EPA Superfund Record of Decision:

Bridgeport Rental and Oil Services Superfund Site Logan Township, New Jersey

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
NEW YORK, NEW YORK

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LIST OF ACRONYMS AND ABBREVIATIONS

AFC – Alternate Final Cover
AOC – Area of Concern
ARAR - Applicable or Relevant and Appropriate Requirement
ASM – Adaptive Site Management
AWQC - Ambient Water Quality Criterion

BCEE – Bis-2 Chloroethyl Ether
BROS – Bridgeport Rental and Oil Services, Inc.
BTC – BROS Technical Committee
BTEX – Benzene, Toluene, Ethylbenzene, Xylene

CD – Consent Decree
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
COC – Chemical of Concern
COPC - Chemical of Potential Concern
COPEC – Chemical of Potential Ecological Concern
CSF - Cancer Slope Factor
CSM - Conceptual Site Model
CT - Central Tendency
CWA - Clean Water Act

DGW – Deep Groundwater
DNAPL – Dense Non-Aqueous Phase Liquid
DOI - Department of Interior
DOT - Department of Transportation

EE/CA - Engineering Evaluation/Cost Analysis
EO - Executive Order
EPA - Environmental Protection Agency
EPC – Exposure Point Concentration
ERA - Ecological Risk Assessment
ESA - Endangered Species Act

FS - Feasibility Study
FWQC - Federal Water Quality Criteria

GRA – General Response Action

HHRA - Human Health Risk Assessment
HI - Hazard Index
HQ - Hazard Quotient

IRIS - Integrated Risk Information System

LNAPL- Light Non-Aqueous Phase Liquid
LTC – Little Timber Creek

LTCS – Little Timber Creek Swamp

MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal
μg/kg - Micrograms per Kilogram (parts per billion)
mg/kg - Milligrams per Kilogram (parts per million)
mg/L – Micrograms per Liter
MNA - Monitored Natural Attenuation

NCP - National Oil and Hazardous Substances Pollution Contingency Plan
NEPA - National Environmental Policy Act
NHPA - National Historic Preservation Act
N.J.A.C. – New Jersey Administrative Code
NJDEP - New Jersey Department of Environmental Protection
NOAA - National Oceanic and Atmospheric Administration
NOAEL - No Observed Adverse Effect Level
NPL - National Priorities List
NRRB - National Remedy Review Board

O&M - Operation and Maintenance

PCB - Polychlorinated Biphenyl
ppb – Part(s) per Billion (ug/Kg or ug/L)
ppm - Part(s) per Million (mg/kg or mg/L)
PRG - Preliminary Remediation Goal
PTZ – Principal Threat Zone

RAO - Remedial Action Objective
RCRA - Resource Conservation and Recovery Act
RfD - Reference Dose
RI - Remedial Investigation
RI/FS - Remedial Investigation and Feasibility Study
RME - Reasonable Maximum Exposure
ROD - Record of Decision

SARA - Superfund Amendments and Reauthorization Act of 1986
SEL – Severe Effects Level
SHS – Soil Hot Spot

TBC – To be considered (criteria)
TCE – Trichloroethene
TRV - Toxicity Reference Value
TSCA - Toxic Substances Control Act

USACE - United States Army Corp of Engineers
USGS - United States Geological Survey
USEPA - United States Environmental Protection Agency
USFWS - United States Fish and Wildlife Service
VOC – Volatile Organic Compound

DECLARATION STATEMENT

Bridgeport Rental and Oil Services

Site Name and Location

The Bridgeport Rental and Oil Services site (commonly referred to as the "BROS" site) is located in Logan Township, Gloucester County, New Jersey, about two miles south of the Delaware River. The Superfund Site Identification Number is NJD053292652. The remedial actions to be conducted under this Record of Decision are designated as Operable Unit 2.

Statement of Basis and Purpose

This second and final planned Record of Decision (ROD) for the BROS site selects a remedy for contaminated soils, shallow and deep groundwater, and wetlands. The first ROD for Operable Unit 1, signed on December 31, 1984, provided for the installation of a public water supply for residents near the site, dismantling of the tank farm and disposal of contaminated tank wastes, and excavation and on-site incineration of contaminated lagoon oils and sediments.

The remedy identified in this document was selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This document explains the factual and legal basis for selecting the remedy for the site. The decisions herein are based on the Administrative Record for the site.

EPA is the lead agency for the BROS site. The New Jersey Department of Environmental Protection (NJDEP), the support agency for site actions, concurs with the selected remedy.

Assessment of the Site

The response actions selected in this ROD are necessary to protect the public health, welfare, and/or the environment from an imminent and substantial endangerment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The first operable unit response actions provided nearby residents with an alternate water supply to prevent the ingestion of contaminated water, eliminated the waste oil lagoon and tank farm as potential sources, and reduced the direct contact risk by placing clean fill on the surface of the site property. This second operable unit provides for the remediation of the groundwater and the more highly contaminated wetland sediments while seeking to address residual source materials in the form of contaminated soils and light non-aqueous phase liquids (LNAPLs). Reduction in the mass of residual contamination in the soils and LNAPLs will aid in the restoration of groundwater and support the overall risk reduction goals for the site.

The selected remedy combines conventional and innovative physical, chemical and biological treatment technologies to manage contaminated groundwater, light non-aqueous phase liquids, soils and sediments. Due to the complexity of the BROS site along with the nature of the innovative remedial technologies, an adaptive phased management approach is considered appropriate to achieve the desired human health and ecological risk management goals. This includes utilization of a number of sequenced or phased remedial technologies and/or program controls with contingency actions if the planned measures are not successful. This prioritized approach will ensure protection of human health throughout the remedial process by reducing the mobility of chemicals of concern from the principal threat areas through their removal, destruction or containment as a first priority. Success will be based on site-specific technology performance criteria.

The remedy for the site includes distinct yet integrated remedial actions organized within the Groundwater and Wetlands categories. Groundwater has been further divided into two major sub-categories to address media or area-specific concerns. The components of the selected remedy are as follows:

GROUNDWATER

- Soil, LNAPL and Shallow Groundwater management through cover and drainage improvements, water budget management (using phytoremediation techniques), bioslurping with steam injection (where warranted), enhanced biodegradation, and institutional controls.

  The drainage improvements will include site regrading, placement of engineered channels and the installation of an alternate cover on the BROS property. Following these actions, limited hot spot soil excavation will be undertaken at the Gaventa Pond seep and Green Acres properties. These hot spots are located just southwest and south of the BROS property boundary, respectively. Next, bioslurping vacuum extraction technology will be employed along the northern portion of the BROS property, centered in two areas with extensive LNAPL in the subsurface. Water budget management will involve the use of phytoremediation. A densely planted stand of trees will regulate water infiltration and evapotranspiration, and promote nutrient movement and biological activity in the subsurface. This will support the biodegradation of site-related chemicals of concern (COCs) in soil and shallow groundwater.

- Deep Groundwater management through extraction and treatment followed by in-situ chemical and biological treatment (with a contingency for hydraulic containment of groundwater contamination).

  Initially, deep groundwater will be extracted in the central and southern portions of the BROS property to remove contaminant mass. This will include pumping groundwater from the principal threat zone (PTZ) or area of highest contaminant concentrations. This will be followed by in-situ chemical oxidation treatment (the subsurface injection of oxidizing compounds) along with groundwater pumping. Pumping during injection will optimize the delivery of treatment chemicals to the zones of concern. The cycle of chemical oxidation treatment with pumping will be repeated as necessary in contaminant concentration rebound areas. The lower threat zone, or area immediately surrounding the PTZ, will undergo bioremediation (the addition of amendments to enhance or accelerate naturally occurring COC degradation mechanisms) following pumping. Areas further downgradient to the southeast will undergo enhanced biodegradation treatment as necessary.

WETLANDS

- Wetland sediment management through excavation, ex-situ treatment and off-site disposal (via landfilling), in-situ treatment with sorptive agents, backfilling and wetland restoration for the more highly contaminated areas, and monitored natural attenuation with institutional controls for the less contaminated wetland areas.

  Sediments from the more highly contaminated area of the wetland just east of the BROS site, designated as the DeManifestis Zone, will be excavated and disposed off-site. Sorptive agents will be applied over the surface of the exposed excavated area. The area will then be backfilled with clean material and the wetland will be restored.

The Groundwater adaptive management approach includes discrete remedial actions and a contingency action. The contingency action involves long-term hydraulic containment pumping of the deep groundwater in place of in-situ chemical and biological treatment. The contingency action will be implemented, at EPA's discretion, if the data from the completed sequential remedial process (i.e., multiple rounds of chemical and biological treatment with pumping of the deep groundwater) indicates that the established remedial goals have not and/or cannot be achieved.

The steam injection component of the preferred remedy is primarily designed to enhance the extraction of the more viscous LNAPL materials in the subsurface. Once mobilized, the LNAPLs will be addressed by the bioslurping technology that will retrieve the LNAPL product at the groundwater/free product interface and the residual soil contamination through vapor extraction.

While applicable or relevant and appropriate requirements (ARARs), to be considered (TBC) criteria and risk-based standards form the basis for site cleanup levels, individual technology performance criteria will be established for each Groundwater cleanup technology. The criteria, which will be developed during both the design and remedial action stages, will be used within the context of the adaptive management approach to evaluate technological performance and determine the need for additional treatment or change-over to other technology components of the selected remedy. These performance criteria for the evaluation of various remedial technologies are to be distinguished from remedial action objectives (RAOs) and preliminary remediation goals (PRGs), sometimes referred to as performance *standards*, which are ARARs and risk-based standards designed to protect human health and the environment. Individual technology performance criteria will be developed to evaluate bioslurping LNAPL recovery rates to trigger the implementation and/or termination of steam injection, and for chemical oxidant injection re-treatment of rebound areas. The magnitude of the steam injection effort will be dependent on the effectiveness of the bioslurping technology.

In addition, institutional controls (ICs) are incorporated into the overall site remedy. The ICs will include:

- Adopting the existing on-property deed restrictions already recorded with the township;
- Maintaining the State of New Jersey groundwater use restrictions (i.e., a Classification Exception Area/Well Restriction Area designation for site-specific areas) until such time that water quality standards are met for the areas of concern; and,
- Developing and implementing vapor intrusion controls for buildings constructed on the site (future use).

The primary objective of the groundwater response action is to restore contaminated shallow and deep groundwater in the Upper Potomac-Raritan-Magothy and Upper Middle Potomac-Raritan-Magothy formations to their classified and beneficial uses as drinking water aquifers. The cleanup goals are federal and state maximum contaminant levels (MCLs).

Other objectives of the remedy are to eliminate LNAPL (with a focus on the more mobile, free phase LNAPL) and reduce soil contaminant levels on the BROS property to the lower of the non-residential (industrial) direct contact cleanup criteria or impact to groundwater soil cleanup levels developed by the State of New Jersey. Off-property soils will be remediated to the lower of state residential direct contact cleanup criteria or the impact to groundwater cleanup criteria. In addition, consistent with NJDEP requirements, free phase LNAPL will be removed to the extent practicable.

Wetland cleanup goals include removal of sediment in Little Timber Creek Swamp with total polychlorinated biphenyl (PCB) levels greater than 10 milligrams per kilogram (mg/kg) and lead greater than 1,000 mg/kg. Despite the implementation of the planned sediment removal and wetland restoration endeavor, some low-level residual sediment contamination may remain at the surface and in the subsurface. However, these low residual levels do not cause human health risks in the wetland to exceed threshold values, and a detail quantification of ecological risk indicates that areas outside the proposed active remediation zone do not pose a risk above threshold levels to relevant ecological receptors.

Public Participation

EPA provided numerous opportunities for public participation and comment during the process leading up to this ROD. These included project update mailings, establishing a 30-day public comment period and conducting a public meeting on the Proposed Plan. The comments received support the remedy selected in this decision document. A summary of the comments and EPA's responses are provided in the Responsiveness Summary attached to this ROD (Part 3, Attachment 1).

Declaration of Statutory Determinations

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 U.S.C. § 9621. It is protective of human health and the environment, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

As selected, the remedy meets a level or standard of control of hazardous substances, pollutants and contaminants which attains the legally applicable or relevant and appropriate requirements under federal and state laws. It will allow for unlimited use of the off-property areas and restricted (or industrial) use of the on-property area. It is recognized, however, that achievement of ARARs on the BROS property may be difficult given the nature of the contamination and the presence of free phase LNAPL. EPA does not rule out the possibility of waiving such requirements at some point in the future if achievement of one or more ARARs proves technically impracticable or another of the criteria set forth in CERCLA Section 121(d)(4) are met. In addition, while reasonable efforts will be made to meet the state requirement for LNAPL treatment or removal when practicable, factors including high viscosity and locations at or below the water table may render complete removal impracticable.

In keeping with the statutory preference for treatment that reduces toxicity, mobility or volume of contaminated media as a principal element, the remedy generally satisfies this preference. Although the remedy will result in a long-term reduction in the mobility and volume of PCBs in the environment, it does not satisfy the statutory preference for treatment of residual PCB-containing soils as a principal element. Treatment of such material prior to off-site disposal (other than stabilization of sediments for handling purposes) would not be cost-effective.

Because the remedy will result in hazardous substances potentially remaining on the site (on-property area) above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be protective of human health and the environment.

ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for the site.

- Findings of the remedial investigation and feasibility reports which support the selected remedy (Section 6.0 – Site Characteristics);
- Chemicals of concern and their respective concentrations (Section 6.2.2.1 – Nature of Contamination);
- Groundwater and land use assumptions employed in the baseline risk assessments and ROD (Section 7.1 – Current and Reasonably Anticipated Future Land Use);

- Site risks under baseline conditions and future use scenarios (Section 8.0 - Summary of Site Risks);
- Cleanup goals for site-related volatile organic, semi-volatile organic and PCB contaminants in groundwater and soil (Section 9.1 – Remedial Action Objectives/ Preliminary Remediation Goals);
- Cleanup goals for LNAPLs (Section 9.1 – Remedial Action Objectives/Preliminary Remediation Goals);
- Cleanup goals for PCBs and lead in sediments (Section 9.1 – Remedial Action Objectives/Preliminary Remediation Goals);
- Estimated capital, annual operation and maintenance, and total present worth costs along with the time to construct the remedial alternatives (Section 11.7 – Cost and Section 13.2 – Summary of Estimated Costs of the Selected Remedy);
- How the selected remedy addresses groundwater and LNAPLs that constitute principal threats (Section 12.0 – Principal Threat Wastes); and,
- Key factors that led to selecting the remedy (*i.e.*, how the selected remedy provides the best balance of trade-offs with respect to the balancing and modifying criteria) (Section 13.0 - Selected Remedy).

Authorizing Signature

[signature] 9/27/06

George Pavlou, Director
Emergency & Remedial Response Division

Date

PART 2: THE DECISION SUMMARY

1. SITE NAME, LOCATION AND BRIEF DESCRIPTION

1.1 Site Name

This federal Superfund Record of Decision (ROD) describes the remedial actions to address the risks to human health and the environment associated with multimedia contamination at the Bridgeport Rental and Oil Services (BROS) site. The United States Environmental Protection Agency (EPA) identification number for the site is NJD053292652.

1.2 Site Location

The site is located in Logan Township, Gloucester County, New Jersey, approximately one mile east of the town of Bridgeport and two miles south of the Delaware River.

The BROS property borders Cedar Swamp Road and U.S. Route 130 along the northern edge, Little Timber Creek Swamp (LTCS) and Little Timber Creek (LTC) along its eastern perimeter, two man-made ponds (Swindell and Gaventa Ponds) created by former sand mining operations along the southern and southwestern boundary, and an agricultural plot used for commercial farming (field and/or orchard crops) along the western boundary. A large tidally influenced wetland known as Cedar Swamp lies north of U.S Route 130, and Interstate 295 runs in a northeast/southwest direction just south of the man-made ponds.

Much of the land surrounding the BROS property is wetland/swamp with intermittent surface water flowing diffusely northward to the Delaware River. A vehicle repair shop, which was formerly used as an industrial equipment storage yard, lies just north of the site across Cedar Swamp Road, and three homes are located approximately 800 feet north of the site. A site location map is provided as Figure 1-1.

1.3 Brief Description

The site includes both on-property (the BROS property itself) and off-property areas where contamination has come to be located. The on-property area includes a 30-acre parcel of land, formerly used as a waste oil storage and recovery facility. The off-property areas encompass approximately 500 acres of upland area, open water, emergent and forested wetland surrounding the property, and a significant land mass hydrogeologically downgradient where contaminated groundwater has come to be located.

Currently, the BROS property is a gently undulating plot of land with an upland grass habitat cover. During its operational period, the property housed a tank farm consisting of approximately 100 tanks and process vessels, drums, tank trucks, as well as the sites's most prominent feature, a 13-acre waste oil and wastewater lagoon. Hazardous substances emanating from on-property sources at the site have come to be located in the Little Timber Creek Swamp and Cedar Swamp which lie east and north of the site. Free phase and/or residual light non-aqueous phase liquid (LNAPL) are found both on-property and at select off-property areas immediately adjacent to the property. Groundwater contamination attributed to the site is found in the upper two aquifer (water bearing strata) zones beneath the site, and has migrated some 2400 feet to the southeast in the lower aquifer, which is commonly termed the Upper Middle Potomac-Raritan-Magothy (UMPRM) formation.

Extensive remedial work has been completed at the site in connection with the 1984 ROD and through subsequent EPA removal and remedial program activities. By 1997, the tank farm was demobilized, and the 13-acre waste oil lagoon had been excavated and backfilled. Backfill material included clean fill and ash generated from the on-site incineration process conducted as part of the Phase 1 lagoon remediation activity. The predominant sources of contamination remaining after the lagoon cleanup include:

- A zone of highly contaminated groundwater in the UMPRM aquifer immediately beneath the property;
- The downgradient contaminant plume associated with former releases from the lagoon and ongoing releases from the highly contaminated groundwater beneath the on-property area;
- Free phase and residual light non-aqueous phase liquid (LNAPL) both above, at and below the water table;
- Contaminated wetland sediments; and,
- Localized areas with contaminated soil in the subsurface.

Groundwater contamination in the shallow/surficial aquifer, termed the Upper Potomac-Raritan-Magothy (UPRM) formation also exists. This contamination is most significant in areas where LNAPL is present on the BROS property area.

1.4 Lead Agency/Funding Information

The United States Environmental Protection Agency is the lead governmental agency for this project. The New Jersey Department of Environmental Protection (NJDEP), which is the support agency for this project, concurs with the selected remedy. In addition, no new information has been brought to light or offered by the community (during the public comment period) which suggested a change to the preferred remedy described in the Proposed Plan.

The remedial actions for Groundwater Work (including subcategories described as soils, light non-aqueous phase liquids, shallow groundwater and deep groundwater) and Wetlands Work selected by this document are to be funded in accordance with a 1997 settlement. This includes contributions by federal, state and private potential responsible parties.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Site History

The BROS site began as a sand and gravel mining operation in the mid-to-late 1940's. Dredging from an open pit was the primary mechanism for sand recovery. The sand was mined to a depth of approximately 25 feet. During the 1950's and 1960's, the surface area of the main dredged area formed a network of lagoons which filled with groundwater and precipitation.

A waste oil storage and recovery and tank leasing operation was began during the late 1960's and continued until 1981, when a court order stopped all waste handling activities. A tank farm (a.k.a. the production area) consisting of tanks and process vessels was constructed, and at some point after the initial mining operation was discontinued, waste oils and drums were disposed in the on-site lagoon(s). Over time, the main lagoon brimmed with chemical wastes and expanded to 13 acres. At the height of the operation, the tank farm included 100 tanks and vessels.

On one occasion in the early 1970's, the waste oil lagoon overflowed, spreading contaminants into the adjacent LTCS and LTC. Approximately three acres of the LTCS were significantly impacted. This overflow event caused extensive damage to plant life. Significant quantities of volatile organic compounds and metals were found in groundwater surrounding the site as a result of leakage from the former lagoon and production area, and overflows of lagoon materials into the wetland. In 1982 and again in 1983, EPA pumped out and treated aqueous waste from the lagoon to prevent another lagoon overflow.

The site was added to the Superfund National Priorities List (NPL) in 1983. An EPA Record of Decision was finalized in 1984 which called for the remediation of the waste oil lagoon, removal of the tank farm, and the installation of an alternative water supply to 15 nearby homes.

The alternate water supply work was undertaken during 1985, and the award to demolish the tank farm and dispose of the associated wastes was issued in September 1986. More than 350,000 gallons of oils, sludges and other hazardous liquids were removed during the tank farm remediation effort. As part of this work, an aqueous wastewater treatment system was constructed.

Efforts to address the lagoon wastes began in earnest in March 1989. After a few years of detailed investigation and evaluation, including trial burns of the lagoon waste material, remedial activities were initiated in November 1991. The lagoon cleanup involved the on-site thermal destruction (incineration) of more than 172,000 tons of hazardous wastes and the treatment of almost 200 million gallons of wastewater. The lagoon was backfilled with sand, lime-treated ash, stone and clean topsoil to grade. This work was completed by 1997.

The Phase 2 Remedial Investigation and Feasibility Study (RI/FS), which began in 1998, was conducted with the understanding that the primary sources of contamination had to a significant degree been removed. Consequently, the mass loading of chemicals of potential concern to exposure pathways has been decreased substantially. The scope of the RI/FS was expanded on a number of occasions due to the presence of previously unidentified wastes and the large areal extent of contamination.

During the Phase 2 RI/FS field work, two areas with debris and drums were encountered along with a number of areas exhibiting the presence of LNAPLs. To address the two debris/drum areas, EPA undertook a removal activity. Between September 2001 and December 2002, 350 drums, eight cylinders and approximately 4,000 cubic yards of soil were excavated and transported off-site for disposal.

At that time, EPA also conducted investigatory activities to better define the nature and extent of the LNAPL problem. Upon evaluation of the investigation data, 15 oil recovery trenches were installed as an interim measure to control the potential release of LNAPLs. Working in conjunction with the EPA's Environmental Response Team, five passive oil recovery systems were installed in 2002. The passive oil recovery system continues to operate and, to date, over 11,000 gallons of contaminated LNAPL have been recovered and shipped off-site for treatment/disposal.

The draft Phase 2 RI was submitted in May 2004 and the FS was submitted in November 2005. A bench-scale treatability study to determine the feasibility of chemical and biological treatment of groundwater was conducted as part of the Phase 2 RI/FS work. Based on detailed comments by EPA, revised RI/FS reports were submitted in June 2006. EPA has reviewed and approved the RI/FS reports and other documents which support the alternatives described herein.

2.2 Enforcement Activities

NJDEP initiated several enforcement actions against the owners of the BROS operation during the five-year period from 1975 to 1980. In response to the enforcement actions, the property owners proposed and attempted various cleanup efforts. EPA, however, did not consider the cleanup efforts to be successful. This led to a court order prohibiting commercial waste handling activities at the site. Subsequently, a large group of federal, state and private parties agreed to work cooperatively, to pay for and conduct the investigatory and cleanup activities related to the groundwater and wetlands work. This settlement agreement was embodied in a Consent Decree (CD) entered by the New Jersey Federal District Court on January 17, 1997.

The Settling Defendants (SDs) formed a technical committee, hereafter known as the BROS Technical Committee (BTC). Under EPA oversight, the BTC prepared the Phase 2 RI/FS report. The RI/FS describes the nature and extent of site-related contamination, noted available site cleanup goals, and identifies and provides cost information for the remedial action alternatives.

At the time of settlement, certain institutional controls (ICs) were established for the BROS property. Three perpetual deeds were recorded with the Clerk of Gloucester County on October 28, 1997. The ICs included the following declaration of restrictive covenants:

1. The Premises shall never be used for residential purposes or for the conduct of any retail business (including, without limitation, stores or restaurants). Instead, the Premises shall only be use for commercial or industrial purposes, which use shall not include schools, camps, or day care uses.

2. All subsurface activities on the Premises, including but not limited to the placement, installation, or repair of subsurface utilities or underground storage tanks, are prohibited without prior written approval of EPA and NJDEP.

3. The installation or use of any groundwater wells at the Premises, whether for potable use or otherwise, whether into deep or shallow aquifers, is prohibited without prior written approval of EPA and NJDEP.

These deed restrictions run with the land and continue in perpetuity.

3. COMMUNITY/PUBLIC PARTICIPATION

Community/public participation activities to support selection of the remedy were conducted in accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and Section 300.430(f)(3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Record of Decision formalizes the remedy selection for the site and summarizes information which can be found in greater detail in the RI/FS reports and other documents contained in the Administrative Record for the site.

The cleanup drew considerable public attention during the Phase 1 work due to the construction and operation of an on-site incinerator to treat materials from the waste oil lagoon. The use of this technology raised concern by the community at the time, which feared that EPA would continue to utilize the incinerator for the cleanup of other Superfund sites. It was important to the community for the incineration unit to be removed after completion of the lagoon cleanup. The Phase 1 work was very successful and reduced the waste quantity by an estimated 90 percent, thereby reducing human health and ecological risks associated with the site. At the conclusion of the Phase 1 effort, the incinerator was demobilized.

While an active community involvement program was conducted during the Phase 1 activities, there has been less community interest during the preparation of the Phase 2 RI/FS. To provide the maximum opportunity for all interested parties to participate in the project, EPA provided for community/public participation and kept citizens, government officials, and environmental groups aware of each step in the RI/FS process through personal communications, distributing fact sheets, holding a public availability session, and posting a site fact sheet on the internet (EPA Superfund website).

The SDs, with EPA oversight, also participated in the community relations program for the site. During the RI/FS process, the SDs drafted, and upon approval from EPA, distributed nine project updates, performed well surveys on area homes, and provided access for site activities. Also, with EPA concurrence, the SDs were instrumental in turning an adjacent parcel of land over to the New Jersey Green Acres program. EPA established and maintained an Informational Repository at the Logan Township Municipal Building (125 Main Street, Bridgeport, New Jersey 08014) (the local repository) and placed copies of the Phase 2 RI/FS reports and other pertinent documents in the Superfund file room in EPA's New York City office. A notice of availability of the Administrative Record documents, along with an announcement of a public meeting was published in the Gloucester County Times and the Courier-Post newspapers.

Township governmental officials were briefed periodically during the RI/FS process. Formal presentations to government officials regarding the overall findings of the RI and preferred remedy were conducted in March and early July 2006. The Proposed Plan was released for public comment on July 12, 2006. A 30-day comment period ending August 11 was announced in the Proposed Plan. During the comment period, a public meeting was held on July 25, 2006. Approximately 40 people attended the public meeting. At the public meeting, EPA presented information and answered questions about completed site remedial actions, the findings of the Phase 2 remedial investigation, and the preferred Groundwater and Wetland remedial actions.

Oral comments from local citizens were received during the meeting. EPA's responses to comments offered at the meeting are included in the Responsiveness Summary, which is part of this Record of Decision (see Part 3, Attachment 1). In addition to oral comments received at the public meeting. EPA received a few written comments during the comment period. These included one letter from a concerned resident, a letter from a grass roots non-profit environmental conservation group and an e-mail from a representative of local government (the Logan Township Council). Responses to these written concerns are also contained within the Responsiveness Summary. None of the comments remedy was critical or substantive enough to require a change in the preferred remedy.

On July 31, 2006, EPA held an informal meeting with representatives of the BROS Technical Committee, representing the Settling Defendants, to discuss the proposed remedy. The outcome of that meeting was that no disputes or major disagreements exist between EPA and the BTC regarding the proposed remedy.

The State of New Jersey has been consulted and concurs with the selected remedy.

4. SCOPE AND ROLE OF RESPONSE ACTION

As with many sites, the problems at the BROS site are complex. Consequently, EPA organized the work in two remedial phases or operable units (OUs):

- Operable Unit 1: The on-property tank farm, contaminated wastewater, oily liquids, drums and soil/sludge/sediment associated with the 13-acre lagoon, and potentially impacted private residential groundwater supplies in the area immediately north of the BROS property.
- Operable Unit 2: Groundwater (includes post-lagoon cleanup residuals) and Wetlands.

EPA selected the remedy for OU 1 in a ROD signed in December 1984. The OU 1 remedy, including excavation and on-site incineration of the waste lagoon, dismantling of the tank farm and providing a public water supply to select residences was completed by 1997.

The second operable unit, the subject of this ROD, addresses the contamination of groundwater, the source areas impacting groundwater, and the wetland impacted by historical releases from the former lagoon. The primary objective of this response action is to address the risks to human health and the environment associated with site-related contaminated groundwater, LNAPL, sediments and soil.

Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), inorganic compounds and polychlorinated biphenyls (PCBs) are present in elevated concentrations in different media in and about the site. The contamination is present in both localized hot spots (i.e., contaminated LNAPL and soil areas) and larger areas (i.e., the contaminated deep groundwater plume). The remedy employs in-situ treatment, pumping, innovative extraction techniques, and excavation as a means to address the various contaminated media.

As a starting point, the selected remedy takes into consideration that source control measures were implemented on-property for the tank farm, the 13-acre waste lagoon, a drum disposal east of the former lagoon and, to some extent, the LNAPL near the Pepper Building and north-central part of the on-property area (near Monitoring Well 32). The RI reports that some post-EPA Phase 1 remediation residual contamination exists in the area of the former lagoon. This residual

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contamination for the most part appears to be material present beneath the former excavation and in areas adjacent to excavated areas. It is also recognized that LNAPL and residual LNAPL exist primarily in areas west and north of the former lagoon footprint (the former lagoon footprint area is outlined in Attachment F to the CD, primarily the area excavated during the lagoon remediation).

This second operable unit represents the final response action for the BROS site and addresses the principal threats at the site through the treatment of groundwater and removal of LNAPL.

5. PEER REVIEW

The preferred remedy was evaluated by EPA's National Remedy Review Board (NRRB). The board functions as an internal peer review group and includes senior Agency staff with a broad range of technical expertise across the country. It was established to review complex remedies to ensure they are both cost effective and nationally consistent. The board's comments regarding the preferred remedy and the Region's responses are included in the Administrative Record file. In general, the NRRB agreed with the Region's preferred approach to address the remaining contamination at the site.

6. SITE CHARACTERISTICS

6.1 Conceptual Site Model

The conceptual site model(s) for the BROS site describes the source to receptor routes in simple terms and identifies the major contamination sources, contaminant release mechanisms, secondary sources, exposure pathways and receptors of concern. Due to the complexity of this site, the depiction of pathway exposures is broken down into Soil, LNAPL, Shallow Groundwater, Deep Groundwater and Wetland areas of concern. The design of field investigations and human and ecological risk assessments completed as part of the Phase 2 RI/FS reflect the basic components of the conceptual site model. Figure 6-1 provides a site map depicting the general location of contaminant source areas. Figures 6-2, 6-3 and 6-4 provide the shallow groundwater, deep groundwater and wetland extent of contamination maps, respectively. More detailed figures and plates regarding the extent and types of multimedia contamination and media source to receptor models are provided in the RI/FS documents.

In the overall conceptual site model, the primary source of contamination was the uncontrolled release from the former 13-acre waste oil lagoon. LNAPL, PCBs, dissolved VOCs, SVOCs and metals were deposited directly into the lagoon and then migrated to other areas through various release mechanisms including downward leakage from the lagoon into the underlying aquifer, lateral seepage away from the lagoon into adjacent and underlying soils, and direct discharge via overland flow to Little Timber Creek and Cedar Swamp. By 1997, the 13-acre waste oil lagoon had been excavated and backfilled. The greatest impact to LTC and Cedar Swamp was a single major overflow event caused by dike failure during a storm event in 1972.

In addition to the lagoon, contamination was released into the environment through tank and piping leakage and spills in the former production area and miscellaneous areas of dumping or spillage surrounding the former lagoon. While the tank farm and piping were removed during the first phase of remedial activities, contaminated material in the subsurface was not addressed in a significant way in areas outside the lagoon area footprint.

The post-lagoon/tank farm remediation setting includes the presence of free phase and residual LNAPL, soil contamination, and shallow and deep groundwater contamination in a number of areas about the site. These remaining/residual/secondary sources continue to impact the environment and are considered the ongoing concerns being addressed within this ROD. A brief description of the Phase 2 work conceptual models by media follows.

Soil Model (including LNAPL contamination)

The conceptual model for soils depicts eight hot spot areas where contamination remains. The hot spots serve as pockets of source material which can leach/release contaminants to the groundwater system or are potential direct human contact and/or vapor intrusion exposure points (exposure scenarios include activities such as utility worker exposure to subsurface soil and VOC vapor release into future structures constructed on-property).

Three of the hot spots are areas where LNAPL is present in free phase and/or residual forms. The remaining areas include a seep on the west side of the site which impacts Gaventa Pond, three soil areas and a debris/fill area along the eastern flank of the former lagoon. Other less contaminated areas are present throughout the on-property area. The debris/fill area consisted of two distinct areas where approximately 300 drums and associated contaminated soils were present. The drums and soil were removed by EPA in 2001-2002. There is limited current potential human exposure/access to all the contaminated areas, due to in-place ICs and the presence of clean fill at the land surface.

Areas in the northeastern portion of the on-property area are underlain by a mix of native materials and fill. The fill contains such things as timbers, construction debris and miscellaneous auto parts. In areas where a significant amount of this fill material is present, the subsurface condition presents different hydraulic characteristics from the natural material deposited beneath the site. This further convolutes the presence and movement of contaminants in the subsurface. There is also a potential for buried metal objects, including drums, in select areas outside the former lagoon area but within the main on-property boundary.

Shallow Groundwater Model

The shallow groundwater model establishes the former tank farm area (near Monitoring Well 32) and the Pepper Building area (northwest corner of the on-property area) as the primary areas of concern. These locations are sometimes referred to as fingers or veins of the former lagoon. The primary concern is migration of contaminated shallow groundwater to the deeper aquifer. Additional concerns are migration of contaminated groundwater within the shallow system to off-property areas and discharge of contaminated groundwater to adjacent surface water bodies. In the past and currently, the trend in groundwater flow is downward from the shallow groundwater to the deep groundwater system. The contaminants in shallow groundwater include chlorinated VOCs, BTEX compounds (benzene, toluene, ethylbenzene and xylene) and bis (2-chloroethyl) ether (BCEE).

The shallow groundwater system, in itself, is complicated by the presence of less permeable clay, silt and peat zones, and fill and debris with varying degrees of contamination. Based on these complications, the RI divided the shallow groundwater system into two major areas of concern. The more surficial of the two zones exhibits higher levels of contamination. The lower of the two zones contains groundwater with reduced concentration levels. The reductions in concentrations in this zone indicate that the Phase 1 lagoon remediation had a significant positive impact on the overall water quality at the site. While the lower of the two shallow zones shows reduced contaminant levels, since the trend in groundwater flow remains downward, it remains necessary to consider shallow groundwater a source which needs to be addressed within this ROD.

As represented by benzene distribution in the shallow groundwater (Figure 6-2), some off-property areas immediately adjacent to the BROS property boundary also exhibit shallow groundwater contamination. In addition, the main on-property (former lagoon) area, in and about Monitoring Well (MW) 26, also exhibits shallow groundwater contamination. In fact, the area between MW 32 and MW 26 exhibits the highest concentrations of contaminants in shallow groundwater and also appears to be the zone of highest shallow and deep aquifer interconnection (where shallow contamination historically migrated and still has the potential to migrate downward to the deeper aquifer).

The groundwater in the shallow aquifer is classified as Class II – Ground Water for Potable Water Supply in accordance with the New Jersey Code (N.J.A.C 7:9-6 Ground Water Quality Standards). Potentially completed pathways which need addressing include worker exposure and future exposure to vapors (volatilized from groundwater) if buildings were constructed on the BROS property. Direct exposure to shallow groundwater (via ingestion, dermal contact and inhalation) is also of concern. While groundwater restoration is the goal, institutional controls are in place to restrict the use of shallow groundwater, thereby aiding in the management of site-related risk.

Deep Groundwater Model

The Deep Groundwater model notes the presence of a highly contaminated zone in the UMPRM. This zone also exhibits low pH. The low pH is attributed to past oil reclamation activities which included the use of sulfuric acid. It appears that the acid wastes were deposited into the lagoon, migrated downward and settled at the bottom of the UMPRM aquifer in a depression in the confining clay unit. This highly contaminated mass serves as a principal threat zone. It continues to release mobile contamination into the groundwater system, which migrates off-site in a southeasterly direction. Direct exposure to deep groundwater via ingestion, dermal contact and inhalation is an area of concern. Cleanup of downgradient groundwater cannot be successful if this principal threat zone is not addressed.

Wetland Sediment/Surface Water Model

The Wetland model depicts the portions of LTC and Cedar Swamp which were impacted by releases from the former lagoon. A storm event which allowed oily liquids to overflow directly into the wetland and creek accounts for a majority of the pollution. The boundary for the areas of concern is depicted primarily by the extent of lead and PCB concentrations in sediments, although BTEX (benzene, toluene, ethylbenzene and xylene) compounds are also a concern. While limited in use, occasional use by hunters, fisherman and trespassers is the main exposure pathway of concern. Surface water is impacted in areas exhibiting high sediment values.

Once introduced into the LTCS wetland system, the oily liquids saturated the highly organic sediment and vegetation mat. The wetlands have a moderate to high retentive characteristic which tends to hold the contaminated sediment in-place. Surface water flow within and away from LTC and LTCS is limited due to the current physical characteristics of the wetland topography and seasonal variations in available water. The LTC drainage pattern has little in the way of defined channels and flowing water is primarily observed only near the Route 130 culvert. During storm event conditions, contaminants migrated off-site to their current locations. Remediating the areas with the highest sediment contaminant concentrations will have the biggest impact on reducing environmental risks associated with the wetlands.

There is no surface water exchange between Swindell and Gaventa Ponds. There is limited surface water flow between Swindell Pond and LTCS. During periods of significant runoff following dry periods, some surface water flow from LTCS to Swindell Pond was observed. Nevertheless, metal concentrations in filtered and unfiltered surface water samples were low, indicating negligible sediment transport between Swindell Pond and LTCS.

The northeast corner of Gaventa Pond is known as the seep area. Some contaminated sediment exists in this area. The source of this contamination is believed to be leakage from the former lagoon and a discharge line from the BROS property which terminated in the corner of the pond. Recent testing of surface water quality in Gaventa Pond indicated that the water meets State of New Jersey Surface Water Quality Standards. Both ponds behave as surface water storage features which recharge the underlying aquifer.

Additional information on the human and ecological receptor populations is provided in the Summary of Site Risks section of this document.

6.2 Results of the Remedial Investigation

A brief summary of RI/FS findings is provided below. More detailed information can be found in the RI/FS and associated documents.

6.2.1 Site Overview

The BROS site general area, for the most part, is comprised of grassed upland areas of little topographic relief, which are bisected by Delaware River tributaries and their associated wetland borders. In fact, open water and wetland areas comprise over 50 percent of the land use for the immediate area. One of these tributaries, Little Timber Creek and its associated wetlands, are adjacent to the northeastern side of the BROS property. Moss Branch, another Delaware tributary and its associated wetland areas, lies just beyond the agricultural field to the west. The Chemical Leaman NPL site is located approximately 1600 feet southwest of the site, just on the other side of Moss Branch. Many of the remaining upland areas are in agricultural use and a few residential properties are also present off-property, but within the site boundary.

Other features of the BROS property include a gravel driveway and parking area, a cinder block structure known as the Pepper Building which was formerly used as a warehouse, two office trailers, and a stone and earthen road which led to the former wastewater treatment plant. The treatment plant, used during the lagoon remediation, was demobilized/dismantled in the Spring of 2005. A number of small sheds used in the ongoing EPA-managed LNAPL recovery operation are also present on the property.

The climate is typical of the Middle Atlantic States with an average annual temperature of 55.8 degrees fahrenheit. The study area receives about 42.8 inches of rainfall each year.

6.2.1.1 Topography and Surface Water Drainage

Site elevations range from near sea level to approximately 15 feet above mean sea level. The southeast to northwest trending LTC and two man-made former sand mining ponds are present at the site. Natural surface water drainage patterns have been altered by Routes 130 and 295.

As a result of remedial actions completed at the site, the on-property area is flat to gently undulating. The former lagoon area was capped with clean finer-grained material, topsoil and grass and graded to promote drainage. Some land settling in the former lagoon remediation area (to be addressed by the Soil/LNAPL/Shallow Groundwater remedy) has created low spots at the surface where water collects after storm events.

Surface water drainage from the eastern portion of the site, and to which overflow from the former lagoon historically discharged, is directed to Little Timber Creek and Little Timber Creek Swamp. Swindell Pond and Gaventa Pond receive a limited amount of surface runoff from the south and west sides of the property, respectively. Cedar Swamp receives discharge from the north side of the property and LTC and LTC swamp. LTC flows through LTCS and Cedar Swamp prior to discharging to the Delaware River.

LTC is an intermittent stream south of Route 130 that does not have a defined channel east and north of the BROS property. Flow within and from LTC is highly dependent on seasonal conditions and precipitation events. Monitoring and dye flow/movement tests conducted during the RI indicated the existence of some preferential flow paths in the swamp, but the general braided nature of the area creates a generally diffuse flow pattern between Route 295 and Cedar Swamp. This diffuse pattern limits the flow of water from the site area.

Seasonally, there are periods when no standing water or stream flow is present in LTC/LTCS. Some interconnection between LTC/LTCS and Swindell Pond has also been documented. While Cedar Swamp is tidal, there is a tide gate which separates it from LTC in the area of the site.

During the RI activities, both jurisdictional and non-jurisdictional wetlands were identified and mapped. At total of seven jurisdictional wetlands were identified on-site. These include the areas of LTCS and Cedar Swamp which were investigated to determine impacts from past BROS releases. During investigations, it was observed that LTC has a relationship with Swindell Pond. Based on the data, surface water will flow into Swindell Pond during periods of abundant runoff that follow extended dry periods. Swindell Pond acts as a storage area during these high flow periods and may serve to recharge the underlying aquifer. During winter and spring, some flux from Swindell Pond to the wetland was observed.

Recharge to the shallow aquifer from LTC seems to be lower than for the regional reference station. This may be attributable to the low permeability and specific yield of the shallow aquifer units within the LTC drainage basin which also results in increased surface water runoff. Also, based on observed downward heads, there appears to be a significant component of infiltration to deep recharge rather than local discharge as stream base flow.

6.2.1.2 Geology/Hydrogeology

The entire site overlies unconsolidated strata of the New Jersey Coastal Plain physiographic province. Regionally, the strata consist of a southeastward dipping wedge of sands, silts and clay. For the purpose of investigating and evaluating the vertical and horizontal extent of contamination in groundwater, the hydrogeologic units underlying the site have been identified. The two uppermost aquifers, known as the Upper Potomac-Raritan- Magothy and the Upper Middle Potomac- Raritan-Magothy were impacted by site activities. Sampling of the next deeper aquifer, early in the investigation process, indicated that it had not been impacted by BROS constituents.

The UPRM is the water table aquifer at the site. It consists of three hydraulically connected stratigraphic units. The units range in thickness from 10 feet below the former lagoon area, to greater than 100 feet downgradient near the terminus of the deep groundwater plume. Groundwater levels in the UPRM vary seasonally, but are typically around 4 to 5 feet above mean sea level (about10 feet below the land surface) in the middle of the BROS property and within a few feet of, or at the land surface in wetland areas which border the property.

A 15-foot confining layer/unit underlies the UPRM in the vicinity of the BROS property. The confining unit is not continuous throughout the property due to local stratigraphic variation and impacts from prior sand mining operations. A predominantly downward head from the UPRM to the UMPRM allowed the flow of contaminants from the upper aquifer to the next lower aquifer.

The UMPRM ranges in thickness from 30 to 60 feet. It is characterized by moderately to well-sorted sands with minor clay interbeds of limited extent. A basal sandy gravel sequence has been observed in the vicinity of the BROS site and is important in regard to chemical of concern (COC) transport. Moving in a southeasterly direction away from the property, the contamination tends to be confined to this more permeable gravel zone at the bottom of the UMRPM. Southeast of the BROS property, aquifer zones above this basal unit are relatively free of BROS constituents.

Groundwater flow in the shallow UPRM aquifer exhibits a radial pattern (i.e., flow in all directions) away from the property, centered about a high in the west central portion. There is some seasonal variation to water levels and the flow is impacted by precipitation events. Overall, the primary direction of shallow flow is towards LTC (to the northeast).

Groundwater flow in the UMPRM aquifer is towards the southeast. The site-related contamination plume extends some 2400 feet from the southeastern extent of the property boundary.

During the lagoon operations, contamination migrated downward from the UPRM to the UMPRM, predominantly near the southeastern quadrant of the property. Contaminated groundwater continued its downward migration (due to advective flow within the aquifer system and the physical/geochemical characteristics of the contaminated water) until reaching the basal gravel zone of the UMPRM. The contamination then migrated in a southeasterly direction off the BROS property. The southeast component of flow conforms to the direction of regional flow and is also the down dip (direction that the strata or layers of earth materials trend structurally) direction for the local strata.

Cross-sectional analysis of the site geology indicates that many clay and/or lenses of finer-grained strata are present beneath the site. This further complicates the movement of groundwater and contaminants in the subsurface. The data suggests that in the central to southeastern part of the site, the geology has played an important factor in allowing contaminants to migrate from the upper aquifer to the middle aquifer through gaps in the clay and finer-grained strata lenses. It is suggested that the UPRM and UMPRM are most connected in this area. This may also be described as an aquifer interconnection or hole in the confining unit between the UPRM and UMPRM aquifers. This interconnection along with a downward flow component allowed for more dense acidic waters to migrate downward prior to leaving the site along the southeast-flowing regional trend.

A clay confining unit is present between the bottom of the UMPRM and the Lower Middle Potomac-Raritan-Magothy aquifer. The bowl-shaped geometry of this clay unit immediately beneath the BROS property appears to have an impact on the rate of release of contaminants. This depression provides some structural control on the flow of groundwater, whereby the more highly contaminated material (in the bowl) slowly disperses due to lower flow conditions within the depression from the overlying strata.

The first operable unit (or OU-1) lagoon remedial action resulted in a noticeably cleaner groundwater zone beneath the current areas of residual source material, but above the deeper contamination at the base of the UMPRM. Detailed groundwater flow and modeling information is provided in the RI/FS reports.

The main source of potable water in the area is groundwater. The sources for groundwater are primarily individual private wells, but efforts are underway to expand the public water supply infrastructure. Residential well sampling conducted in the area indicated that BROS constituents are not currently impacting any domestic private or public supply wells. To ensure that this remains the case, a Classification Exception Area/Well Restriction Area (CEA/WRA -- an institutional control mechanism administered through the State of New Jersey) has been established. The CEA/WRA essentially prohibits the installation of wells within the areas impacted by the BROS plume. The CEA/WRA may be modified in the future based on the success of the proposed remedial actions.

An extensive array of monitoring wells has been installed, samples analyzed, and aquifer testing completed to determine the horizontal and vertical extent of the groundwater plume, its chemical constituents and flow patterns. Discrete vertical sampling/profiling was accomplished through the use of screened auger sampling techniques to evaluate the three dimensional extent of contamination, thereby ensuring contaminated zones were not missed.

One focus of the Phase 2 RI//FS was to identify the potential for secondary (post-waste oil lagoon) sources of contamination to impact the groundwater system. In that regard, two significant or principal threats to groundwater have been noted. These include the dense residuals residing at the base of the UMPRM aquifer beneath the site and free phase/residual LNAPL found both floating on the water table, above the water table and below the water table. Section 12 – Principal Threat Wastes, contains addition information on these areas.

6.2.1.3 Wetlands/Floodplain

Wetlands

Both federal and state freshwater wetlands exist throughout the region. Wetland areas which were delineated for possible investigation comprised approximately 359 acres. Soil Conservation Service Soil Surveys, U.S. Fish and Wildlife maps and United States Geological Survey data were reviewed during the evaluation of wetlands. Four major wetland areas were delineated: in Cedar Swamp just north of Route 44; the area just east of Route 44 and Route 130; the BROS property and adjacent areas; and south of Route 295. The wetland areas for the most part were considered to be palustrine forested, broad leave deciduous wetlands and palustrine scrub/shrub, broad leave deciduous wetlands. Two laucustrine open water areas currently exist on-site as Gaventa and Swindell Ponds.

A federal wetland identification and delineation for this project was performed in accordance with the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Manual) (Federal Interagency Committee 1989). This was completed to identify which Phase 2 remedial activities would be performed in wetland areas and therefore require permit equivalencies. A total of eight areas were identified. This included three jurisdictional areas, one reference area and four problem wetland areas.

The jurisdictional wetlands in the immediate area of the site were identified in March 1999. These included the following areas which comprise about 35 acres of land:

- Wetland 1 - The portion of Little Timber Creek Swamp between I-295 and Route 130. Soils in LTC were consistent with the muck series; however, a six-inch clay lens separated muck and peat layers in portions of the wetland.
- Wetland 5 - The portion of LTC between Route 130 and Cedar Swamp Road. The majority of soils in this wetland were muck, with the edges grading to sandier, dryer soils.
- Wetland 6 - A portion of Cedar Swamp north of County Route 44. The majority of this wetland exhibited muck soil with the eastern portion grading into sandy soils.

In addition, a number of small wetland areas were created by human activities. At BROS, these include three small wetland areas located in the southeast corner of the BROS property between the former lagoon and the shore of Swindell Pond, and one along the northern fenceline. These areas are a result of prior mining operations and overlie an area which was covered with clean fill during on-property remedial activities.

Floodplains

Prior investigations indicate that much of the site lies between the limits of the 100-year and 500-year floods, or certain areas subject to 100-year flooding with average depths of less than one foot or where the contributing drainage area is less than one square mile, or areas protected by levees for the base flood. The impact on these areas during remedial actions will be considered and factored into the design of remedial actions for the site. Select areas which are within the 100-year flood plain will be screened for applicability with New Jersey technical requirements for Stream Encroachment and other flood hazard area rules and regulations. The Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (FEMA) were the primary source for this information.

6.2.1.4 Cultural Resources

Phase 1A and 1B Cultural Resources Assessments were conducted in order to initiate substantive compliance with Section 106 of the National Historic Preservation Act with respect to the selected remedy. Five zones of cultural interest, including a potential prehistoric occupation area northeast of the project area, two areas around the Lock Farmstead where there could be early 19th century activities, a small area east of Interstate Route 295, and the bluff area on the western side of the Keller Farmstead were identified. While these areas were considered zones of archaeological sensitivity, none appear to be located in areas which will be impacted by the proposed remedial actions. During the remedial design stage, if it is determined that planned remedial actions will impact the area, further cultural resource investigations will be completed.

6.2.2 Summary of Sampling Results

The nature and extent of contamination as defined through investigations conducted to complete the RI and FS, along with findings of the groundwater modeling exercise are provided below.

6.2.2.1 Nature of Contamination

The nature/types and extent of contaminated media both on- and off-property make the BROS site very complex from a risk management and remediation standpoint. In addition to considerable volumes of on- and off-property groundwater contaminated with volatile and semi-volatile organic compounds, there are a number of soil hot spots and residual and free phase LNAPLs with organic, inorganic and PCB contamination, and sediment with high concentrations of lead and PCBs.

Table 6-1 provides a general breakout of classes of chemicals of concern at the site by media. Generally speaking, while a large number of chemical constituents are present in the various site media, only a few compounds drive the carcinogenic and non-carcinogenic human health risks. A brief summary of the COCs and chemicals of potential ecological concern (COPECs) (by media), focusing on the chemicals which drive human health risk, is presented below.

Soils: Arsenic (not likely site-related), total PCBs, trichloroethene (TCE), naphthalene, phenanthrene, phenol, and total xylenes.

Total volatile organic compounds in soil average 699 milligrams per kilogram (mg/Kg) at soil Hot Spot 1 and 164 mg/Kg at Hot Spot 2. Total TCE (along with tetrachloroethene and dichloroethene compounds) concentrations exceeding 100 mg/Kg and benzene exceeding 10 mg/Kg are also present at soil Hot Spot 1. Arsenic is not believed to be site-related but rather attributable to naturally occurring minerals in the aquifer media present on the site as well as other anthropogenic activities.

LNAPL and Shallow Groundwater: 1,2-dichloroethane, 1,2-dichloropropane, benzene, bis (2-chloroethyl) ether, chloroethane, chloroform, methylene chloride, tetrachloroethene, thallium, TCE, and vinyl chloride.

Two exposure pathways, construction-related activities and the potential for future exposure on-site via the vapor intrusion mechanism, are important scenarios that were evaluated. In shallow groundwater, benzene and TCE concentrations exceeding 500 micrograms per liter (ug/L) extend over an approximate one-acre area centered about MW 32. Metals such as iron, manganese lead and arsenic are also present exceeding groundwater quality criteria. Most LNAPL samples contained greater than 50 mg/Kg PCBs, with Arochlor mixtures 1254 and 1260 predominating.

Deep groundwater: Arsenic (not site-related), BCEE, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, benzene, cis-1,2-dichloroethene, tetrachloroethene, TCE, and vinyl chloride contribute the most to the site-related risk.

Chlorinated VOCs, including TCE and its breakdown products, ranging from 2,000 to 10,000 ug/L are found in the more highly contaminated areas. BTEX concentrations as high as 4,000 ug/L were recorded during investigations and BCEE concentrations ranged from 9 to 3,800 ug/L. Over most of the southeastern portion of the on-property area, total benzene and TCE concentrations exceed 1,000 ug/L. Metals such as iron, manganese, lead and arsenic are also present exceeding groundwater quality criteria. The aluminum, iron and manganese levels exceed the federal Secondary Groundwater Quality Standards. In the principal threat zone, pH ranges from 2 to 5.

Wetland Sediment: COPECs include the primary ecological stressors PCBs, lead and mercury, and secondary stressors including barium, cadmium chromium, cobalt, copper, nickel, vanadium and zinc.

Lead values in the more highly contaminated area (the DMZ) exceed 1,000 mg/Kg in the shallow sediment (0 to 6 inches). PCB values exceeding 100 mg/Kg are also present in this zone. Select areas exhibit total petroleum hydrocarbon levels exceeding 10,000 mg/Kg.

Based on the site-specific data, contamination gradients exist in all media. Soil levels tend to reduce as one moves away from the areas with residual LNAPL. Shallow and deep groundwater contaminant concentrations similarly decrease with distance from the property. In the wetland hydric soil/sediment, there is a rapid decrease in COPEC concentrations both horizontally and vertically outside the area containing residual LNAPL (the DMZ area).

6.2.2.2 Extent of Contamination

It is estimated that over 300,000 cubic yards of COC-contaminated soil remain on-property with levels above preliminary remediation goals (PRGs). While the 13-acre waste oil lagoon has been remediated and the surface of the production area cleaned, the subsurface zone outside of the former lagoon area footprint contains most of this residual contamination. There are also some areas of residual contamination beneath the former lagoon and areas where mobile LNAPL has re-infiltrated into formerly remediated areas. It is estimated that over 100,000 gallons of free phase LNAPL are present, significant amounts of residual LNAPL (perhaps over one million pounds) remain, and roughly 350 million gallons of groundwater are contaminated.

In summary, the areas of concern both on-property and off-property include:

- *Soil and Associated Hot Spots* – Soil Hot Spot around Monitoring Well 32 (also known as Hot Spot 1), the Pepper Building Soil Hot Spot (also known as Hot Spot 2), Debris/Fill Area, West Side Property, and the Former Process Area. Figure 6-1 provides a site map with details on the location of the above noted areas.
- *LNAPL* – Free and residual LNAPL wherever it occurs on the BROS site (widely distributed geographically and both above, at and below the water table), but including the Hot Spot

around MW 32, the Pepper Building Hot Spot, Debris/Fill Area, West Side Property, South Side Property, and the North Swale Area. See Figure 6-1 for location of LNAPL areas.

- *Shallow Groundwater* – UPRM aquifer primarily on-property. Figure 6-2 provides the general distribution of shallow groundwater contamination based on benzene. In this case, the benzene distribution is typical of other site contaminants.
- *Deep Groundwater* – UMPRM aquifer both on- and off-property. The off-property groundwater plume extends some 2400 feet to the southeast of the property boundary. Figure 6-3 provides the distribution of deep groundwater contamination based on TCE and benzene. In this case, these two contaminants lead the plume and provide the largest extent of contamination configuration.
- *Wetland Sediments and Surface Water* – Sediment and surface water in LTCS and Cedar Swamp. A concentration-effects model was used to assist in the evaluation of wetland areas at the site. The general framework to categorize risk from exposure to the chemicals of potential environmental/ecological concern included mapping of three distinct severity of risk zones. The zones were labeled the *De Manifestis*, *Intermediate* and *DeMinimis* zones. Table 6.2 provides some preliminary information on the three zones. Figure 6-4 shows the geographic distribution of the areas.

Each of the areas of concern is described in depth in the RI/FS documents.

Of the remaining residual wastes, LNAPLs with high PCB levels in close proximity to the outline of the former lagoon, and low pH waters contaminated with chlorinated volatile organic compounds (CVOCs) present in a zone at the bottom of the UMPRM aquifer immediately beneath the on-property area are considered the principal threat wastes associated with the Groundwater Work. Principal threat wastes are further discussed in Section 12. Residual contamination in the *De Manifestis* Zone contains the most significant wastes related to the Wetland Work.

Soil and shallow groundwater contamination is mostly associated with areas exhibiting the presence of LNAPL. The contamination levels in both soil and shallow groundwater trend lower with increasing distance from LNAPL locations. Similarly, wetland sediment contamination is highest in areas impacted by LNAPLs and residuals.

6.2.3 Modeling Conclusions

A groundwater fate and transport model was developed during the RI. A detailed summary of the model is contained in *Technical Memorandum No. 10, Development of a Groundwater Flow, Fate and Transport Model for the BROS Phase 2 RI/FS*. The model was used for flow analysis (i.e., delineating flow paths from source areas and groundwater travel times) and fate and transport modeling of organic chemicals of concern. Industry standard models accepted by EPA were utilized including MT3D, SWIFT and MODLFOW. Benzene, BCEE and TCE were recognized as the compounds that most likely would be transported in groundwater downgradient of the BROS property at potentially significant concentrations.

In addition, a treatability study was conducted to support the analysis of the applicability of chemical and biological treatment for contaminated groundwater/aquifer materials. A number of distinct activities were conducted to determine the benefits of such enhancements as in-situ chemical oxidant addition, aerobic biostimulation of VOCs, aerobic biostimulation of BCEE, and anaerobic biostimulation of VOCs. Combining data from the treatability study with the modeling allowed for site-specific simulations to evaluate contaminant reductions via the various enhancements.

The results of the modeling and treatability studies indicated the following:

- The calibrated fate and transport model was able to qualitatively and within reasonable limits quantitatively reproduce the distribution of TCE observed south of Route 295;
- The TCE plume probably reached its maximum extent in the late 1980's (prior to the lagoon remediation); and,
- Source reductions will dramatically reduce contaminant concentrations in the downgradient areas.

Based on the information provided in the treatability study and modeling effort, groundwater pumping together with chemical and biological treatment offers the highest degree of reduction in the toxicity, mobility and volume of the chemicals of potential concern at the site. This will result in the most efficient aquifer restoration goal time frame.

7. CURRENT AND POTENTIAL FUTURE LAND AND WATER USES

7.1 Current and Reasonably Anticipated Future Land Use

Much of the immediate BROS site area is undeveloped swamps/wetlands and stream corridors draining northward to the Delaware River. These are interspersed with agricultural land and a few residential properties. A truck repair garage is located a few hundred feet north of the site and the Chemical Leaman Tank Lines NPL site, an active industrial operation, is approximately one-half mile west of the site.

The on-property area is slightly less than 30 acres in size and is predominantly a vacant upland grassed area. The on-property area is located within an R-2 Residential District, as noted on the tax map of Logan Township, Gloucester County, New Jersey. The R-2 designation includes a minimum two-acre lot area and allows for single family, agricultural, home occupations, parks, playgrounds and recreational facilities, governmental uses, social clubs and other non-profit institutions, schools and places of worship. The surrounding properties are also zoned R-2 Residential with roadways classified as Interchange Commercial zones.

In 2002, the 20.5-acre sandy peninsula area southeast of the former waste oil lagoon, and Swindell Pond (about 12 acres in size) were donated to the New Jersey Green Acres program. Under the agreement with Green Acres, access to the property will be granted to conduct any necessary remedial actions. While it will take some time to manage the groundwater contamination beneath this portion of the site, minimal contamination in the shallow subsurface on this property is to be remediated. Testing of the pond (surface water and sediments) indicates that it is essentially free of BROS constituents. The remedial actions identified in this ROD will leave this property viable for future use. The property was formerly owned by Mr. Norman Swindell.

In keeping with the IC's (deed restrictions) recorded for the on-property area, only non-residential, non-retail purposes with no schools, camps or day care facilities are allowed. The IC restrictions are detailed in Section 2.2 of this ROD. Further, the sandy upland area just north of Swindell Pond and south of the former lagoon (a.k.a., the New Jersey Green Acres program property) includes restrictions which only allow for uses in conformity with the remediation of the site, and for recreational purposes and open space only and for no other purposes.

According to the local zoning, the reasonably anticipated future use for the BROS property and surrounding area is R2 Residential. However, the BROS property deed restrictions prohibit residential use. At this time, no changes in future land use for the surrounding area are known, nor are any new uses expected.

General land use categories in the LTC watershed include agriculture, forest, urban land, barren land, wetlands and water elements. Wetlands and water elements comprise nearly 57 percent of the land use. This is in keeping with the general area surrounding the site.

Based on the levels of contamination and potential for completion of numerous exposure pathways, future land use is a factor in managing the site. However, as previously noted, three perpetual deed restrictions have been recorded for the property. These three deed restrictions, as well as the Green Acres program exclusion, above, are formally recognized herein as part of the ROD remedy for the BROS site.

7.2 Surface Water/Groundwater Uses

Surface water is not currently used in the immediate area of the site for public water supply, industrial or commercial purposes, or residential/domestic supply. Some use of surface water supply has been observed for agricultural purposes. For example, water from Gaventa Pond is used to irrigate the agricultural fields immediately adjacent to the BROS property. Gaventa Pond surface water has been found to be free of site-related contaminants. Diversion of water from this pond is subject to permit approval from the State of New Jersey, and all permits are up to date.

Recreational use of surface water has also been observed in the area. Although the ponds on the site are of limited access, past observations of people fishing in the ponds has been noted. No boating or swimming has been documented. Sampling from the ponds indicates the presence of fish and other aquatic organisms typical in a surface water body of this kind.

Groundwater is used for water supply purposes in the BROS area. In the early stages of the project, a number of residences in the site area were on private wells. However, as part of the ROD for the Phase 1 lagoon work, public water supply lines were extended to homes within the area of concern. Based on EPA file information and information received from the Pennsgrove Water Supply Company, in response to the Phase 1 ROD, all of the properties in the immediate vicinity of the BROS property along Cedar Swamp Road are served by a public water supply.

As the Phase 2 work developed, it was evident that a number of homes were adjacent to or near the Classification Exception Area or mapped plume downgradient of the BROS contaminants. These properties have been, or are scheduled to be connected to the public water supply system. This work is being completed through an agreement between the town, the local water purveyor and the BROS Technical Committee.

8. SUMMARY OF SITE RISKS

Baseline human health and ecological risk assessments were conducted to estimate risks associated with potential current and future impacts of site-related contaminants on receptors visiting, utilizing or inhabiting the BROS site. Assessments were based upon the data and results collected and presented as part of the RI.

8.1 Human Health Risks

The baseline risk assessment estimates the human health risk which could result from the contamination at the site if no remedial action were taken. A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification* - identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment* - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well water) by which humans are potentially exposed. *Toxicity Assessment* – determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of effect (response). *Risk Characterization* – summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the BROS site in its current state. The risk assessment focused on contaminants in the groundwater which are likely to pose significant risks to human health. A summary of the contaminants of concern in the shallow and deep groundwater is provided in Table 8-1.

EPA's baseline risk assessment addressed the potential risks to human health by identifying several potential exposure pathways by which the public may be exposed to contaminant releases at the site under current and future land use conditions. Groundwater exposures were assessed for both potential present and future land use scenarios. Although nearby residents are on public water, based on the fact that the State of New Jersey has classified all groundwater as potable water, groundwater pathways for residential populations were included in the assessment for exposure through drinking water and inhalation of volatiles while showering. In addition, construction workers may contact contaminated shallow groundwater, and this population was included under a current/future use scenario. The reasonable maximum exposure, which is the greatest exposure that is reasonably anticipated to occur, was evaluated.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and non-carcinogenic (systemic) effects due to exposure to site chemicals are considered separately. It was assumed that the toxic effects of the site-related chemicals would be additive. Thus, carcinogenic and non-carcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Non-carcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (reference doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligrams per kilogram per day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (*e.g.*, the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds within a particular medium that impacts a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The toxicity values, including reference doses, for the compounds of concern at the site are presented in Table 8-2. A summary of the noncarcinogenic hazards associated with these chemicals for each exposure pathway is contained in Table 8-4.

It can be seen from Table 8-4 that the HI for noncarcinogenic effects associated with dermal exposure to shallow groundwater contaminated with PCBs results in a hazard index of 4 for the construction worker, which exceeds EPA's benchmark value of 1.0. Table 8-4 also presents the HI values for the combined adult and child resident exposed to contaminated groundwater in the deep aquifer under the potential future use scenario of potable use. The HI value of 7.3 is driven by TCE, with vinyl chloride also contributing.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. The SFs for the compounds of concern are presented in Table 8-3.

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between E-04 to E-06 (10^{-4} to 10^{-6}) to be acceptable. This level indicates that an individual has not greater than approximately a one in ten thousand to one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at a site. As shown in Table 8-5, excess lifetime cancer risks estimated at this site were 5.3E-03 for the combined adult and child resident. This value is above the NCP's acceptable risk range. The estimated total risks are primarily due to bis (2-chloroethyl) ether, trichloroethene, and vinyl chloride. The calculations were based on reasonable maximum exposure scenarios. These estimates were developed by taking into account various conservative assumptions about the likelihood of a person being exposed to these media.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of variables. For example, uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Exposure assessments are based on estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals.

These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the site, and is highly unlikely to underestimate actual risks related to the site.

More specific information concerning public health and environmental risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the risk assessment report.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

8.2 Ecological Risks

The primary objective of the ecological assessment was to identify and characterize the potential risks posed to wildlife receptors as a result of contaminant releases. A secondary objective was to determine the need, if any, and potential consequences of performing a response action at the site, from an ecological perspective. A four-step ecological risk assessment process is used to evaluate site risks: *Problem Formulation* - identifies ecosystems potential at risk while listing potential stressors, pathways and effects and selecting ecological assessment endpoints in need further study. *Exposure Assessment* - further characterizes exposure pathways and receptors and estimates of exposure in concentrations. *Ecological Effects Assessment* - notes the potential adverse ecological effect of each chemical of potential ecological concern. *Risk Characterization* - summarizes risks using general comparison and hazard quotients calculated with estimated exposure and toxicity reference values for each receptor species.

Surface water, sediments and soils are considered to be sources of ecological exposure at the site. The ecological risk assessment addressed four main areas: Little Timber Creek Swamp, Cedar Swamp, Swindell and Gaventa Ponds, and the debris/fill and transition areas. LTC and LTCS lie to the east and north of the property. Further downstream, upon entering into Cedar Swamp, the swamp and drainage channels are freshwater tidal streams. A tide gate separates flow from LTCS and Cedar Swamp (CS). Swindell Pond and Gaventa Pond are south and southwest of the property and are separated by a peninsula with remnants of former sand mining access roads.

LTCS and CS have been further divided into physical segments to facilitate discussion of remedial activities. These areas include:

- LTCS-I, the area south of Route 295;

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- LTCS-II, between Route 295 and Route 130;
- LTCS-III, between Route 130 and Route 44;
- CS-I, between Route 130 and 44; and,
- CS-II, the remaining portion of site-related CS.

To address the varied levels of contamination present at the site, further definition of areas of concern was accomplished by delineating concentration zones. For BROS, these included the following:

The *De Manifestis* Zone (DMZ): An area represented by sediment total petroleum hydrocarbon concentrations above 10,000 mg/Kg, constituents which consistently exceed severe effects levels (SELs) for several BROS COPECs, areas where vegetal shifts are currently evident, areas where surface water samples exceed water quality criteria in greater than 50 percent of the samples (for site COPECs), and areas subject to erosion. The DMZ is primarily located adjacent to the on-property area (primarily in LTCS-II), just east of the former lagoon. This zone also exhibits high levels of lead (greater than 1,000 mg/Kg) and PCBs.

The *Intermediate* Zone (IZ): A transitional area outside the DMZ with some chemicals at elevated concentrations. The IZ, generally speaking, forms a 100-foot buffer around the DMZ.

The *De Minimis* Zone (DM): A zone which is characterized by conditions similar to the chosen site-specific reference areas.

Completed remedial actions, including the placement of clean fill at the land surface, eliminated surface soil as a continued source of contamination to the LTC Swamp area. After completing the lagoon remediation, the surface of the on-property area was graded and restored to an upland grass habitat. Contaminated groundwater and residual subsurface contamination remain potential sources of contamination to the wetland.

Based on review of the analytical and field survey data, areas of ecological effects (from chemical exposure) were identified in LTCS-II and LTCS-III, but not in LTCS-I or CS I/II. Within LTCS-II and III, the *De Manifestis* Zone had significant effects while no significant effects were noted in the *De Minimis* Zone. The IZ is a zone of transition.

Adverse effects on vegetation, aquatic invertebrates, small mammals, birds and carnivores were selected as assessment endpoints. For LTCS, vegetation communities, aquatic communities, higher trophic level mammals (red fox) and higher trophic level birds (Eastern screech owl) were selected as assessment endpoints. For CS, aquatic organisms (white perch), piscivorous (fish eating) birds (great blue heron), higher trophic level mammals (red fox) and higher trophic level birds (Eastern screech owl) were selected. Receptor species considered representative of local wildlife populations were selected based on their potential exposure and susceptibility to the adverse effects of site contamination. Average and maximum exposure scenarios were considered due to the mobility of receptor species.

Sediments and surface water were considered when completing the risk calculations. After a rigorous screening process, COPECs were identified. These included lead, mercury and total PCBs as primary COPECs, and secondary COPECs consisting of barium, cadmium, chromium, cobalt, copper, nickel, vanadium and zinc.

Potential risks were estimated through a weight of evidence approach using various assessment and measurement endpoints. Direct comparisons against ecologically protective benchmarks were used as a measurement endpoint in addition to vegetative surveys for the assessment of vegetative communities. The calculations of hazard quotients (HQs) were used as a line of evidence to characterize any potential food chain exposures to upper trophic level receptors. The HQ is the ratio of the contaminant concentration in the environmental media to the corresponding toxicity benchmark. An HQ greater than 1.0 indicates that an effect threshold has been exceeded (i.e., receptor exposure to contamination exceeds known benchmarks) and there is the potential for risk to the receptor. Data from small mammal tissue analyses were incorporated into the food chain calculations and used to assess contaminant bioavailability for the primary chemicals of potential ecological concern. The potential exposure and the associated potential ecological risk should actually be much lower however, due to the decreased concentration gradients with distance from the DMZ, limited site accessibility, and the likely decrease in chemical concentrations over time based on the elimination of the primary source.

Overall, the *DeMinimis* Zone in LTCS I was designated a no apparent ecological effects zone due to surface water concentrations similar to those in the reference area, filtered surface water results below surface water quality benchmarks, and sediment COPEC concentrations overlapping the ranges observed in the reference areas.

Based on the calculation results, the ecological risk associated with the *Intermediate* Zone do not appear to be significant. Assuming the IZ is represented by a 100-foot halo zone around the DMZ, there were only two elevated HQs for the Eastern screech owl (chromium at 2.4, zinc at 1.0)

The DMZ represents an area where historical lagoon overflows may have resulted in a vegetation shift (to *phragmites* from red maple vegetation community). Large quantities of residual LNAPL and metals are present in the DMZ. In this zone, calculated risks to red fox and Eastern screech owl were higher than the reference areas. However, in LTCS II/III (the areas of highest concern), there were no calculated HQs exceeding 1.0 for the red fox (representative of the upper trophic level predatory mammal), mink (representative of the upper trophic level aquatic mammal), or the Eastern screech owl (representative of the upper trophic level avian population). The active remediation (excavation and placement of sorptive materials) component of the remedy for contaminated sediments in the DMZ will significantly reduce the contaminant mass in the wetland area thereby reducing ecological risks.

Similar results were obtained for areas of CS, where great blue heron (receptor representing piscivorous bird population), red fox and Eastern screech owl had HQ values less that 1.0. Risks to white perch (representing water column biota) and mummichugs (benthic feeding forage fish species) were not considered significant.

Swindell Pond sampling indicated no observed results above aquatic benchmarks. It was concluded that Swindell Pond does not contain site-related COPECs at concentrations of potential ecological concern. Potential adverse effects to benthic organisms, however, are probable within a limited area surrounding the seep area of Gaventa Pond. An active remedial action consisting of sediment removal is proposed for the seep area. This will reduce risks to below threshold values.

The wetland transition and debris/fill areas along the eastern flank of the property were qualitatively evaluated. A removal action completed by EPA eliminated waste materials for those areas, thereby reducing the associated risks.

As previously noted, while habitat for threatened and endangered species potentially occurs in Gloucester County, no rare plants or animals have been observed on the site.

9. REMEDIAL ACTION OBJECTIVES

Consistent with the NCP and the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (RI/FS guidance), remedial action objectives (RAOs) for the protection of human health and the environment were developed. RAOs provide a general description of what the cleanup will accomplish, such as restoration of groundwater to drinking water levels. The RAOs specify the contaminants and media of concern, exposure routes and potential receptors, and an acceptable risk level or concentration limit or range for each contaminant for each of the various media, exposure routes and receptors. The RAOs were then used to develop specific preliminary remediation goals (PRGs) for the site. PRGs were established after review of applicable or relevant and appropriate requirements (ARARs) and risk-based concentration limits and serve to focus the development of alternatives and/or technologies that can achieve the remedial goals.

9.1 Remedial Action Objectives/Preliminary Remediation Goals

The remedy offered in this ROD is necessary to protect public health and the environment from actual and threatened releases of hazardous substances, pollutants or contaminants from the site which may present an imminent and substantial endangerment to public health or welfare.

Remedial action objectives are specific goals to protect human health and the environment. Section 121 (d) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that, at a minimum, any remedial action implemented at a site achieve overall protection of human health and the environment and comply with ARARs. ARARs for the BROS site include both federal and state regulations. Other criteria that do not meet the definition of ARARs, but may also be considered when developing cleanup alternatives are know as to be considered criteria (TBCs). State soil cleanup levels, which are not promulgated standards, are considered TBCs for the site.

Remedial action objectives for each media were developed in accordance with CERCLA, as amended by SARA, the NCP and current EPA guidance. The RAOs considered on-property use in the commercial/industrial category (as prescribed in the current IC/deed restrictions for the on-property area), and off-property use under a residential/agricultural/recreational setting.

Shallow/Deep Groundwater

The groundwater RAOs for both shallow and deep groundwater found on-property and off-property include:

- *Reduce or eliminate ingestion and/or direct contact with VOCs, SVOCs and metals in groundwater above federal MCLs and New Jersey groundwater quality standards. Restore off-property groundwater to its expected beneficial use as a potable drinking water supply.*
- *Reduce or eliminate vapor intrusion from VOCs, SVOCs and PCBs in groundwater above acceptable site-specific, risk-based levels.*
- *Reduce or eliminate direct contact with VOCs, SVOCs, LNAPLs, PCBs and metals in groundwater above acceptable site-specific, risk-based levels to the public, construction workers and utility workers levels.*

From a numerical standpoint, the PRGs identified for shallow groundwater include the federal maximum contaminant levels (MCLs) or New Jersey groundwater quality standards (GWQSs), which are considered ARARs for the site. Table 9-1 provides a listing of federal MCLs and state groundwater quality criteria by key compound of concern. Values for all of the COCs in shallow groundwater are found in the RI. It is believed that the PRGs for off-property shallow groundwater are achievable in a reasonable period of time

The deep groundwater PRGs are also the lower of the federal MCLs, or state GWQSs. While complete restoration of the deep groundwater to achieve chemical-specific ARARs is the primary goal, conditions in the principle threat zone (PTZ) will have an effect on the restoration time frame. It also remains a possibility that complete restoration of the PTZ may be technically impracticable. It is anticipated that the deep groundwater outside the PTZ can be restored within a reasonable time period. Due to the depth of deep groundwater, it is not believed that exposures from vapors or worker direct contact will be an issue. Values for all of the groundwater COCs are found in the RI.

Soil

The RAOs for soils on-property and off-property include:

- *Reduce or eliminate vapor intrusion and inhalation from adsorbed VOCs, SVOCs and PCBs in the soil above acceptable site-specific, risk-based levels.*
- *Reduce or eliminate the migration to groundwater of the adsorbed VOCs in soil above acceptable site-specific, risk-based levels.*
- *Reduce or eliminate direct contact with adsorbed VOCs, SVOCs, LNAPLs, PCBs and metals in soil above acceptable site-specific, risk-based levels to the public, construction workers, and utility workers.*
- *Reduce or eliminate the uptake of adsorbed VOCs, SVOCs and metals into soil and into crops off-property.*
- *Reduce or eliminate impacts from contact with contaminated soils to ecological receptors (including food web effects).*

Soil cleanup levels or risk-based preliminary remedial goals for surface soils at the site were developed in accordance with EPA Risk Assessment Guidance (RAGS) Part B. The PRGs were based on a conservative land use scenario and included a target risk for carcinogens in the range of 10^{-4} to 10^{-6} and a hazard index of 1.0 for non-carcinogens.

There are no federal chemical-specific cleanup levels for contaminated soils. The PRGs adopted for soils (dependent on location) are the lower of NJDEP's residential direct contact soil cleanup criteria, non-residential direct contact soil cleanup criteria (for commercial/industrial settings), or impact to groundwater soil cleanup criteria. The New Jersey soil cleanup criteria, referred to as TBCs, are non-promulgated guidance values developed by NJDEP. The residential and impact to groundwater soil cleanup criteria are applicable to off-property areas while the non-residential and impact to groundwater criteria are be applied to the on-property areas. Table 9-2 provides numerical values for key COCs.

All reasonable efforts will be made to reduce contaminant levels in soil. The effectiveness of the remedial actions implemented at the site will be evaluated over a number of years to determine the long-term practicability of achieving cleanup goals.

LNAPL

LNAPL floating on and beneath the water table and present as a residual in soil represents a principal threat at the site. While the RAOs for LNAPL are the same as the soil and shallow groundwater objectives, the following additional goal is added:

- *Consistent with ARARs (State of New Jersey requirement N.J.A.C. 7:26E-6.1(d) N.J.A.C 26E 2.1(a)(11)), remove LNAPL and contain residuals, to the extent practicable.*

LNAPL remediation represents a difficult site challenge. In an effort to reduce risk to the extent practicable while attempting to restore the site, a performance goal involving the removal of free phase LNAPL has been adopted (further information is provided in the Other Performance Goals section).

Sediment

The RAOs for sediment include:

- *Reduce or eliminate ingestion or direct contact with residual LNAPL and PCBs greater than 50 ppm and reduce exposure to other chemical constituents exceeding the severe effects level concentrations in hydric soils and sediments in the DMZ in LTCS II and III.*
- *Reduce or eliminate exposure to constituents exceeding the severe effects level concentrations in the intermediate zone.*

For the wetland areas, multiple lines of evidence determined the risks posed to ecologically relevant receptors outside the DMZ to be characterized by hazard quotients less than 1.0, and were not significantly different than the reference areas selected in careful consultation with the EPA/State Biological Technical Assessment Group. Further, concentration gradients exist such that levels drop off dramatically with increasing distance from the DMZ. The fact that no HQ values were above 1.0 or above those observed in the reference areas for avian and mammalian terrestrial receptors indicates that site-related chemicals do not significantly affect those populations. Disruption of wetlands is always a factor when dealing with cleanup in such settings. For these reasons, a lead cleanup level of 1,000 mg/Kg has been adopted for areas outside the DMZ. As the DMZ will be excavated, the levels of lead and PCB in the excavation zone will be reduced to below threshold values. The cleanup goals for key wetland sediment contaminants are provided in Table 9-3.

PCBs in sediments may become bioavailable or able to be absorbed and ready to interact by various mechanisms (*e.g.*, through groundwater advection, pore water diffusion, scour, benthic food chains, etc.). There are no federal cleanup standards for PCBs in sediment; however, reducing the inventory of PCBs in sediments that are susceptible to the mechanisms noted is a project objective. This will ultimately reduce PCB levels available to receptor populations. Surface water quality does not represent a significant site risk. Co-located shallow sediment and surface water samples were collected from LTCS. The results suggest that PCBs are not being released to any significant degree from sediment to surface water throughout most of the area (i.e., they are persistent in sediments).

Other Performance Goals

LNAPLs, especially in their free phase form, contain a wide range of chlorinated organics and PCBs, and are recognized as one of the principal threats at the site. EPA has been conducting a passive free phase LNAPL extraction program with some success for over two years. The selected remedy will improve the free phase LNAPL removal process through the use of bioslurping. Based on inventories conducted by EPA, an estimated 107,000 gallons of free phase LNAPL is believed to be present on-site. Of this amount, it is estimated that 40,500 gallons are recoverable. EPA efforts to date have removed about 11,000 gallons. Therefore, a technology performance criterion or goal of extracting 29,500 gallons of free phase LNAPL is being adopted at this time. Confirmation or modification of the performance criterion for the extraction of free phase LNAPL will be accomplished during the bioslurping design and/or remedial action. Other technology performance criteria may be established during bioslurping design and operation and maintenance such as the quantity of shallow groundwater removed and the pounds of contaminants removed from the vapor phase extraction. Monitoring will be conducted to evaluate the level of risk reduction achieved.

COC mass estimates were calculated (may be biased high due to the use of wells screened in the locations predicted to have the highest concentrations) for shallow and deep groundwater by area of concern. Mass estimates include the following:

- Top 40 feet UPRM – VOCs = 5,525 pounds, SVOCs = 684 pounds
- 40 feet to 80 feet UMPRM beneath the BROS property – VOCs = 1,753 pounds, SVOCs = 1,990 pounds
- 40 feet to 85 feet/UMPRM adjacent to/downgradient of the site – VOCs = 54 pounds, SVOCs = 100 pounds

Multiple rounds of chemical treatment and biological treatment following the adaptive management process will be utilized to reduce the above mass of contamination thereby achieving the necessary risk reduction goals. It is anticipated that after each round, treatment success will be evaluated.

While ARARs/TBCs form the basis for site cleanup levels, individual technology performance criteria (in addition to the free phase LNAPL extraction volume noted above will be established for each Groundwater Work cleanup technology. The criteria, which will be developed during both the design and remedial action stages, will be periodically evaluated within the context of the adaptive management approach, to determine the need for addition treatment or change-over to other technology components of the selected remedy. Individual technology performance criteria will be developed to evaluate bioslurping LNAPL recovery rates to trigger the implementation and/or termination of steam injection, and for chemical oxidant injection re-treatment of rebound areas. The magnitude of the steam injection effort will be dependent on the effectiveness of the innovative bioslurping technology.

9.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Under the NCP and CERCLA, many federal and state environmental requirements must be considered when implementing a remedial action. ARARs and "to be considered" requirements (or TBCs) fall into three broad categories, based on the manner in which they are applied at a site. These categories are chemical-specific, location-specific and action-specific requirements. The major ARARs for each category are provided below. Additional ARAR information is found in the FS Section 1.6 – *Applicable Relevant and Appropriate Requirements*. In addition to ARARs, EPA may review TBCs which are advisories or guidance that are not legally enforceable, but may be helpful in implementing the remedy or determining the level of protectiveness.

Chemical-specific: These are health- or risk-based numerical values or methodologies that establish concentration or discharge limits, or a basis for calculating such limits, for particular contaminants. Chemical-specific ARARs for the site include:

Groundwater

- Federal: 40 CFR 141.61-.62, Maximum Contaminant Levels or MCLs
- State: N.J.A.C. 7:9-6, Table 1 – Groundwater Quality Standards

Surface Water

- Federal: 40 CFR 131, Surface Water Quality Standards
- State: N.J.A.C 7:9-1.14, Surface Water Quality Criteria

PCBs and LNAPL in Soils

- NJDEP: NJAC7:26E-6.1(d)/NJAC 7:26E 2.1(a)(11). LNAPL should be treated or removed, when practicable.
- EPA: Risk-based and performance-based procedures are applicable to BROS. A site-by-site evaluation for spills older than May 1987 (40CFR 761-120) is required. Excavated soils containing PCBs greater than 50 parts per million (ppm) must be disposed of in a federal- or state-permitted hazardous waste landfill or PCB disposal facility as hazardous waste per applicable Toxic Substances Control Act (TSCA) regulations.

If more than one such requirement applies to a contaminant, compliance with the more stringent ARAR is required.

Location-specific: These are restrictions based on the concentration of hazardous substances or the conduct of activities in specific locations such as wetlands, floodplains and habitats of endangered species. Examples of man-made features potentially affected include historic districts and archaeological sites. Remedial action alternatives may be restricted or precluded depending on the location or characteristics of a site and the requirements that apply to it. The following location-specific wetland, floodplain and endangered species ARARs are or may be applicable to the BROS work.

Wetlands

Executive Order 11990, "Protection of Wetlands" and EPA's 1985 Statement of "Policy on Floodplains/Wetlands Assessments for CERCLA Actions"

Both jurisdictional and non-jurisdictional wetlands were delineated. Based on the RI, wetland identification and delineation were conducted in accordance with the 1989 Federal Manual for Identifying and Delineating Wetlands. The current identification and delineation are acceptable. Impacts from the proposed remedial action, considering both Groundwater and Wetland Work will be reviewed during the remedial design. Furthermore, since wetlands will be affected (excavated and restored) by implementation of the proposed remedy, a plan of action, completion of appropriate state permits (Stream Encroachment and Freshwater Wetlands General Permit No. 4, per NJSA 13:9B-1, NJSA13:1D-1, NJSA58:10A-1, and NJSA 58:16A-50, et. seq.) and a wetland restoration plan will be completed.

Floodplains

Executive Order 11988, "Floodplain Management"

The entire BROS site lies in the Delaware River floodplain; thus, soil and sediment contamination are present in the 100-year and 500-year floodplains. During design, the 100-year/500-year floodplain and areas potentially impacted during the remedial action will be delineated. Actions will be considered during the wetland excavation to protect against and prevent the spread of contamination and/or the long-term disabling of remedial systems.

Endangered Species

Endangered Species Act (ESA of 1973, 16 U.S.C. 1531, et seq.)

It was noted that the federally endangered bald eagles were identified by the New Jersey National Heritage Program near the BROS site. Further, it was noted that the bald eagle is not a likely inhabitant due to the lack of required habitat. Foraging bald eagles in or around the BROS Site are protected under the Endangered Species Act (ESA). The New Jersey Endangered and Non-game Species Program will be contacted to update screening for the existence of nesting and foraging bald eagles in the project area, and if any new restrictions are in effect or additional habitat surveys are required prior to start-up of remedial actions. Endangered species data will be updated for other species as well, since a significant period of time has elapsed since the last survey was conducted.

Significant Agricultural Lands

Farmland Protection Policy Act (FPPA of 1981, 7 U.S.C. 4201, et seq.)

The BROS site is bordered by farmlands on the west side. Additional characterization of these farmlands will be performed during remedial design. If it becomes necessary to convert significant agricultural lands to non-agricultural uses as part of site remediation, or if site contamination is having a direct impact on significant agricultural lands, consultation with the Natural Resources

Conservation Service will occur.

Cultural Resources - See section 6.2.1.4 Cultural Resources

National Historic Preservation Act (NAPA of 1960, 16 U.S.C. 470, et seq.)

While a select few areas were considered zones of archaeological sensitivity, none appear to be located in areas which will be impacted by the proposed remedial actions. During the remedial design stage, if it is determined that the planned remedial actions will impact the area, further cultural resource investigations will be completed.

Other Resources

Coastal Zone Management Act (CZMA of 1972, 16 U.S.C. 1450, et seq.)

At this time, it does not appear that the remedial actions to be conducted at the site are inconsistent with the New Jersey Coastal Zone Management Program requirements

Wild and Scenic Rivers Act (WSRA of 1968, U.S.C. 1274, et seq.)

At this time, it does not appear that the remedial actions to be conducted at the site will impact the Delaware River in regard to its designation as a National Wild and Scenic River System. Additional reviews will be conducted at the design stage to ensure compliance with these regulations.

Action-specific: Action-specific requirements set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants or contaminants, and are primarily used to assess the feasibility of remedial technologies and alternatives. Examples of action-specific ARARs include Resource Conservation and Recovery Act (RCRA) monitoring requirements and TSCA disposal requirements.

Chemical-specific, location-specific, and action-specific ARARs and TBCs are all considered in the development and evaluation of remedial alternatives. ARARs and TBCs that may be applicable to various remedial alternatives at this site were identified in the FS. TBCs are non-promulgated criteria, advisories, guidance, and proposed standards issued by federal or state governments. TBCs are not potential ARARs because they are neither promulgated nor enforceable, although it may be necessary to consult TBCs to interpret ARARs, or to determine preliminary remediation goals when ARARs do not exist for particular contaminants, or are not sufficiently protective. Compliance with TBCs is not mandatory, as it is for ARARs, though ARARs may be waived in certain circumstances. The following site TBCs have been considered for soils at the BROS site:

- NJDEP Soil Cleanup Criteria (May 1999). Site-specific risk assessment and other factors will be considered in the risk management analysis for on- and off-property soils.

According to CERCLA Section 121(d)(4), an ARAR may be waived by EPA provided protection of human health and the environment is still achieved if one or more of six listed criteria are met. While every effort will be made to meet ARARs, EPA does not rule out the possibility of such a waiver at some time in the future, should achievement of one or more ARARs prove technically impracticable or another of the criteria set forth in CERCLA Section 121 (d)(4) are met.

10. DESCRIPTION OF ALTERNATIVES

The complexity of site conditions and varied contaminants of concern (including VOCs, SVOCs, PCBs and lead) has had a significant impact on the selection of viable and appropriate alternatives for addressing the remaining conditions at the site. Site complexities include the non-homogenous nature of shallow subsurface materials (i.e., debris/fill commingled with the soil in many areas), widespread LNAPL above, at and below the water table, high PCB concentrations in the LNAPL, and the widespread distribution of contamination both surrounding and beneath the remediated former lagoon area.

The interaction of contaminant movement between the various media further complicates the selection of technologies for the site. To address this issue, an integrated, sequentially conducted or adaptive remedial action approach was considered and forms the basis for the selected remedy.

Remedy components will employ treatment technologies, engineering controls and institutional controls. Remedial alternatives have been developed for soil, LNAPL, shallow groundwater, deep groundwater and wetlands. Generally speaking, EPA has a preference for meeting the goal of reducing toxicity, mobility and volume through treatment. Chemical and biological treatment technologies have been identified for the deep groundwater cleanup; vacuum extraction and water budget technologies are preferred to address residual source materials on-property; and contaminated wetland sediment will be managed by excavation (with off-site treatment/disposal) and restoration techniques. A wide range of alternatives were reviewed for each media of concern. The alternatives which passed an initial screening received detailed analyses.

The nine criteria identified in the NCP are used to evaluate the alternatives and compare them to one another in the detailed analysis provided in Section 11 and the FS. These include threshold criteria (Overall Protection of Human Health and the Environment/Compliance with ARARs) which are requirements each alternative must meet in order to be eligible for consideration, primary balancing criteria (Long-Term Effectiveness/Reduction in Toxicity, Mobility or Volume Through Treatment/Short-Term Effectiveness/Implementability/Cost) which are used to weigh some of the major trade-offs among the alternatives, and modifying criteria (State Acceptance/Community Acceptance) which incorporate state/support agency and community feedback.

Costing information including estimated capital costs, estimated operation and maintenance costs, estimated present value, estimated total cost and construction time frames are provided for the alternatives. Capital costs include those expenditures required to construct the remedial action. Operation and maintenance (O&M) costs are those post-construction costs necessary to ensure or verify the continued effectiveness of the remedial action. Present value costs included discounting costs to the year in which they are projected to occur and include both capital and O&M costs. Estimated total costs reflect first year undiscounted costs. Estimated construction time frames reflect only the time required to construct the remedy and do not reflect the time required to design the remedy, negotiate and procure contracts or complete long-term operation and maintenance.

It is believed that the preferred alternatives will achieve their desired results.

SOIL

Soil (Soil Hot Spots) alternatives would be combined with LNAPL and Shallow Groundwater technologies in the adaptive management approach. While soil vapor extraction (SVE), a seemingly viable technology for VOCs in soil, was not carried forward to the detailed alternative analysis, the bioslurping technology considered under LNAPL alternatives LNAPL 4/5 has a vapor removal component. SVE was not carried forward primarily due to its inability to address the very large volume of free phase LNAPL.

Alternative SHS-1: No Further Action, Unmonitored Natural Remediation

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

Alternative SHS-2: Institutional Controls, and Cover and Drainage Improvements

Estimated Capital Cost: $3,690,087
Estimated Annual O&M: $138,450
Present Value: $6,650,934
Estimated Total Cost: $6,857,626
Estimated Construction Time Frame: 36 months

ICs include the existing deed restrictions and the New Jersey CEA/WRA. Cover and drainage improvements will include surface regrading and the installation of specific engineered runoff channels to appropriately direct surface runoff and reduce infiltration.

Alternative SHS-3: Institutional Controls, Cover and Drainage Improvements, and In-Situ Treatment (via Phytoremediation)

Estimated Capital Cost: $5,175,087
Estimated Annual O&M: $174,450
Present Value: $8,799,453
Estimated Total Cost: $9,201,795
Estimated Construction Time Frame: 36 months

The ICs and cover and drainage improvements under Alternative SHS-2 apply to SHS-3. Alternatives SHS-3 and SHS-4 add an in-situ technology which will incorporate the use of hybrid poplar trees (or other appropriate species) to aid in site water budget control, as well as provide some shallow groundwater remediation through the development of root masses that enhance the movement of nutrients, increase microbial activity and improve in-situ biodegradation. This remedial measure will require some pilot work to identify the species of trees best suited for site conditions and the potential success of this measure. The Region, in conjunction with phytoremediation/water budget management experts from the Agency's Environmental Response Team (ERT), is currently performing pilot work to aid in the final design of this activity.

Alternative SHS-4: Institutional Controls, Cover and Drainage Improvements, In-Situ Treatment (via Phytoremediation), and Enhanced Biodegradation

Estimated Capital Cost: $7,167,687
Estimated Annual O&M: 174,450
Present Value: $10,663,221
Estimated Total Cost: $11,493,285
Estimated Construction Time Frame: 48 months

The ICs, cover and drainage improvements under SHS-2, and phytoremediation technology from SHS-3 apply to SHS-4. An enhanced bioremediation component is added to SHS-3 to develop Alternative SHS-4.

Soil excavation alternatives were screened out during the FS. However, EPA believed that both hot spot and aggressive soil excavation alternatives were worthy of some consideration. The Agency independently developed two excavation alternatives.

Alternative SHS-5: Soil Hot Spot Area Excavation Associated with the Pepper Building and Monitoring Well 32

Approximately 75,000 cubic yards of contaminated soil would be excavated from two distinct hot spot areas adjacent to the Pepper Building and in the north-central area of the BROS property. Soil would be removed from a three-acre area, down to a depth (below surface) of approximately 15 feet. The placement of final cover and drainage improvements would also be part of this action. Under this scenario, deeper residual contamination and lesser contaminated materials in other areas of the site would not be addressed.

The estimated capital cost for Alternative SHS-5 is $34,600,000. The majority of this cost is associated with the excavation and off-site disposal of contaminated soil. It is estimated that hot spot excavation could be completed in 24 months.

Alternative SHS-6: Aggressive Soil Excavation Associated with the Former Production Area (including the Pepper Building and Monitoring Well 32 Area)

Under the more aggressive of the soil excavation alternatives evaluated, soil over an area of approximately 11 acres would be excavated to 15 feet below grade. Despite the removal and off-site disposal of over 300,000 cubic yards of contaminated soil, some deeper residual contamination would remain. The placement of final cover and drainage improvements would also be part of this action.

The estimated capital cost for Alternative SHS-6 is $126,000,000. The majority of this cost is associated with the excavation and off-site disposal of contaminated soil. It is estimated that this larger-scale excavation activity could be completed in 48 months.

Upon comparison with the other alternatives for soil media, it was determined that the potential for recontamination and or the amount of residual contamination which would not be removed through an excavation activity precluded further consideration of these alternatives.

LNAPL

Both free and residual LNAPLs are present above, at and below the water table on the site. Beyond the areas where LNAPL is present, contaminant of concern concentrations ultimately decline to non-detect levels in soils and shallow groundwater.

Alternative LNAPL-1: No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

Alternative LNAPL-2: Institutional Controls, Cover and Drainage Improvements, Limited Off-Property Excavation (Gaventa Pond Seep and Green Acres Property), and Passive LNAPL Recovery

Estimated Capital Cost: $5,264,575
Estimated Annual O&M: $151,650
Present Value: $8,662,448
Estimated Total Cost: $9,091,675
Estimated Construction Time Frame: 60 months

ICs include the existing deed restrictions and the New Jersey CEA/WRA. Cover and drainage improvements will include surface regrading and the installation of specific engineered runoff channels to appropriately direct surface runoff and reduce infiltration.

Alternative LNAPL-2 adds excavation of contaminated LNAPLs/soils at the Gaventa Pond seep and Green Acres property and a passive LNAPL recovery activity.

The Gaventa Pond seep excavation includes the removal of soils and sediments from near the waters edge over an approximate 2,500 square foot area. After placement of a geo-membrane, the excavated area will be backfilled. Contaminated material will be disposed off-site. The Green Acres property remedy includes the excavation of contaminated shallow soil (in the 2-4 foot depth range) over a 10,000 square foot area.

Passive LNAPL recovery would consist of continuing the program initiated by EPA. This includes the use of five oil skimmers that make use of the differences in specific gravity and surface tension between oil and water to extract LNAPL from gravel-filled trenches. EPA has determined that this action, while having produced good results for a reasonable cost, is not sufficient to extract the remaining free phase LNAPL.

Alternative LNAPL-3: Institutional Controls, Cover and Drainage Improvements, Limited Off-Property Excavation (Gaventa Pond Seep and Green Acres Property), Passive LNAPL Recovery, and Containment (via Phytoremediation/ Alternative Final Cover)

Estimated Capital Cost: $6,804,575
Estimated Annual O&M: $187,650
Present Value: $10,795,853
Estimated Total Cost: $11,499,094
Estimated Construction Time Frame: 72 months

Alternative LNAPL-3 adds a water budget management (referred to as phytoremediation) component (described under Alternative SHS-3) and an alternative final cover to the site remediation activities. The alternative cover would include an evapotranspiration-type vegetative soil cover to limit water infiltration.

Alternative LNAPL-4: Institutional Controls, Cover and Drainage Improvements, Limited Off-Property Excavation (Gaventa Pond Seep and Green Acres Property), Passive LNAPL Recovery with Select Enhancements (Bioslurping), and Containment (via Phytoremediation/ Alternative Final Cover)

Estimated Capital Cost: $7,171,095
Estimated Annual O&M: $273,450
Present Value: $13,590,897
Estimated Total Cost: $14,454,670
Estimated Construction Time Frame: 72 months

Alternative LNAPL-4 includes all the components of LNAPL-3 with the exception of taking a more aggressive approach to the extraction of free phase LNAPL. Bioslurping, a vacuum extraction process which employs an adjustable (length) drop or slurp tube, is used to enhance the removal of free product. The slurp tube is lowered to the LNAPL layer inside a well, and vacuum is applied to promote entry of LNAPL into the well and up the tube. When the LNAPL layer declines, the tube draws in vapor (vapor extraction) and promotes biodegradation processes (bioventing). Tube adjustments are made when warranted. When the water table rises, some shallow groundwater is extracted.

Alternative LNAPL-5: Institutional Controls, Cover and Drainage Improvements, Limited Off-Property Excavation (Gaventa Pond Seep and Green Acres Property), Enhanced LNAPL Recovery (via Bioslurping and Thermal/Steam), and Containment (via Phytoremediation/ Alternative Final Cover)

Estimated Capital Cost: $8,524,335
Estimated Annual O&M: 294,333
Present Value: $15,051,691
Estimated Total Cost: $16,524,638
Estimated Construction Time Frame: 72 months

Alternative LNAPL-5 is the most aggressive remedial alternative for this media. In addition to all the components of LNAPL-4, thermal technologies would be employed to mobilize the free phase

LNAPLs with high viscosities. This allows the bioslurping system to extract the mobilized LNAPLs from the subsurface.

SHALLOW GROUNDWATER

Shallow groundwater (SGW) contamination is primarily impacted by LNAPLs and hot spot soil contamination. Therefore, integration with the LNAPL alternative is critical to the successful risk reduction and remediation of the site. The bioslurping component of the LNAPL alternatives, in addition to collecting free phase product, would also recover an estimated 11 million gallons of shallow groundwater (over the first five years of operation). In that respect, it may be considered a defined-term shallow groundwater pumping system.

Alternative SGW-1: No Further Action, Unmonitored Natural Attenuation

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

Alternative SGW-2: Institutional Controls, Source Remediation/Control (see Soils/LNAPL), and Monitored Natural Attenuation

Estimated Capital Cost: $168,000
Estimated Annual O&M: $88,950
Present Value: $1,929.521
Estimated Total Cost: $1,932,149
Estimated Construction Time Frame: 36 months

Shallow groundwater is impacted by remaining site sources including LNAPL and contaminated soil. It is addressed through the soil, LNAPL and deep groundwater alternatives. The more aggressive LNAPL-4 and LNAPL-5 alternatives include bioslurping which will also extract some contaminated shallow groundwater. ICs include the existing deed restrictions and the New Jersey CEA/WRA.

Alternative SGW-3: Institutional Controls, Source Remediation/Control (see Soils/LNAPL), In-Situ Treatment (via Phytoremediation), and Monitored Natural Attenuation

Estimated Capital Cost: $1,674,000
Estimated Annual O&M: $121,950
Present Value: $4,085,706
Estimated Total Cost: $4,247,434
Estimated Construction Time Frame: 36 months

This alternative includes all the components of SGW-2 and adds the phytoremediation component noted in SHS-3 to aid in the remedy of shallow groundwater. The in-situ phytoremediation will include dense planting of trees with abundant water uptake to provide hydraulic containment while providing biodegradation in the root zone.

DEEP GROUNDWATER

Alternative DGW-1: No Further Action, Unmonitored Natural Attenuation

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

Alternative DGW-2: Source Area In-Situ Treatment (via Chemical Oxidation (ISCO) and Enhanced Aerobic Biodegradation)

Estimated Capital Cost: $14,687,099
Estimated Annual O&M: $166,500
Present Value: $17,787,014
Estimated Total Cost: $20,217,749
Estimated Construction Time Frame: 48 months

Alternative DGW-2 employs in-situ chemical oxidation treatment in high COC areas at the base of the UMPRM aquifer in order to oxidize the COCs to carbon dioxide or convert them to innocuous transformation products. Oxidants would be injected through a series of wells installed into the groundwater PTZ which lies beneath the southeastern portion of the BROS property. Post-treatment of the PTZ, the addition of oxygen, carbon and nutrients would be conducted to enhance natural aerobic biodegradation in lower threat and downgradient areas, if necessary.

Alternative DGW-3: Source Area In-Situ Treatment (via Chemical Oxidation), Monitored Natural Attenuation

Estimated Capital Cost: $9,738,144
Estimated Annual O&M: $111,000
Present Value: $11,921,702
Estimated Total Cost: $13,417,255
Estimated Construction Time Frame: 48 months

Alternative DGW-3 utilizes monitored natural attenuation in place of enhanced biodegradation for lower threat and downgradient groundwater areas.

Alternative DGW-4: Source Area Containment Pumping/Treatment/Discharge with Downgradient In-Situ Treatment (via Enhanced Aerobic Biodegradation)

Estimated Capital Cost: $11,704,770
Estimated Annual O&M: $2,272,148

Present Value: $46,897,860
Estimated Total Cost: $48,492,384
Estimated Construction Time Frame: 48 months

Alternatives DGW-4 and 5 are containment technologies and will not actively treat groundwater at the site. A series of extraction wells would be constructed to capture contaminated groundwater emanating from the site. Contaminated water would be pumped to a newly constructed on-property wastewater treatment plant. Treated water would be discharged to a tributary of Little Timber Creek. Enhanced biodegradation for downgradient areas will include the injection of amendments to contaminated aquifer zones to accelerate naturally occurring biodegradation mechanisms.

Alternative DGW-5: Source Area Containment Pumping/Treatment/Discharge with Downgradient Monitored Natural Attenuation

Estimated Capital Cost: $5,009,445
Estimated Annual O&M: $2,044,724
Present Value: $28,582,158
Estimated Total Cost: $34,284,834
Estimated Construction Time Frame: 48 months

Alternative DGW-5 replaces the enhanced biodegradation component for downgradient areas with monitored natural attenuation.

Alternative DGW-6: Phased Combination

Principal Threat Zone (PTZ) Pumping and Treatment (for Mass Reduction), followed by In-Situ Treatment (via Chemical Oxidation) in Significant Rebound Areas, and Enhanced Biodegradation

Lower Threat Zone (LTZ – i.e., area surrounding the PTZ) Pumping and Treatment (for Mass Reduction), followed by Enhanced Biodegradation in Significant Rebound Areas, and Downgradient Area Enhanced Biodegradation

Estimated Capital Cost: $26,986,075
Estimated Annual O&M: $3,709,336
Present Value: $47,981,276
Estimated Total Cost: $57,719,628
Estimated Construction Time Frame: 48 months

Alternative DGW-6 will employ multiple technologies in different areas of the site. The technologies will be employed following an adaptive or sequenced event management process. In the process, treatment will be applied and potentially re-applied in zones not responding or achieving remedial action objectives.

Initially, the PTZ will be pumped for contaminant mass reduction. This will be followed by an initial round of chemical oxidant injection along with aquifer pumping. The pumping will aid in the distribution of the chemical additives. Subsequent chemical oxidant injections will be completed in rebound areas. Extracted water will be treated in an on-site treatment facility prior to surface water discharge. Following the extraction and addition of oxidants in the PTZ, the LTZ (area surrounding the PTZ) remediation will begin. This will include groundwater extraction with on-site treatment and discharge along with enhanced biodegradation through the addition of amendments. Enhanced biodegradation for downgradient areas will include the injection of amendments to contaminated aquifer zones to accelerate naturally occurring biodegradation mechanisms.

Alternative DGW-7: Phased Combination Source Area (PTZ) Pumping and Treatment (for Mass Reduction), followed by In-situ Treatment (via Chemical Oxidation) in Significant Rebound Areas, followed by Enhanced Biodegradation in Significant Rebound Areas, and Downgradient Area Monitored Natural Attenuation

Estimated Capital Cost: $20,438,575
Estimated Annual O&M: $3,528,287
Present Value: $41,158,265
Estimated Total Cost: $47,216,495
Estimated Construction Time Frame: 48 months

Alternative DGW-7 includes all the components of DGW-6 with the exception of replacing downgradient enhanced biodegradation with MNA.

WETLANDS

Wetland alternatives take into consideration that approximately 10 acres of wetlands pose ecological risks substantially exceeding sediment screening criteria. The wetlands are divided into *De Manifestis*, *Intermediate* and *De Minimis* zones. Human health risks are not an issue with regard to the wetlands.

Due to the substantial differences in the potential applicability of the various alternative groupings, separate sets of alternatives were developed and screened for the *De Manifestis* and *Intermediate* zones. A total of five remedial alternatives survived the two-tier screening process for the *De Manifestis* zone. All five were carried forward for detailed analysis.

Alternatives for De Manifestis Zone Areas:

Alternative DMZ-1: No Further Action, Unmonitored Natural Remediation

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

Natural remediation processes evidenced in the DMZ areas of the site include deposition of clean sediment, sequestration of metals, and absorption and biological degradation of organics, COPECs and LNAPL.

Alternative DMZ-2: Semi-solid Excavation, Ex-Situ Treatment, On-Site Disposal (Sediment Management Area), Backfill, and Wetland Restoration

Estimated Capital Cost: $8,493,195
Estimated Annual O&M: $30,000
Present Value: $9,239,559
Estimated Total Cost: $10,297,524
Estimated Construction Time Frame: 36 months

Alternative DMZ-2 will involve the physical removal of petroleum and PCB-impacted sediment and organic muck by excavation. Excavated material would be solidified and stabilized prior to transport and disposal on-site in a newly constructed sediment management area on the BROS property. The excavated area would be backfilled with clean material to facilitate subsequent wetland restoration.

Alternative DMZ-3: Semi-Solid Excavation, Ex-Situ Treatment, Off-Site Disposal (Landfilling), Backfill, and Wetland Restoration

Estimated Capital Cost: $9,384,228
Estimated Annual O&M: $20,000
Present Value: $9,940,554
Estimated Total Cost: $11,145,429
Estimated Construction Time Frame: 36 months

DMZ-3 is identical to DMZ-2 with the exception that excavated material would be disposed off-site.

Alternative DMZ-4: Semi-Solid Excavation, Ex-Situ Treatment, On-Site Disposal (Sediment Management Area), In-Situ Treatment with Sorptive Agent (prior to Capping or incorporated into Backfill), Backfill, and Wetland Restoration

Estimated Capital Cost: $9,121,029
Estimated Annual O&M: $30,000
Present Value: $9,878,850
Estimated Total Cost: $11,019,533
Estimated Construction Time Frame: 36 months

Alternative DMZ-4 is identical to DMZ-2, with the exception that a sorptive agent would be applied over the exposed excavated surface of the DMZ.

Alternative DMZ-5: Semi-Solid Excavation, Ex-Situ Treatment, Off-Site Disposal (Landfilling), In-Situ Treatment with Sorptive Agent (prior to Capping or incorporated into Backfill), Backfill, and Wetland Restoration

Estimated Capital Cost: $10,012,062
Estimated Annual O&M: $20,000
Present Value: $10,579,845
Estimated Total Cost: $11,867,438
Estimated Construction Time Frame: 36 months

Alternative DMZ-5 includes all the components of DMZ-4 with the exception that excavated material would be disposed off-site.

Alternatives for Intermediate Zone Areas:

IZ-1 No Further Action, Unmonitored Natural Remediation

Estimated Capital Cost: $0
Estimated Annual O&M: $0
Present Value: $0
Estimated Total Cost: $0
Estimated Construction Time Frame: None

The no action alternative, consistent with the NCP, is evaluated generally to establish a baseline for comparison. Under this alternative, no additional remedial action beyond that which has already been undertaken would occur. The BROS property institutional controls would remain in place.

IZ-2: Natural Remediation (Monitored), Institutional Controls

Estimated Capital Cost: $ 0
Estimated Annual O&M: $65,000
Present Value: $577,232
Estimated Total Cost: $577,232
Estimated Construction Time Frame: None

Alternative IZ-2 includes additional environmental monitoring and institutional controls beyond those already implemented at the site. Monitoring would be performed to confirm the stability of existing conditions following DMZ remediation. ICs would include deed restrictions to control activities in wetland and buffer areas.

IZ-3: Silt/Clay Cover, and Wetland Restoration

Estimated Capital Cost: $975,238
Estimated Annual O&M: $45,000
Present Value: $1,545,161
Estimated Total Cost: $1,633,059
Estimated Construction Time Frame: 12 months

This alternative involves the placement of a silt/clay cover over the entire IZ area to minimize the potential for direct contact between the IZ sediment and potential ecological receptors. The wetland would be restored to preserve the integrity of the existing habitat and facilitate the natural remediation of COCs.

IZ-4: Silt/Clay Cover with Sorptive Agent Properties (In-Situ Treatment), and Wetland Restoration

Estimated Capital Cost: $1,439,613
Estimated Annual O&M: $45,000
Present Value: $1,990,503
Estimated Total Cost: $2,197,090

Estimated Construction Time Frame: 12 months

This alternative is similar to IZ-3 but adds a sorptive agent prior to, during, or immediately after cover placement to further reduce the potential movement of COPECs. The wetland would be restored to preserve the integrity of the existing habitat and facilitate the natural remediation of COCs.

11. COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA § 121, 42 U.S.C. § 9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR § 300.430(e)(9), EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies*, OSWER Directive 9355.3-01, and EPA's *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, OSWER 9200.1-23.P. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria (two threshold, five primary balancing and two modifying criteria) and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

Threshold Criteria - *The first two Superfund criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

11.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

While surficial soils at the site are clean and do not pose a significant threat to human health or the environment, a number of future use scenarios exhibit potentially completed exposure pathways. Remedial measures found in all of the alternatives, with the exception of the no action alternative, contain ICs and drainage improvements to reduce the impacts from contaminated soil. As these processes are also amenable to the more significant LNAPL media, they are not discussed under the soil category. The preferred soil alternative, SHS-4, does contain an enhanced biodegradation component which will provide a higher level of treatment among the alternatives.

Alternative LNAPL-5 provides the highest level of protection depending on bioslurping technology performance. Operations evaluations will be conducted to determine the success of bioslurping and to assess the need for utilization of other technologies (included in the selected remedy). LNAPL-5 was selected over the other active remediation alternatives based on its ability, through the addition of thermal technologies (in addition to bioslurping technology), to remove and treat the various types and viscosities of oily LNAPL present in different areas of the site.

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Shallow groundwater will be managed primarily through the implementation of the soil and LNAPL alternatives. Deep groundwater alternatives are centered on the ability to achieve established restoration goals and the time frames required for implementation. Alternatives DGW-2, 3, 6 and 7 provide direct aquifer treatment, while DGW-4 and 5 involve primarily hydraulic control technologies. Alternatives DGW-6 and 7 provide the greatest protection and employ phased, combined technologies to address both the PTZ and LTZ.

With the exception of the no action alternatives (DMZ-1 and IZ-1), the alternatives provided a similar level of protection for ecological receptors in the wetlands. Those alternatives involving off-site disposal of contaminated wetland sediments were preferred since they avoided long-term maintenance requirements associated with on-site disposal. Also, because it included an additional in-situ treatment step thought to enhance wetland restoration efforts, Alternative DMZ-5 was considered the most desirable.

11.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121 (d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Although Alternatives SHS-5 and 6 involve the removal of large amounts of contaminated soil, some soil contamination would still remain and represent a continuing source of groundwater contamination. Alternatives SHS-1 and 2, with no treatment component, would not meet ARARs. The minimal treatment provided under Alternative SHS-3 also is not expected to result in ARAR compliance. Alternative SHS-4, with an enhanced biodegradation component representing the highest degree of treatment, is believed to offer the best chance of meeting soil cleanup standards.

The State of New Jersey requires the removal of LNAPLs to the extent practicable. Alternatives LNAPL-2 and 3, using passive techniques similar to the ones currently operating on-site, do not satisfy this requirement. Alternative LNAPL-4 includes a bioslurping technology to more actively extract LNAPL. However, bioslurping alone may not be effective in removing a portion of the LNAPL characterized by its higher viscosity. Alternative LNAPL-5 adds thermal treatment to the bioslurping technology to enhance the recovery of the less mobile LNAPL. This alternative is expected to remove the most LNAPL from the subsurface and satisfy the state LNAPL requirement. In addition, removal of larger amounts of LNAPL also reduces a major source of groundwater contamination helping to achieve groundwater ARARs in both the shallow and deep aquifers.

For deep groundwater, Alternative DGW-1 involves no action and would not meet ARARs. Alternatives DGW-2 and 3 provide for in-situ treatment of source area contamination leaving a large portion of the plume to be addressed by natural processes. Under these alternatives, ARARs would not be met for much of the groundwater plume in a reasonable time period. Alternatives DGW-4 and 5 focus on containing the more contaminated portion of the groundwater plume and prevent it from spreading by pumping the groundwater in the source area. By definition, the goal of these alternatives is not to restore the groundwater to meet ARARs in a reasonable period of time. Alternatives DGW-6 and 7 include a combination of groundwater pumping and in-situ treatment technologies. These alternatives employ the most aggressive actions to meet ARARs in larger areas of the groundwater plume (including the PTZ). Alternative DGW-6 includes bioremediation (vs natural attenuation for DGW-7) of the downgradient portion of the groundwater plume. Thus, it attempts to achieve ARARs throughout the entire plume in the most reasonable time period.

For wetlands, Alternative DMZ-1 which involves no action would not meet ARARs. Alternatives DMZ-2, 3, 4 and 5 involve similar excavation of the land area impacted by the past release of oily liquid from the former waste oil lagoon and all are expected to achieve a similar level of ARAR compliance. The alternatives differ in regard to the disposal methods for the excavated material and two of the alternatives add an in-situ treatment step which is expected to benefit wetland restoration. With the exception of IZ-1 involving no action, Alternatives IZ-2, 3 and 4 are all expected to comply with ARARs in the remaining wetland areas not targeted for active remediation.

Primary Balancing Criteria - *The next five Superfund criteria, 3 through 7, are known as "primary balancing criteria." These five criteria are factors with which tradeoffs between response measures are assessed so that the best option will be chosen, given site-specific data and conditions.*

11.3 Long-Term Effectiveness and Permanence

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Alternative SHS-1 involves no action and is not an effective alternative. Alternative SHS-2 requires only institutional controls to deal with the contaminated soil. Alternatives SHS-3 and 4 include treatment components in additional to institutional controls which enhance their long-term effectiveness and permanence. Alternatives SHS-5 and 6 involve excavation of contaminated soil which also provides a high degree of permanence for that portion of the contamination addressed. Because it provides the highest level of treatment along with ICs, Alternative SHS-4 is believed to offer the most effective and permanent solution to the soil contamination problem.

Alternatives LNAPL-2 and 3 only include passive recovery methods and do not offer permanent resolution of the free phase or residual LNAPL. Both LNAPL-4 and 5 provide high levels of recovery and treatment affording long-term effectiveness and permanence. More highly viscous fluids may only be removed through Alternative LNAPL-5.

Alternative SGW-2 adds additional monitored natural attenuation and monitoring to the soil and LNAPL components.

Alternative DGW-1 involves no action and does not provide an effective or permanent solution to the groundwater contamination problem. Alternatives DGW-2 and 3 include in-situ treatment of source area contamination but do not attempt to actively remove contaminant mass. Consequently, unacceptable contaminant levels will exist in much of the groundwater plume for extended periods. Alternatives DGW-4 and 5 only attempt to contain the more highly contaminated groundwater zone and thus do not offer a permanent solution to the problem.

Alternatives DGW-6 and 7 afford the highest degree of long-term effectiveness and permanence. Both DGW-6 and 7 provide for the extraction of significant volumes of contaminated groundwater which will reduce contaminant mass. These alternatives employ in-situ chemical treatment technologies which have the potential to reduce contaminants in the aquifer to a permanently innocuous state. Alternative DGW-6 provides a further benefit in attempting to address a larger groundwater area (downgradient) in a more active manner.

With the exception of no action, the wetland alternatives (DMZ-2, 3, 4 and 5) all involve removal of highly contaminated wetland sediments which represents an effective and permanent solution to the problem.

11.4 Reduction in Toxicity, Mobility, or Volume Through Treatment

Reduction in Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment and the amount of contamination present.

Alternative SHS-2 provides the least amount of toxicity and volume reduction of the active soil alternatives. While SHS-3 adds some toxicity, mobility and volume reductions through the use of phytoremediation, it would still leave large quantities of contaminant mass in the environment. Alternative SHS-4 provides the highest level of treatment to reduce toxicity, mobility and volume of COCs through the use of phytoremediation and biodegradation.

Alternatives LNAPL-2 and 3 provide some reduction in volume and mobility. LNAPL-4 and 5 provide the highest level of treatment to reduce toxicity, mobility and volume. LNAPL-5 may be required to mobilize more viscous oily material present on the site, thereby allowing a larger volume of LNAPL to be removed.

As part of the overall site-wide remedy, millions of gallons of shallow groundwater will be extracted. While attaining water quality standards on-property is recognized as difficult and perhaps impracticable, the overall approach to shallow groundwater remediation, including the implementation of SGW-2, will provide the most reduction in toxicity, mobility and volume of all the alternatives evaluated.

Alternative DGW-1 involves no treatment to reduce the toxicity, mobility and volume of site contaminants. Alternatives DGW-2 and 3 provide in-situ treatment of source area contamination. Alternatives DGW-4 and 5 contain the high levels of groundwater contaminants by pumping and making them less mobile. Although the goal of such alternatives is not to restore the aquifer, the extracted groundwater is treated to remove contaminants of concern from the environment.

Alternatives DGW-6 and 7 offer the highest level of treatment to reduce the toxicity, mobility and volume of COCs at the site. Both of these alternatives remove contaminant mass through pumping and provide groundwater treatment through the addition of chemical additives. DGW-6 is believed to offer the highest potential to reduce the time frame required to achieve site RAOs as it also employs a bioremediation component.

For wetlands, with the exception of no action, the alternatives all involve the excavation of contaminated sediments from that area impacted by the past releases of oily liquids. However, the excavated materials will not be treated (other than for transportation purposes) to reduce toxicity, mobility or volume.

11.5 Short-Term Effectiveness

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents and the environment during implementation.

For soils, none of the alternatives are projected to pose any unacceptable risk to the community, workers or the environment, although there are some risks associated with construction and implementation activities for all of the alternatives except no action.

While none of the active LNAPL alternatives are projected to pose any unacceptable risk to the community, workers or the environment, Alternative LNAPL-5, by using thermal enhancements, does pose some risk of cross-contamination to non-impacted soils.

There are no unacceptable risks associated with Alternative SGW-2 or the other shallow groundwater alternatives.

None of the deep groundwater alternatives are predicted to pose unacceptable risks to the community, workers, or the environment during construction or implementation.

All of the active wetland alternatives involve the excavation of contaminated sediments for either on-site or off-site disposal. Minimal short-term risks are anticipated in connection with excavation activities or transportation of excavated sediments to disposal facilities.

11.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility and coordination with other governmental entities are also considered.

The active soil alternatives will utilize relatively standard and available construction equipment and techniques. For those alternatives involving soil excavation, such equipment is readily available as this method of cleanup is employed frequently at Superfund sites. Some field trial work may be needed in connection with the enhanced biodegradation component of Alternative SHS-4.

Given the innovative nature of the technologies to address LNAPL contamination, pilot-scale or field trial work will be required for all of the active alternatives. Work completed to date by EPA, including the LNAPL extraction program and water budget testing using phytotechnology (planting trees to reduce the amount of water available to infiltrate the site), will assist in future system design. Alternative LNAPL-5 will require the most field-scale pilot work due to the potential use of thermal enhancement technology in addition to the innovative bioslurping technology. Performance criteria will need to be established to trigger the initiation of thermal treatment.

Shallow groundwater alternatives, SGW-2 and SGW-3, add a monitored natural attenuation component to the soil and LNAPL technologies and are fully implementable.

Alternative DGW-1 involving no action for groundwater is implementable. Alternatives DGW-2 and 3 providing for in-situ treatment may require field trials to determine the most effective groundwater additives. There may be some additional administrative issues regarding the underground injection of chemicals for these and other alternatives employing in-situ treatment technologies. The conventional extraction and treatment facilities associated with Alternatives

DGW-4 and 5 are readily available since this technique is utilized at many Superfund sites. The discharge from such facilities represents an additional administrative issue. Alternatives DGW-6 and 7 combine conventional pumping and innovative in-situ methods to treat contaminated groundwater.

The technical feasibility of deep groundwater chemical oxidation and enhanced aerobic biodegradation has been demonstrated through treatability studies. Additional field-scale pilot studies will be required to finalize design parameters for Alternatives DGW-6 and 7. In addition, access to off-site areas will be needed to implement the downgradient biodegradation component of Alternative DGW-6. However, the overall potential for a successful remedial action in a timely manner makes it the selected alternative. Further, the selected remedy includes a contingency action consisting of hydraulic containment (DGW-4) in the event the preferred approach is not successful in achieving cleanup goals.

The excavation alternatives for wetland sediments are all considered to be implementable. They will utilize readily available construction equipment similar to that used at numerous other Superfund sites. The off-site disposal facilities required for the selected alternative are also expected to be available.

11.7 Cost

Cost includes estimated capital and annual operation and maintenance costs, as well as present value cost. Present value cost is the total cost of an alternative over time in terms of today's dollar value.

Capital costs, O&M costs, present value costs and total remedy costs were used for remedial alternative comparison purposes. Overall, the total costs for the selected remedy appear reasonable for the risk reduction that will be realized. Table 13-11 provides the breakout of total costs.

For Wetlands, Alternative DMZ-5 is at the upper end of costs. However, the alternative provides the highest level of contaminant mass and risk reduction. Based on the risks present, IZ-2, at the lower end of cost intermediate zone remediation costs, still meets project goals.

The estimated costs for implementation of the biodegradation component for soils (under Alternative SHS-4) are reasonable and may be reduced pending the outcome of aggressive LNAPL remediation.

Alternative LNAPL-5, at the upper end of LNAPL remediation costs, also includes components to address shallow groundwater and soil contamination. It is the most comprehensive of the LNAPL alternatives, and offers the best opportunity for achieving remedial goals. LNAPL-5 will provide for the greatest contaminant mass reduction.

Most of the costs related to shallow groundwater remediation are contained in the soil and LNAPL alternatives. Costs for the added SGW-2 monitored natural attenuation and monitoring component are reasonable.

While Alternative DGW-6 is at the upper end of costs for deep groundwater remediation, the alternative provides the most opportunity for a successful deep groundwater cleanup in a timely manner.

EPA also analyzed the feasibility of excavation alternatives for remediation of the contaminated soil. Targeted and aggressive excavation approaches have high estimated costs at $34.6 million and $126 million, respectively. These alternatives were not considered further due to the potential for recontamination of remediated areas from the remaining LNAPL and the extent of residual contamination which would not be practicable to remove.

Modifying Criteria *- The final two evaluation criteria, 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.*

11.8 State Acceptance

State Acceptance indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

The State of New Jersey, which is the support agency for this project, concurs with the selected remedy for the BROS site.

11.9 Community Acceptance

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Judging from the comments received during the public comment period, the residents and town officials strongly support EPA's overall remedial approach for the site. No information has been brought to light or comments offered which suggested a change to the preferred remedy described in the Proposed Plan. All significant comments raised during the comment period are addressed in the Responsiveness Summary (see Part 3, Attachment 1).

12. PRINCIPAL THREAT WASTES

Of the remaining site wastes, a zone of highly contaminated groundwater, characterized by chlorinated volatile organic compounds (CVOCs) and exhibiting a low pH, present at the bottom of the UMPRM aquifer immediately beneath the on-property area, and LNAPLs with high CVOC and PCB levels in close proximity to the outline of the former lagoon are considered principal threat wastes.

The UMPRM contamination includes a slug of highly contaminated groundwater in a 25 to 30-foot thick zone which encompasses approximately 15.06 acres in areal extent. The delineation of the extent of this contaminated groundwater zone is the area which exceeds 1,000 ug/L total CVOCs. This zone is referred to as the Principal Threat Zone. This slug of highly contaminated material is centered in the vicinity of MW 26 (in the middle of the on-property area). This contaminated groundwater is bounded on the bottom by a clay unit within the UMPRM aquifer. The upper surface of the clay unit is a bowl-shaped depression which provides some structural control over the movement of the contaminated groundwater.

This CVOC groundwater zone exhibits a dense non-aqueous phase liquid (DNAPL) like condition, in that the more highly contaminated water resides in the bowl-shaped depression at the base or bottom of the aquifer, due to its physical properties including fluid density and low pH (in the 2 to 4 range). It is reported in the Phase 2 RI that this body of higher density, low pH groundwater was a result of the use of sulfuric acid in the oil recovery processing activities conducted on-site in the past. The dense residuals, derived from the acid-wash process were reportedly deposited directly into the former lagoon. This source mobilized and dissolved to form the downgradient groundwater plume. Tests for the presence of DNAPL at the site were negative. A lower threat zone surrounds the PTZ. The LTZ exhibits similar contaminants as the PTZ but at much lower concentrations.

LNAPL represents the other significant principal threat waste. Residual LNAPL was present in many soil samples collected from within the on-property area. In addition, at least three major zones of free phase LNAPL have been identified along the northern and western perimeters of the BROS property. Each of the zones exhibits unique physical and chemical properties. The LNAPL contamination is very complex and includes contaminated oily fluids of different viscosities. For instance, one LNAPL plume area has a low absolute viscosity (in the 7-8 centipoise range) with high CVOCs and PCBs, while another has a much higher viscosity (in the 600-610 centipoise range) with lower levels but a wider distribution in the types of contaminants. PCB levels in excess of 4,000 ppm were recorded for some of the LNAPL.

Insofar as the LNAPL contamination, recent investigatory activities completed by EPA estimated that 107,000 gallons of free and residual LNAPL remain above, at and below the water table. It is estimated that 40,500 gallons of free-phase LNAPL is recoverable. To date, EPA actions have removed approximately 11,000 gallons of the recoverable LNAPL. This oil-like LNAPL contained high concentrations of BROS-related constituents (i.e., PCBs, BTEX, chlorinated organics) and was properly disposed at an off-site facility.

Areas with free phase LNAPL appear to be of the most concern, due to the potential mobility of this material. Additional information concerning these principal threat residuals are found in the RI/FS documents.

13. SELECTED REMEDY

13.1 The Selected Remedy

The selected remedy includes Alternatives SHS-4, LNAPL-5 and SGW-2 for *Soil, LNAPL and Shallow Groundwater*, Alternative DGW-6 for *Deep Groundwater*, along with Alternative DGW-4 as a contingency, and Alternatives DMZ-5 and IZ-2 for the *Wetland* remedy. Table 13-1 provides EPA's recommended remedy components by media.

The remedy for soils, shallow groundwater and LNAPL includes cover and drainage improvements, bioslurping, water budget management (via phytoremediation – planting of trees), and enhanced bioremediation to reduce contaminant levels. Institutional controls, as described above

(Section 2.2 - *Enforcement Activities*/Section 6.2.1.2 - *Geology/Hydrogeology*) will also be component of the remedy.

The drainage improvements will include site regrading, placement of engineered drainage channels where necessary and the installation of an alternate cover. The alternate cover will be a modified surface runoff, evapotranspiration type vegetative soil cover. This will minimize cover penetrations by optimizing the available water holding capacity of the cover soil and evapotranspiration rates of planted vegetation. Water budget management will also involve the use of phytoremediation. A densely planted stand of trees (approximately 600 per acre) will regulate water infiltration and evapotranspiration, and support nutrient movement and biological activity in the subsurface. This will support the biodegradation of site COCs in soil and shallow groundwater. The phytoremediation activity performed for water budget management would be operated for over 20 years.

Limited off-property excavation will also help manage soil, LNAPL and shallow groundwater contamination for the Gaventa Pond seep and Green Acres property area (contaminated area just south of the former lagoon). The Gaventa Pond seep excavation will include the removal of soils and sediments from near the waters edge over an approximate 2,500 square foot area. After placement of a geo-membrane, the excavated area will be backfilled. Contaminated material will be disposed off-site. The Green Acres property remedy includes the excavation of contaminated shallow soil (in the 2 to 4 foot depth range) over a 10,000 square foot area. These limited excavation activities will take less than three years to complete.

The bioremediation enhancement component for soils, shallow groundwater and LNAPL will include the injection of chemical additives at upwards of 230 locations. The limited excavation activities will take approximately three years to complete.

Bioslurping will be the primary technology to address the Soil, LNAPL, and Shallow Groundwater contamination on-property. Bioslurping involves the vacuum extraction of LNAPL through a slurp tube set at the LNAPL/groundwater interface. Adjustments to the tube are made to optimize the withdrawal of free phase materials. During this process, shallow groundwater and/or soil vapors (volatile contaminants release to the soil unsaturated zone) will be withdrawn when the level of LNAPL drops or raises based on pumping and/or water table elevation conditions (when the vacuum extraction tube is not centered in the free phase LNAPL, but in the unsaturated zone or beneath the free phase LNAPL in the shallow groundwater). The bioslurping activity will include the installation of approximately 72 bioslurping extractions points. Steam injection will be utilized as an enhancement to bioslurping to aid in the mobilization of viscous LNAPLs, when and where warranted. Individual technical performance criteria will be developed to evaluate bioslurping LNAPL recovery rates to trigger the implementation and/or termination of steam injection. The magnitude of the steam injection effort will be dependent on the effectiveness of the innovative bioslurping technology.

FS estimates for the bioslurping component of the remedy indicate that system operation and maintenance could extend up to 10 years.

The Agency selected Alternative DGW-6 for deep groundwater because it provides the most treatment and engineering controls available among the alternatives screened to address groundwater contamination. Alternative DGW-6 takes a more comprehensive approach to groundwater remediation than DGW-7, through more active in-situ biological treatment of the downgradient groundwater contaminant plume.

The selected deep groundwater remediation will employ pumping and treatment for mass reduction, followed by in-situ chemical oxidation. The mass reduction pumping will optimize groundwater conditions to support the chemical treatment applications. Oxidants will be added to the subsurface over the entire southern half of the BROS property to address both the UMPRM principal threat area and the dissolved groundwater plume. Additional aquifer pumping and chemical oxidation treatments will be performed, where necessary, following the adaptive management process (conducting additional treatment events in areas where contaminant concentrations rebound). In the principal threat zone, enhanced biodegradation will be employed following the chemical oxidation. It is expected that an array of 50 extraction wells and upwards of 300 chemical injection points will be necessary. It is anticipated that over 100 million gallons of water will be pumped from the aquifer over the first two years of system operations, and the long-term operations could realize the extraction of over 500 million gallons. This will support both mass reductions of contaminants in the aquifer as well as support delivery of chemical additives designed to treat groundwater. In the lower threat zone, pumping and treatment will be followed by bioremediation in significant rebound areas. In areas downgradient of the lower threat zone (south of Route 295), enhanced bioremediation will be employed. The downgradient bioremediation will be one of the last actions conducted. Risk reduction will be a factor in determining the extent of bioremediation.

FS estimates indicate that the deep groundwater PTZ pumping and treatment component will take almost nine years of operation and maintenance to complete. Upon completion of the PTZ cleanup effort, the LTZ and downgradient components would require just over 14 years of operation and maintenance. The overall duration of the groundwater operation and maintenance program (post-construction) will be approximately 23 years.

The primary treatment technology, chemical oxidation, uses chemicals called oxidants to destroy pollution in groundwater. Oxidants help change harmful chemicals into harmless ones, like water and carbon dioxide. To clean up the site faster, aquifer pumping is proposed along with oxidant injection. This approach helps mix the oxidant with the harmful chemicals in the groundwater. A range of oxidants will be tested at the site including hydrogen peroxide and potassium permanganate. Biological treatment (the biodegradation component for shallow groundwater) will include the addition of nutrients and/or an oxygen source. Individual technology performance criteria will be developed to evaluate the need for chemical oxidant injection re-treatment of rebound areas.

Source area containment pumping (Alternative DGW-4) with enhanced biodegradation in downgradient areas is proposed as the contingency remedy should chemical oxidation prove ineffective. The contingency action will be implemented, at the discretion of EPA with notice to the Settling Defendants, if the data (in-field site-specific measurements) from the completed sequential remedial process (i.e., multiple rounds of chemical and biological treatment with pumping of the deep groundwater) indicate the primary approach cannot achieve the established remedial goals. During design, interim performance measures may also be established.

In the event that the groundwater contingency action must be implemented, the groundwater extraction and treatment facilities constructed for Alternative DGW-6 (pumping with chemical treatment) will already be in place. Therefore, only limited additional construction activities (i.e., the installation of additional groundwater recovery wells and piping infrastructure) to implement the contingency remedy will be necessary.

Treatability studies indicate that contaminants in the downgradient area of the plume can be effectively treated by in-situ biological methods. Detailed information to assess the effectiveness of enhanced biodegradation for the downgradient portion of the plume will be developed during the design phase of the project. The downgradient biodegradation component of the remedy will reduce the elevated concentrations of VOCs in a shorter period of time than monitored attenuation or no action, which is desirable given the pressures in the area to develop the land southeast of the site. Initial estimates indicate the downgradient biodegradation component will take a minimum of three years to complete. Monitored natural attenuation would extend significantly beyond that time frame, perhaps as long as 30 years. This area relies on groundwater resources for potable water supplies. The downgradient biodegradation provides these benefits at a reasonable cost.

The wetlands remediation will include excavation of approximately 17,500 cubic yards of contaminated sediment from the more highly contaminated wetland area identified as the DMZ. The footprint of the area of excavation is approximately 10.6 acres. Excavated material will undergo ex-situ treatment and off-site disposal. Following the addition of sorptive agents over the disrupted area, the wetland will be restored. The excavated area restoration objective is to replace the red maple forested wetland that existed at the time of the lagoon release, and where technically feasible reforest with Atlantic white cedar, or a more diverse indigenous hardwood species. The proposed sediment excavation is a proven technology. The wetlands excavation activity is estimated to take 32 months to complete.

The adaptive management approach employed for remediation of the BROS site could realize additional cost savings. A key benefit of this flexible approach is that it allows specific actions to be evaluated and adjustments made to sequential actions. Individual technology performance criteria will be established for each Groundwater Work cleanup technology. The criteria, which will be developed during both the design and remedial action stages, will be periodically evaluated within the context of the adaptive management approach, to determine the need for additional treatment or change-over to other technology components of the selected remedy.

There is a potential that some of the innovative technologies may work better or be more effective than expected reducing the need for, or extent of, subsequent remedial actions. For example, the chemical oxidation process for the treatment of source area groundwater contamination (i.e., Alternative DGW-6) could be so effective that enhanced biodegradation would not be necessary for the downgradient groundwater plume. This would result in a cost savings relative to the projected amount. Of course, the reverse outcome is also a possibility. The ultimate goal of the recommended approach is to achieve the maximum benefit at a reasonable cost.

While the final sequencing of events will be determined during the design phase of project activities, the following order of major tasks is currently proposed.

1. Site preparation/ design/ contracting/ permitting

2. Limited west side property and off-property LNAPL management
3. Cover and drainage improvements
4. Wetlands excavation
5. Bioslurping/ LNAPL recovery/ shallow groundwater
6. Cover and drainage improvements
7. Initial pumping of deep groundwater
8. Chemical treatment of groundwater (multiple events)
9. Biological treatment of groundwater (multiple events)
10. Water budget management
11. Final restoration alternate cover placement

Based on information currently available, the remedy meets the threshold criteria and provides the best balance of trade-offs among the other alternatives with respect to the balancing and modifying criteria. EPA expects the remedy to satisfy the following statutory requirements of CERCLA Section 121 (b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies to the maximum extent practical; and (5) satisfy the preference for treatment as a principal element.

The information and experience gained during the first phase of chemical oxidation and bioslurping will be used to evaluate and determine compliance with the technology performance criteria. Further, the data gathered will enable EPA to determine if adjustments are needed to operations in the succeeding phase of chemical treatment and bioslurping.

13.2 Summary of the Estimated Costs of the Selected Remedy

The estimated total cost to implement the alternatives that comprise the remedy is $90.9 million. The total costs include:

Groundwater Work	
Soil/LNAPL/Shallow Groundwater	$20.7 million
Deep Groundwater	$57.7 million
Groundwater Contingency (as a stand alone) Groundwater Contingency (assuming start-up in year 15 of the remedial program and running for 15 years)	($42.5 million) ($5.7 million)
Wetlands Work	
DMZ/IZ	$12.5 million
Total Estimated Cost (without groundwater contingency)	$90.9 million

Present value costs for the remedy are estimated at less than $79 million (without the groundwater contingency). Excluding the wetlands work, those costs are estimated at just under $70 million. A breakdown of remedy total estimated costs is presented in Table 13-2. Detailed cost breakouts for each remedy component are found in the FS.

A number of cost scenarios were run for the potential transition to the contingency deep groundwater remedy (DGW-4). For example, the present value for DGW-4 assuming start-up in year 15 of the remedial program and continuing for 15 years is $5.7 million. Implementation (of Alternative DGW-4) at year 10 of the remedial program and continuing for 20 years is estimated at $8.8 million. Detailed costs for the present value analyses are found in the *BROS Remedial Alternatives Present Value Cost Analysis Technical Memo.*

The total estimated costs are based on the best available information. However, changes in the cost elements may occur as a result of new information and data collected during the remedial design.

13.3 Issues to be Addressed During the Remedial Design Phase of the Selected Remedy

Following issuance of this ROD, EPA will implement a community involvement program that will provide members of the public and elected officials the opportunity for early and meaningful input during the decision-making phases of the remedial design.

EPA will develop a detailed scope of work for the remedy and sampling and monitoring, quality assurance, and safety plans will be developed and implemented during the design, construction and post-construction phases.

While the range of time to construct each of the selected remedial components is from 36 to 72 months, the phased management approach adopted herein will impact the overall length of time to complete the entire remedy. During the project design phase, which is expected to take approximately 18 months, additional schedule details will be forthcoming.

13.4 Rationale for Selection of the Selected Remedy

The selection of a remedy is accomplished through the evaluation of the nine criteria as specified in the NCP. A remedy selected for a site will be protective of human health and the environment, comply with ARARs and offer the best balance of trade-offs with respect to the balancing and modifying criteria in the NCP.

Through the analyses conducted for the RI/FS, EPA has determined that there is an unacceptable risk to human health and the environment from the contamination present at the site. Accordingly, the No Action alternative is not protective of human health and the environment and therefore could not be selected for the site.

The selected remedy provides for source area remediation while achieving aquifer restoration goals. It will employ technologies which will achieve contaminant mass reduction of principal threat wastes in all media and prevent the future off-site migration of contamination. It also is protective of the environment, because it will reduce contaminant levels in the active remediation area to less than threshold values. Overall reductions in ecological risk achieved by the selected remedy are large, especially in comparison with the No Action and monitored natural attenuation (MNA) alternatives.

As selected, the remedy complies with ARARs. Every attempt will be made to achieve ARARs. However, as noted, EPA cannot guarantee that achievement of all ARARs on the BROS property will prove technically practicable.

The selected remedy will be effective in the short and long-term and provides for permanent solutions to resolving groundwater and source area remediation. The permanent solutions utilize both conventional and innovative treatment processes to reduce the toxicity and mobility of site contamination. No impediments to the implementation of the remedy are anticipated. All of the necessary personnel, equipment and services required are expected to be readily available or reasonably arranged.

The costs are reasonable for an effort of this size, and the proposed program is within the baseline funding ceiling established within the settlement.

14. STATUTORY DETERMINATIONS

The selected remedy complies with the CERCLA and NCP provisions dealing with remedy selection. This includes selection of remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements, are cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity or mobility of hazardous substances as a principal element. The following sections discuss how the selected remedy meets these statutory requirements.

14.1 Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Risk is reduced through treatment and removal of contaminated groundwater and other source materials such as LNAPLs. The selected remedy is also protective of the environment. The selected remedy will reduce PCB and lead concentrations in the active wetland remediation area to below threshold values.

14.2 Compliance with ARARs

The selected remedy will comply with the chemical-specific, location-specific and action-specific ARARs as described in Section 9.2.

14.3 Cost-Effectiveness

The cost of the selected remedy is proportional to its overall effectiveness. The selected remedy's overall effectiveness is determined based on a consideration of its long-term effectiveness and permanence (Section 11.3), its ability to reduce the toxicity, mobility or volume of site-related contaminants through treatment (Section 11.4), and its short-term effectiveness (Section 11.5).

The selected remedy is significantly more protective of human health and the environment in the long-term than the No Action and other alternatives evaluated. It is also more implementable and desirable than the more costly excavation alternatives evaluated. While at the high end of cost for those alternatives evaluated, it provides the most contaminant mass and risk reduction of the alternatives.

14.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

Permanent solutions will be employed for deep groundwater, shallow groundwater, soils, LNAPLs and sediment remediation. Deep groundwater will be pumped to remove the more highly contaminated material and then chemically and biologically treated in-situ. Pumped water will be treated in an on-site groundwater treatment plant prior to surface water discharge. LNAPLs, shallow groundwater and soil vapors will be extracted with an innovative technology known as bioslurping. The more highly contaminated fraction of this extraction process will be sent off-site for incineration.

14.5 Preference for Treatment as a Principal Element

The selected remedy offers the highest level of treatment to reduce the toxicity, mobility and volume of COCs at the site. In-situ treatment and extraction and treatment of groundwater are principal elements of the remedy. In addition, the targeted removal of LNAPLs, soils, and sediments contaminated with BROS constituents will result in a long-term reduction in the mobility and volume of residual contamination. As noted, EPA has determined that given the volume of LNAPL, soils and sediment to be removed, treatment of the material prior to off-site disposal (other than the stabilization of the sediments for handling purposes) would not be cost-effective. During remedial design, EPA will consider whether there are any new treatment options for the dredged sediment and whether there are value engineering recommendations (*e.g.*, waste volume or toxicity reductions) that could improve the cost-effectiveness of the remedy.

14.6 Five-Year Review Requirements

Because the selected remedy will result in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action. The five-year review will evaluate the results from monitoring programs established as part of this remedy to ensure that the remedy remains protective of human health and the environment.

The protectiveness of the selected alternative will be further enhanced through continuation of institutional controls, including the continuation of the CEA/WRA until such time that cleanup levels are reached. In-place deed restrictions will continue in perpetuity.

15. DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

The Proposed Plan for the BROS site was released for public comment in July 2006. The Proposed Plan identified Alternatives SHS-4, LNAPL-5 and SGW-2 for *Soil, LNAPL and Shallow Groundwater*, Alternative DGW-6 for *Deep Groundwater*, along with Alternative DGW-4 as a contingency, and Alternatives DMZ-5 and IZ-2 for the *Wetlands* as the Preferred Alternatives for site remediation. The alternatives employ an adaptive management approach to manage conventional and innovative technologies including pumping and treatment with in-situ chemical treatment for deep groundwater, bioslurping, drainage controls, water budget management and institutional controls for soil, shallow groundwater and LNAPLs, and excavation and the addition of sorptive agents for wetland sediments.

EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy as originally identified in the Proposed Plan were necessary or appropriate.

PART 3: RESPONSIVENESS SUMMARY

The Responsiveness Summary is provided as Attachment 1to this Record of Decision.

Reference/Cited Documents

Bridgeport Rental and Oil Services (BROS) Superfund Site - Phase 2 Remedial Investigation, Prepared by the BROS Technical Committee, June 2006.

Bridgeport Rental and Oil Services (BROS) Superfund Site Phase 2 Feasibility Study, Prepared by the BROS Technical Committee, June 2006.

Summary of Monitoring for 2005 – Bridgeport Rental and Oil Services Site, Lockheed Martin, March 2006.

Interim Technical Report, Bridgeport Rental and Oil Services Site – Nature, Extent and Recovery of Light Non-Aqueous Phase Liquids, Lockheed Martin December 2004.

Technical Memorandum No. 10, Development of a Groundwater Flow, Fate and Transport Model for the BROS Phase 2 RI/FS, AMEC Earth & Environmental, February 2003.

BROS Remedial Alternatives Present Value Cost Analysis Technical Memo, P. Brussock to BROS Technical Committee, August 2006.

BROS Record of Decision

Tables

Table 6-1: Chemicals of Concern

COPC / MEDIA	VOCs[1]	SVOCs[2]	PCBs[3]	Metals	Low pH[4]	Total Petroleum Hydrocarbons
Soils/LNAPL/Shallow Groundwater/Deep Groundwater						
Soils	X	X (localized)				
LNAPL	X		X			
Shallow Groundwater	X	X		X	X (localized)	
Deep Groundwater	X	X		X	X	
Wetlands						
Sediments			X	X[5]		X
Surface Water			X[6]	X[7]		

(1) Includes volatile organic compounds such as benzene, toluene, ethylbenzene, xylene, trichloroethene, dichlorethene and vinyl chloride for all media with the exception of LNAPL where only benzene, toluene, ethylbenzene, xylene and trichloroethene present the greatest concern.
(2) Bis(2-chloroethylether)
(3) Polychlorinated biphenyls
(4) Residual sulfuric acid
(5) Predominantly lead
(6) Some detections in both filtered and non-filtered samples
(7) Not detected in filtered samples

Table 6-2: Wetland Zones/Areas of Concern

Severity of Risk	Risk Characterization/ Approach to Risk Reduction	Description/ Location
De Manifestis (DMZ)	Risks are high and considered manifestly intolerable. Action to reduce risk is required.	10.63 acres. Area immediately east of the former lagoon and an impacted area just north of Route 130.
Intermediate (IZ)	Risks are between DeManifestis and DeMinimis zones. Risk reduction may be considered.	12.60 acres. The one-hundred-foot area surrounding ("halo-like") the DeManifestis Zone.
De Minimis	Risks are so low that they are considered negligible. No action warranted.	Areas outside the Intermediate Zone but still within the influence of the site.

TABLE 8-1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Shallow Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Tap Water	PCBs	0.46	264	µg/l	4/4	264	µg/l	Max

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Deep Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Tap Water	BCEE	1	3800	µg/l	11/11	3800	µg/l	Max
	TCE	1	5800	µg/l	27/31	5800	µg/l	Max
	VC	1	93	µg/l	26/31	93	µg/l	Max

Max = Maximum value detected

TABLE 8-2
Non-Cancer Toxicity Data Summary

Pathway: Oral Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty Modifying Factors	Sources of RfD: Target Organ	Dates of RfD:
PCBs	Chronic	2E-05	mg/kg-day	100%	2E-05	mg/kg-day	Immune System	300	IRIS	06/02
BCEE	Chronic	NA	mg/kg-day	100%	NA	mg/kg-day			IRIS	06/02
TCE	Chronic	3E-04	mg/kg-day	100%	3E-04	mg/kg-day	Liver		NCEA	06/02
VC	Chronic	3.0E-3	mg/kg-day	100%	3.0E-3	mg/kg-day	Liver	30	IRIS	06/02

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates:
PCBs	Chronic	NA	mg/cu m	NA	mg/kg-day			IRIS	06/02
BCEE	Chronic	NA	mg/cu m	NA	mg/kg-day			IRIS	06/02
TCE	Chronic		mg/cu m	1.0E-02	mg/kg-day	Liver		NCEA	06/02
VC	Chronic		mg/cu m	2.8E-02	mg/kg-day	Liver	30	IRIS	06/02

Key:
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: National Center for Environmental Assessment, U.S. EPA

Summary of Toxicity Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern. When available, the chronic toxicity data have been used to develop oral reference doses (RfDs) and inhalation reference doses (RfDi).

TABLE 8-3
Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCBs	2.0E00	1/(mg/kg-day)	2.0E00	1/(mg/kg-day)	B2	IRIS	06/02
BCEE	1.1E00	1/(mg/kg-day)	1.1E00	1/(mg/kg-day)	B2	IRIS	06/02
TCE	4.0E-01	1/(mg/kg-day)	4.0E-01	1/(mg/kg-day)	Likely	NCEA	06/02
VC	7.2E-01	1/(mg/kg-day)	7.2E-01	1/(mg/kg-day)	A	IRIS	06/02

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCBs	NA		NA	1/(mg/kg-day)			06/02
BCEE			1.1E00	1/(mg/kg-day)	B2	IRIS	06/02
TCE			4.0E-01	1/(mg/kg-day)	Likely	NCEA	06/02
Vinyl Chloride			1.5E-02	1/(mg/kg-day)	A	IRIS	06/02

Key

IRIS: Integrated Risk Information System, U.S. EPA
NCEA: National Center for Environmental Assessment, U.S. EPA

EPA Group:

A - Human Carcinogen
B2 - Probable Human Carcinogen

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern in groundwater. Toxicity data are provided for both the oral and inhalation routes of exposure.

TABLE 8-4

Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Total
Groundwater	Shallow Groundwater	Tap Water	PCBs	Immune System	--	--	4	4
					Groundwater Hazard Index Total =			4

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult/Child Combined

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Total
Groundwater	Deep Groundwater	Tap Water	BCEE			--	--	
			TCE	Liver	6	0.7	--	6.7
			VC	Liver	0.3	0.3		0.6
					Groundwater Hazard Index Total =			7.3

Summary of Risk Characterization - Non-Carcinogens

The table presents hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance for Superfund states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse non-cancer effects.

TABLE 8-5

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Total
Groundwater	Shallow Groundwater	Tap Water	PCBs	–	–	2.6E-06	2.6E-06
						Total Risk =	2.6E-06

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Combined

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Total
Groundwater	Deep Groundwater	Tap Water	BCEE	5E-03	2E-02	–	3E-03
			TCE	3E-04	2E-04	–	5E-04
			VC	3E-04	9E-04	-	1E-03
						Total Risk =	5E-03

Summary of Risk Characterization - Carcinogens

The table presents cancer risks (CRs) for each route of exposure and for all routes of exposure combined. The Risk Assessment Guidance for Superfund states that, generally, the acceptable cancer risk range is 10^{-4} to 10^{-6}

Table 9-1: Groundwater Preliminary Remediation Goals

Analyte/ Contaminant Group	NJDEP GWQC	Federal MCL
Volatile Organic Compounds (ug/L)		
Benzene	1	5
TCE	1	5
Vinyl Chloride	1	2
Semi-Volatile Organic Compounds (ug/L)		
BCEE	7	-
Polychlorinated Biphenyls (ug/L)		
Total PCBs	0.5	0.5

Table 9-2: Soil Preliminary Remediation Goals

Analyte	On-Property NJDEP Restricted Use SCC (Non-Residential Direct Contact Soil Cleanup Criteria)	Off-Property NJDEP Unrestricted Use SCC (Residential Direct Contact Soil Cleanup Criteria)	Impact to Groundwater Soil Cleanup Criteria
Volatile Organic Compounds (mg/Kg)			
Benzene	13	3	1
Xylenes	1000	410	67
TCE	54	23	1
Semi-Volatile Organic Compounds (mg/Kg)			
Naphthalene	4200	230	100
TPH	10,000	10,000	-
Polychlorinated Biphenyls (mg/Kg)			
Total PCBs	2	0.49	50

Table 9-3: Wetland Preliminary Remediation Goals

Analyte	Proposed Level	Notes
Polychlorinated Biphenyls (mg/KG)		
Total PCBs	10 (surface average)	OU-1 on-site soil cleanup goal was 10 mg/Kg. Most total PCB levels outside the DMZ are less than 1 mg/Kg.
Metals (mg/Kg)		
Lead	1,000	OU-1 on-site soil cleanup goal was 1,000 mg/Kg. Most Intermediate zone lead in 250 to 500 mg/Kg range. SEL is 250 mg/Kg.

TABLE 13-1
BROS Remedy Components by Media

Media	Alternative No.	Remedy Components	Estimated Costs
Wetlands	DMZ-5	Excavation/ Ex-Situ Treatment/ Off-Site Disposal/ Application of Sorptive Agent (prior to Capping or incorporated into Backfill)/ Wetlands Restoration Physical Amenities: Includes the excavation of approximately 17,500 cubic yards of contaminated sediment and application of sorptive material over 10.6 acres.	$11.9M
	IZ-2	Natural Remediation (Monitored)/Institutional Controls	$0.6M
Soil, LNAPL, and Shallow Groundwater	SHS-4	Enhanced Biodegradation Component Only Physical Amenities: Includes the installation of at least 230 chemical injection points.	$2.3M
	LNAPL-5	Institutional Controls/ Cover and Drainage Improvements/ Limited Off-Property Excavation (Gaventa Pond Seep and Green Acres Area)/ Enhanced LNAPL Recovery via Bioslurping and Thermal/Steam Injection (where warranted following Bioslurping)/ Containment-Water Budget Management via Phytoremediation/ Alternate Final Cover Physical Amenities: Includes the installation of approximately 72 bioslurping extraction points. Water budget management may include planting up to 1,000 trees per acre in LNAPL areas.	$16.5M
	SGW-2	Institutional Controls/ Source Remediation/Control/ Monitored Natural Attenuation	$1.9
Deep Groundwater	DGW-6	**Phased Combination:** Source Area (Principal Threat Zone) Pumping and Treatment (Mass Reduction)/ Followed by In-Situ Chemical Oxidation Treatment in Significant Rebound Areas/ Followed by Enhanced Biodegradation -- Lower Threat Zone Pumping and Treatment (Mass Reduction)/ Followed by Enhanced Biodegradation in Significant Rebound Areas Downgradient Area Enhanced Biodegradation Physical Amenities: Includes the installation of over 50 extraction wells in the PTZ/LTZ and 300 Chemical Oxidant injection wells. Will include the inoculation of groundwater with an estimated 600,000 pounds of oxidant and the extraction of over 100 million gallons of contaminated groundwater over the first two years of operation. Long-term operations could realize the extraction of over 500 million gallons of groundwater.	$57.7M
Deep Groundwater Contingency	DGW-4	Source Area Containment Pumping and Treatment/ Downgradient Area Enhanced Aerobic Biodegradation Physical Amenities: Includes the groundwater treatment plant constructed for DGW-6 with additional wells to capture the plume.	$48.5M (1) (1) If implemented as a contingency, cost would be reduced by capital expenditure for treatment plant construction under DGW-6 - estimated at $6 million.

Estimated total cost: $90.9M (Wetlands $12.5M; Soils, LNAPLs, Shallow GW $20.7; Deep GW $57.7M)

BROS Record of Decision

Figures

Figure 1-1: Site Location Map

Based on COCs in Soil, LNAPL, Ground Water and Wetlands

LEGEND

———	BROS SITE (BASED ON WETLANDS AND OPEN WATER AREAS)
— —	APPROXIMATE BROS SITE BOUNDARY BASED ON GROUND WATER DATA, AS PRESENTED IN THE UPDATED (2002) WELL RESTRICTION AREA AT THE BASE (BOTTOM 15 FEET) OF THE UPPER MIDDLE PRM AQUIFER.
(polygon)	APPROXIMATE BROS PROPERTY BOUNDARY
- - -	BOUNDARY OF UPDATED WELL RESTRICTION AREA FOR RECENT STRATA AND A PORTION OF THE UPPER PRM AQUIFER
LTCS	LITTLE TIMBER CREEK SWAMP
CS	CEDAR SWAMP

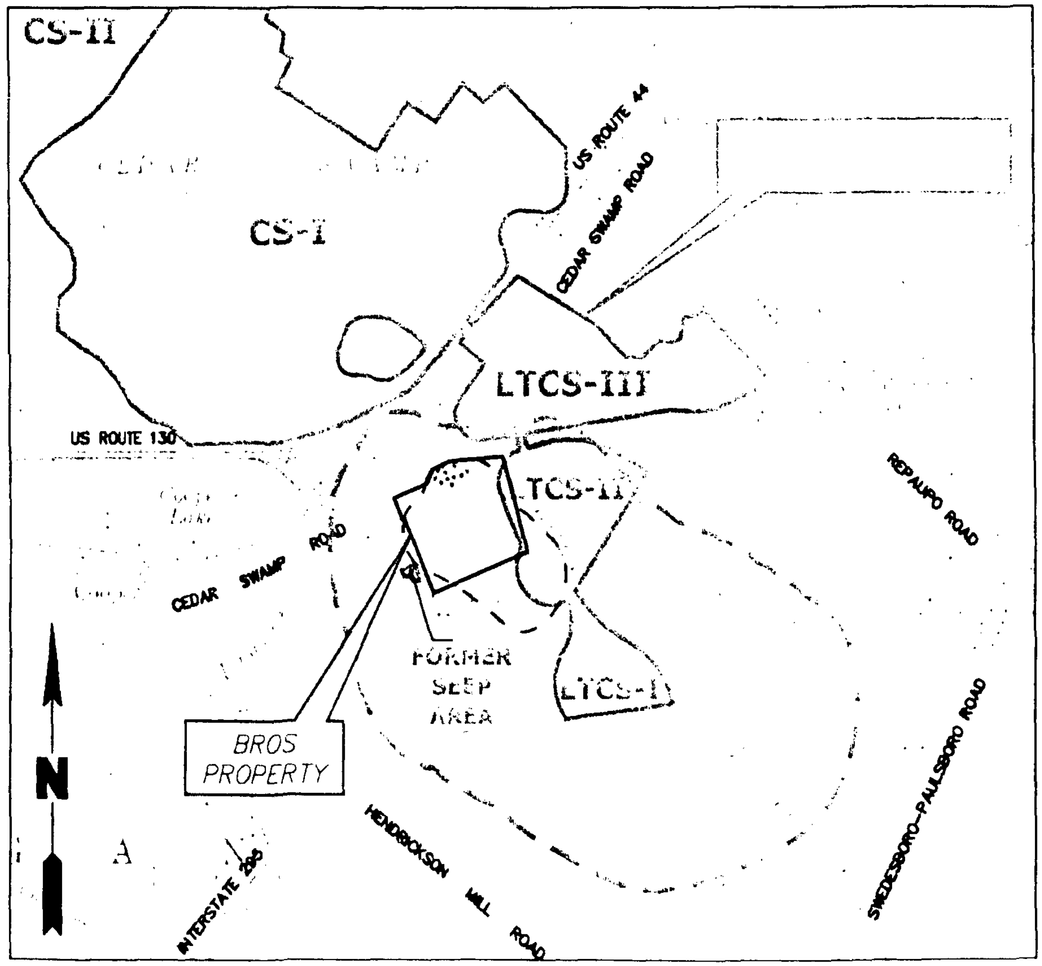


Figure 6-1: Site Map

(Depicting On and Near Property Source Areas)

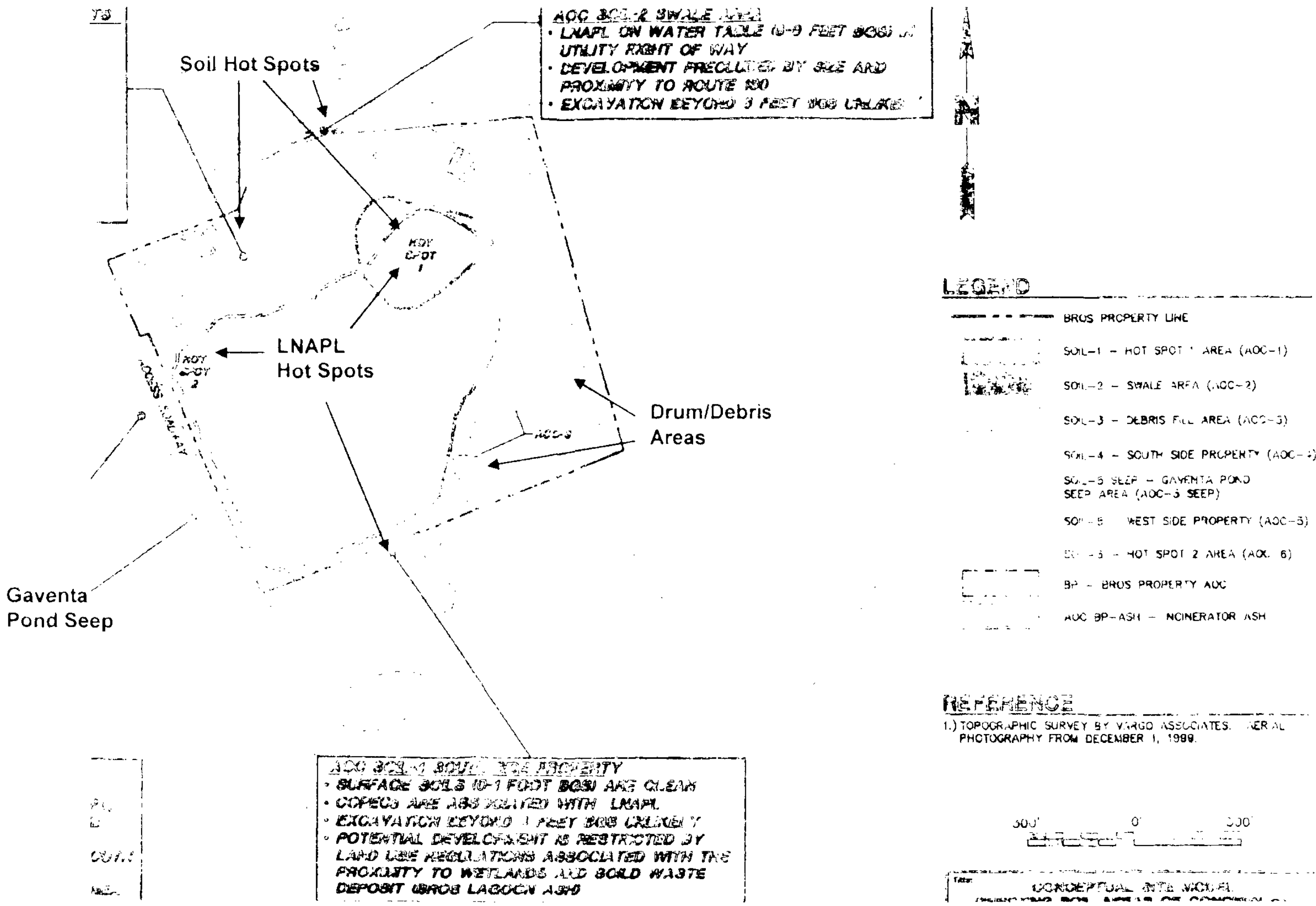


Figure 6-2: Shallow Groundwater Extent of Contamination
(As Represented by Benzene Distribution)

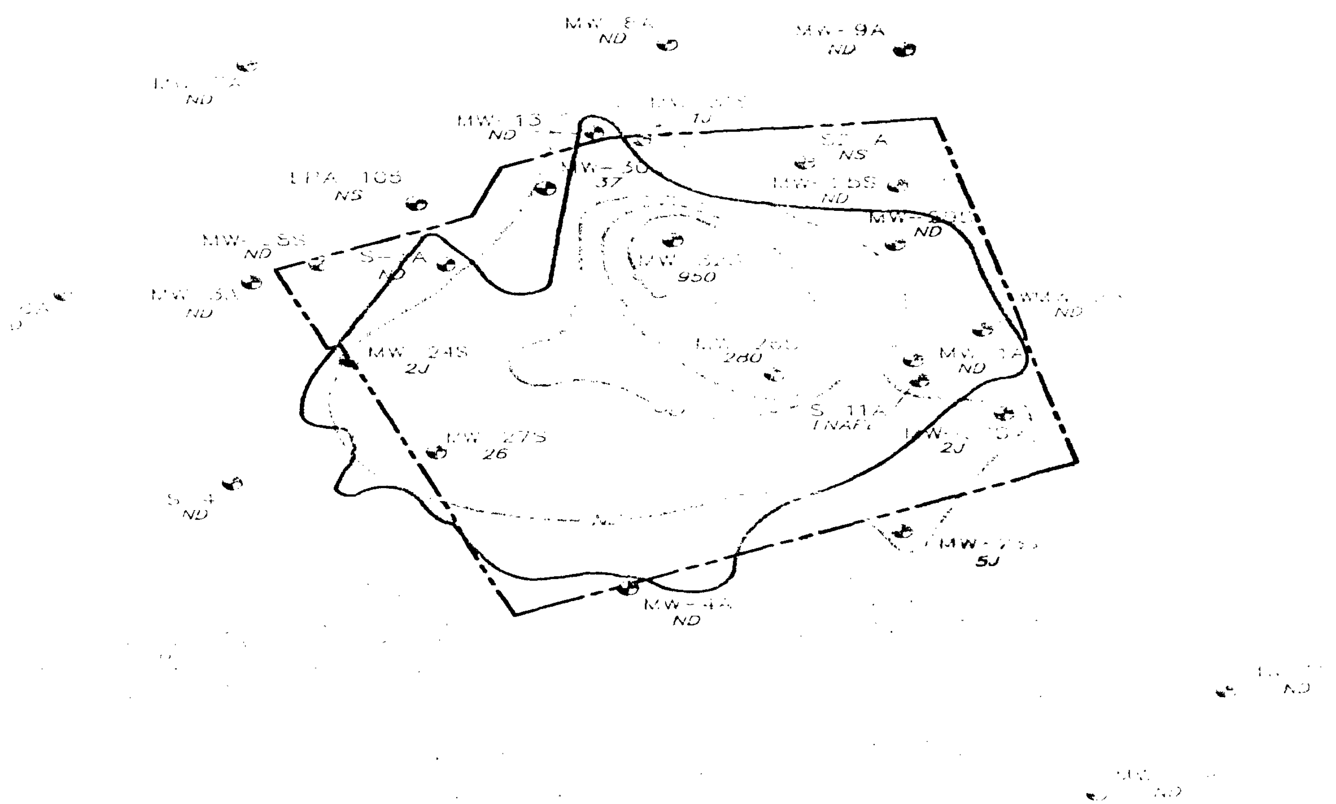


Figure 6-3: Deep Groundwater Extent of Contamination
(As Represented by Benzene and TCE Distribution)

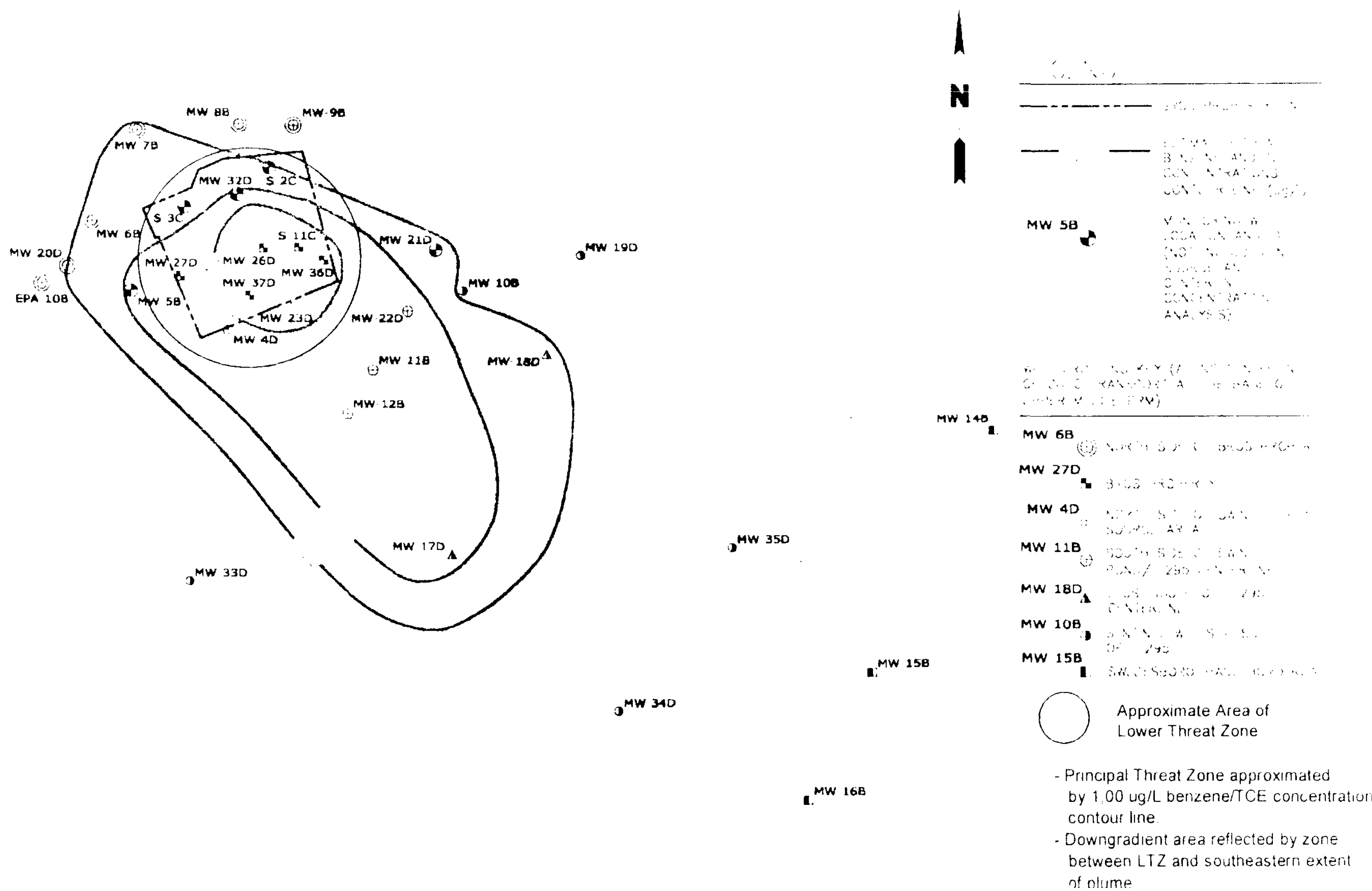
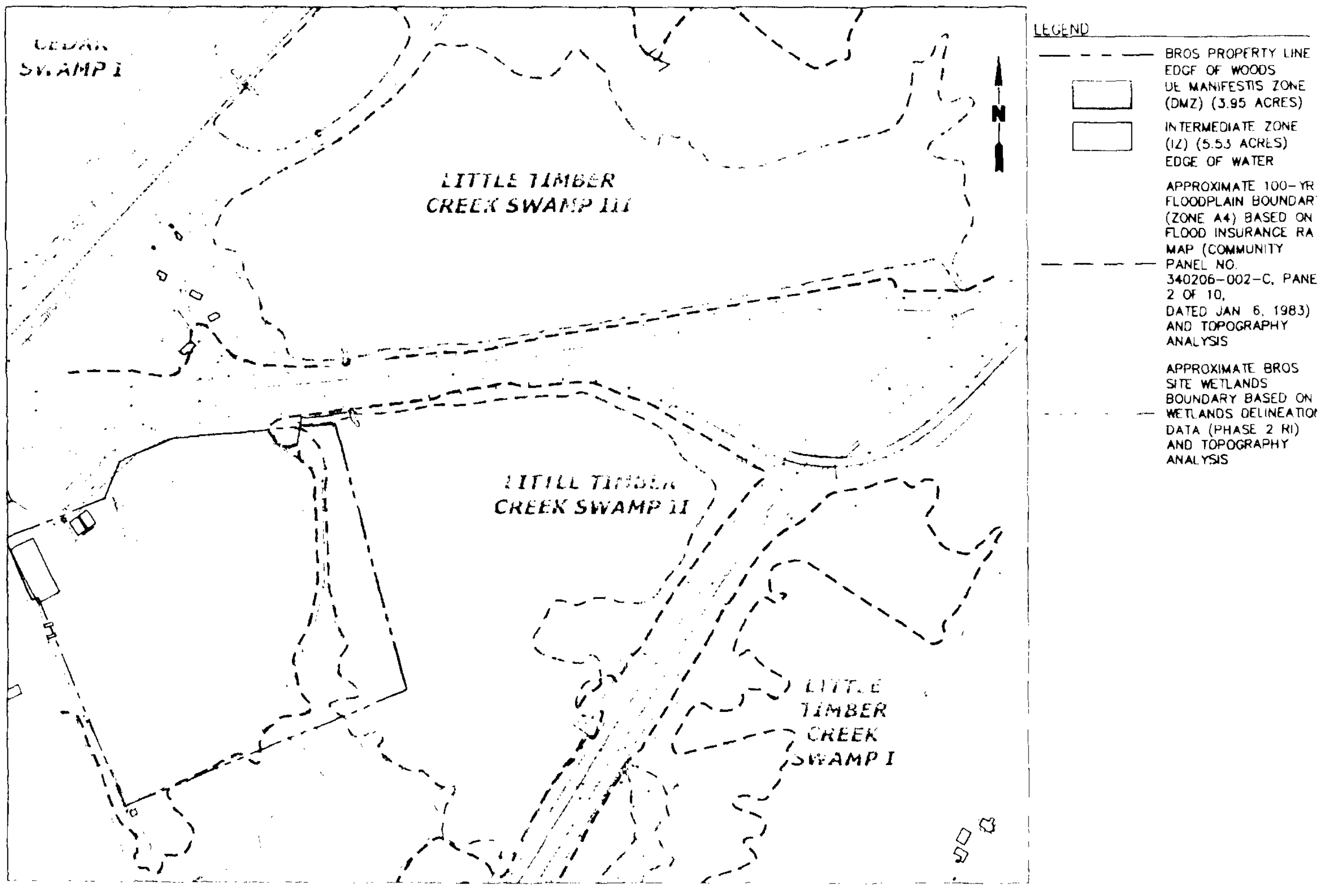


Figure 6-4 – Wetland Extent of Contamination
(As Represented by Lead and PCB Severe and Intermediate Risk Zones)



State of New Jersey
Concurrence Letter

BRIDGEPORT RENTAL AND OIL SERVICES

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Mr. George Pavlou, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway
New York, NY 10007-1866

SEP 27 2006

Re: Bridgeport Rental and Oil Services (BROS) Superfund Site
Record of Decision

Dear Mr. Pavlou:

The New Jersey Department of Environmental Protection (NJDEP) has reviewed the "Record of Decision, Bridgeport Rental and Oil Services Superfund Site, Logan Township, Gloucester County, New Jersey" prepared by the U.S. Environmental Protection Agency (USEPA) Region II in September 2006 and concurs with the selected remedy to address soils, light non-aqueous phase liquids (LNAPLs), shallow and deep groundwater and wetlands.

The major components of the selected remedy include:

- Soil, LNAP and shallow groundwater management through cover and drainage improvements, water budget management (using phytoremediation techniques), bioslurping with steam injection, enhanced biodegradation, and institutional controls.

- Deep groundwater management through pumping and treatment followed by in-situ chemical and biological treatment.

- Wetland sediment management through excavation, ex-situ treatment, off-site disposal, in-situ treatment with sorptive agents, backfilling and wetland restoration for the more highly contaminated areas, and monitored natural attenuation with institutional controls for the less contaminated areas.

NJDEP appreciates the opportunity to participate in the decision making process to select an appropriate remedy and is looking forward to future cooperation with USEPA to implement the selected remedy.

If you have any questions, please call Edward Putnam, Assistant Director of the Remedial Response Element, at 609-984-3078.

Sincerely,

Irene Kropp, Assistant Commissioner
Site Remediation and Waste Management Program

C: Edward Putnam, Assistant Director, Remedial Response Element, NJDEP
Carole Petersen, Chief, New Jersey Remediation Branch, USEPA

ATTACHMENT 1

RESPONSIVENESS SUMMARY

BRIDGEPORT RENTAL AND OIL SERVICES

Bridgeport Rental and Oil Services (BROS) Superfund Site
Logan Township, Gloucester County, New Jersey
Responsiveness Summary

The Responsiveness Summary is an important tool in the Superfund remedy selection process. It provides the Environmental Protection Agency (EPA) with the views of the public, local government, responsible parties and others concerning the proposed remedial action, and documents how comments have been considered. This Responsiveness Summary contains a summary of oral and/or written public comments received by EPA in connection with the Superfund Proposed Plan for remedial action at the Bridgeport Rental and Oil Services (BROS) Superfund Site in Logan Township, Gloucester County, New Jersey.

This responsiveness summary contains the following sections:

A. OVERVIEW
B. BACKGROUND OF COMMUNITY INVOLVMENT
C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES
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A. OVERVIEW

EPA's preferred remedy for the BROS site is a set of alternatives which combines conventional and innovative technologies, within an adaptive management approach, to address both impacted media as well as post-Phase 1 (lagoon and tank farm remediation) residual contamination. The preferred Phase 2 remedy includes:

- Soil, light non-aqueous phase liquid (LNAPL) and shallow groundwater management through cover and drainage improvements, water budget management, bioslurping with steam injection (where warranted), enhanced biodegradation and institutional controls;
- Deep groundwater management through pumping and treatment followed by in-situ chemical and biological treatment (with a contingency for hydraulic containment); and,
- Wetland sediment management through excavation, off-site disposal, treatment with sorptive agents and restoration.

Judging from the comments received during the public comment period, the residents and town officials strongly support EPA's overall remedial approach for the site. The Settling Defendants (as represented by their Potential Responsible Party Technical Group) also support the preferred alternative(s). Overall, no information has been brought to light or comments offered which suggested a change to the preferred remedy as described in the Proposed Plan. All significant comments raised during the comment period are addressed within this Responsiveness Summary.

The Proposed Plan is the blueprint for a site cleanup or remedy that is available to the public for comment. Remedy selection public participation general responsibilities are detailed in Section 300.430 (f)(3)(i)(F) - *Community relations to support the selection of remedy* of the National Contingency Plan (NCP). In compliance with those responsibilities, EPA published a notice of availability, made the proposed plan available in the Administrative Record, briefed local government officials, provided reasonable opportunity for the submission of written and oral comments, and held a public meeting.

The comment period for the BROS Proposed Plan was open from July 12 to August 11, 2006. This allowed time for interested parties to review and comment on EPA's proposed remedy for the site. The Proposed Plan describes the previous actions undertaken by EPA and the basis for proposing additional actions at the site to address the remaining site-related contamination. The residual or remaining contamination is found primarily in groundwater, light non-aqueous phase liquids or LNAPLs floating on the shallow groundwater, and sediments in a wetland adjacent to the site. The Administrative Record which includes the documents that EPA relied upon in selecting a response action for the site was made available during the comment period.

EPA conducted a public meeting on July 25, 2006 to seek oral comments on the Proposed Plan. At the public meeting, representatives from EPA presented information in support of the proposed remedy and answered questions about the site, the remedial and removal actions undertaken, the Phase 2 remedial investigation and feasibility study (RI/FS), and the preferred remedial approach. A transcript was kept of that meeting, which has been made part of the Administrative Record for the site.

In general, the public expressed appreciation for EPA's efforts on this large, technically complex and challenging project. In fact, positive comments were received noting that the agency has done a very good job from the beginning and that thoughtful consideration has been given by EPA to developing a sound approach for the site remedial plan.

On the other hand, some concern was raised regarding groundwater quality in a nearby neighborhood and the potential impact (from site-related contamination) upon an adjacent agricultural field. Responses to these concerns are found in Section C below.

B. BACKGROUND OF COMMUNITY INVOLVEMENT

The BROS site is a 30-acre parcel of land which once housed a large tank farm and a 13-acre waste oil and wastewater lagoon. Wastes released from site sources also impacted groundwater and an adjacent wetland. Actions completed under the first Record of Decision (ROD) for the site are referred to as Phase 1 work. The Phase 1 work included remediation of the on-site lagoon and tank farm, and installation of a potable water supply to a number of nearby homes. An on-site incinerator was constructed and operated to treat materials from the waste oil lagoon. The use of this technology raised concern by the community at the time, which feared that EPA would continue to utilize the incinerator for the cleanup of other Superfund sites. It was important to the community that the incineration unit be removed after the lagoon remediation was completed. An active community involvement program was conducted during the Phase 1 activities. The Phase 1 work was very successful and reduced the overall waste quantity at the site by an estimated 90 percent, thereby significantly reducing the human health and ecological risks associated with the site. At the conclusion of the Phase 1 effort, the incinerator was demobilized, as promised by EPA.

The performance of the Phase 2 RI/FS was also a component of the first ROD. However, implementation of the resultant proposed remedial actions is considered the Phase 2 work. These actions were described in the Proposed Plan and will be formalized in the second ROD for the site. The Phase 2 work focuses on the remediation of contaminated groundwater both on and off the BROS property, sediments in an adjacent wetland, and other site source materials including LNAPLs. While the site received considerable community interest during the Phase 1 activities, there has been less community involvement during the preparation of the Phase 2 RI/FS.

Nevertheless, throughout the Phase 2 RI/FS process, EPA has worked closely with the impacted residents and local officials in keeping them updated on agency activities. While EPA is the lead agency for the site, much of the RI/FS work has been undertaken by a group of potentially responsible parties (PRPs), also referred to as Settling Defendants (SDs),[1] under EPA oversight. In that regard, the SDs, with EPA oversight, also participated in the community relations program for the site. During the RI/FS process, the SDs drafted, and upon approval from EPA, distributed nine project updates, performed well surveys on area homes and provided access for site activities. Also, with EPA concurrence, the SDs were instrumental in turning an adjacent parcel of land over to the New Jersey Green Acres Program. EPA held a public availability session early during the RI/FS process, and has prepared site updates and periodically briefed local governmental officials on the status of project efforts.

On July 12, 2006, EPA released the Proposed Plan and supporting documents related to the remedial investigation and feasibility study performed for the site. EPA made these documents available to the public in the Administrative Record repositories maintained at the Township of Logan Municipal Building (125 Main Street, Bridgeport, New Jersey 08014 - the local repository) and at the EPA Region II office (290 Broadway, New York, New York 10007-1866). A notice of the availability of these documents along with an announcement of the public meeting was published in the Gloucester County Times and the Courier-Post newspapers.

On July 25, 2006, EPA held a public meeting at the Township of Logan Municipal Building. At this meeting, EPA informed the general public, local officials and interested citizens about the previous cleanup actions at the site, along with the results of the recent environmental investigations and treatability study and feasibility study activities. EPA also presented the preferred remedy for addressing the remaining residual waste source materials and contaminated groundwater and wetland sediments.

Oral comments from local citizens received during the public meeting and EPA's responses to those comments are included in this Responsiveness Summary. In addition to oral comments received at the public meeting, EPA received a few written comments during the comment period. These included one letter from a concerned resident, a letter from a grass-roots non-profit environmental conservation group, and an e-mail from a representative of local

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[1] The Settling Defendants are a number of private parties with potential liability at the Site who are obligated to perform the Operable Unit 2 work under a Consent Decree entered on January 17, 1997, in *U.S. v. Allied-Signal, Inc., et al.*, Civil Action No. 92-2726 (JEI); *Rollins Environmental Services (NJ), Inc., et al. v. U.S.*, Civil Action No. 92-1253 (JEI) (consolidated cases), with the U.S. District Court for the District of New Jersey.

government (the Logan Township Council). Responses to these written comments are also contained within this summary.

On July 31, 2006, EPA held an informal meeting with representatives of the BROS Technical Committee ("BTC"), representing the Settling Defendants, to discuss the Proposed Plan. The outcome of that meeting was that no disputes or major disagreements exist between EPA and the BTC regarding the proposed remedy.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSE

Part 1: Summary of Commenters' Major Issues

No significant negative comments were received concerning the site remedial investigation, feasibility study or preferred remedy. In fact, the public was very supportive of the preferred alternative(s) offered for the site. The main concern voiced by the public (both orally and in written form) related to the possible need for a public water line extension for an area located outside of the hydraulic influence of the BROS site. While the concern may be real, it does not appear to be an issue appropriate for addressing through remediation of the BROS site. EPA is looking into other programs at the federal or state level which might support these local citizens concerns. The agency's technical response to this issue is discussed under Part 2 – Comprehensive Responses.

Part 2: Comprehensive Responses

Subpart A. Summary and Response to Comments Discussed at the July 25, 2006 Public Meeting

Oral Question 1: (Regarding the Groundwater Plume) *If it's half a mile (in diameter or radius) now, what is it going to be a year from now? How do you arrive at half a mile as of now? Where will the plume be in two years? Does it move at all?*

EPA Response: As documented in the BROS Remedial Investigation Revised Draft (November 2005), extensive groundwater investigations were performed. The investigations included the collection of multiple events (or rounds) of groundwater elevation and contaminant concentration measurements in both the shallow and deeper aquifers, as well as a detailed contaminant transport modeling activity. RI Figures 5-12 (*Location of Monitoring Wells in Source Area, Along Centerline of COPC Transport, and Around the Perimeter of the Transport Pathway at the Base of the Upper Middle PRM Aquifer*) and Plate 11 (*Historical TCE Transport Simulation at the Base of the Upper PRM Degradation Half-Life = 500 Days*) provide graphic displays of the outer boundary of the extent of contamination and preliminary modeling information. The data upon which these figures or plates are based indicates that the plume starts on the BROS property, sinks downward and then moves off-property in a southeasterly direction approximately 2400 feet.

Monitoring wells (including MW 14B, 15B, 16B, 34D and 35D) screened in the aquifer zone-of-concern outside the half-mile area exhibit no detectable levels of key BROS constituents. This indicates that the outer boundary of the plume has not migrated further than about 2400 feet.

Further evidence was obtained during the installation of wells MW 34D/35D. Soil and groundwater samples from these wells were collected during the drilling process to determine if contamination was present throughout the aquifer. The sampling data supported the finding that the contamination had not migrated to these wells.

Modeling data and multiple rounds of sampling for BROS-related constituents suggests that the plume is not expanding. In fact, at a number of locations along the perimeter of the plume (i.e., wells MW17D/18D/19D/33D), levels have been stable or declining over the last few years.

Despite the presence of a somewhat stagnant plume, the agency does not want to leave this contaminated water in the aquifer. A goal of the proposed groundwater program is to bring the plume back toward the on-property area and return the groundwater in the area to a usable drinking water resource. The program will take time to implement and involves a combination of chemical and biological treatment of the aquifer along with pumping and treating. In the short term (i.e., the next two years), the plume is not anticipated to move beyond the current limits. Further testing will be performed during the design and remedial action to ensure that this goal is met.

Oral Question 2: (Regarding water quality in the Floodgate Road area and the potential for EPA to install water service to that area) *How many test wells were installed and at what distance from the site (from the Cedar Swamp area)? If the Cedar Swamp was affected at the time, what is there to say that groundwater in the Cedar Swamp has not flowed into Repaupo Creek and has not impacted our groundwater. Why were we (Floodgate Road area residents) not tested (down at the lower end of the township)?*

EPA Response: This comment requires discussion of two potential contaminant migration pathways. These include the site-related contamination impacts to groundwater, and potential impacts from contaminated sediment and surface water which migrated into Cedar Swamp.

Impacts to Groundwater:

For the groundwater, the area of concern noted in the question (Floodgate Road area) is hydraulically upgradient and located over two linear miles from the BROS site. Regional groundwater information available through the United States Geological Survey (Water Resource Investigations Report: 90-4142: *Hydrogeology of, and Groundwater Quality in, the Potomac-Raritan-Magothy Aquifer System in the Logan Township Region, Gloucester and Salem Counties, New Jersey*) indicates that much of the area is located over the outcrop of the middle aquifer and/or the confining unit below this aquifer. Also, testing (BROS RI, June 2006) found that BROS constituents in shallow groundwater (designated as the Upper Potomac-Raritan-Magothy Aquifer) migrated only a short distance from the site property to the north. Evidence to support this finding is provided by the analytical data for monitoring wells MW 8B and 9B (located north of the BROS property – toward the Floodgate Road area) which indicate no detectable levels of key BROS constituents. These findings confirm there is no interconnection between the Floodgate Road area shallow groundwater (and wells) and the shallow groundwater system found on and immediately adjacent to the BROS property.

The flow of contaminated groundwater in the middle aquifer is also well understood. It travels away from the BROS property in a southeasterly direction (whereas the Floodgate Road area is north northeast of the site). RI Figure 2-9 (*Phase 2 Water Main Extension Routes and Residential Water Supply Connections*) graphically shows the maximum extent of site-related groundwater contamination associated with the middle aquifer. Based on this distribution, there is no connection between the water quality issue along Floodgate Road and the BROS site.

In addition, and perhaps even more important, the water quality issue raised (by the commenter) is related to inorganic contaminants such as iron and manganese which are usually referred to as secondary drinking water substances affecting taste and odor. These compounds are prevalent throughout the area (including wells within the BROS study area which test non-detect for BROS-related constituents). USGS (Resource Investigations Report 90-4142) reports that the Floodgate Road area exhibits high natural levels of the substances identified by the local residents.

Based on the weight of evidence, the elevated levels of the secondary drinking water substances in the Floodgate Road area are not site-related and thus cannot be addressed as part of the BROS remedial action. In accordance with Section 104(a)(3)(A) of the Comprehensive Environmental Response, Compensation and Liability Act as amended (CERCLA), EPA cannot respond to a "naturally occurring substance. . . from a location where it is naturally found." The agency is only authorized to respond to releases of hazardous substances, and none related to the site are the root cause of the resident's concern. Nonetheless, on behalf of the resident, EPA contacted the State of New Jersey regarding this issue. Unfortunately, secondary drinking water standards or aesthetic standards (covering taste, odor, etc.) are recommendations and generally naturally occurring and are not covered by current State Assistance programs.

<u>Impacts from Contaminated Sediment:</u>

During a major storm event in the early 1970's, contaminated sediment was transported off the BROS property through Little Timber Creek Swamp into Cedar Swamp. The compounds of concern which migrated off the property include lead and polychlorinated biphenyls (PCBs). At the time of the spill event and under current conditions, the flow pathway through Cedar Swamp (where contaminated surface water flowed and contaminated sediments were deposited) was away from Floodgate Road towards the west. RI Figures 2-1 (*Little Timber Creek Watershed Area and Cedar Swamp*) and 3-10 (*Water Table and Surface Water Elevations, April 19, 2001*) show the drainage features and flow directions. Based on this information and the data from over 400 sediment/surface water samples collected in Little Timber Creek Swamp and Cedar Swamp, there does not appear to be a relationship between the secondary standard inorganic substance contamination in the Floodgate Road area and the swamp areas impacted by primarily organic compounds released from the BROS site.

Phase 1 activities and ongoing Phase 2 activities included the extension of water service to residences impacted by BROS constituents. These activities have been performed within EPA's authority under the Superfund program. The agency will continue to evaluate the Floodgate Road water quality issue to ensure that the BROS site is not impacting the area or to identify other programs which may assist in the matter. Regarding the ongoing installation of water service, some delay in completing the Hendrickson-Mill Road loop has been experienced due to the necessity for issuance of a permit by the New Jersey Department of Transportation. EPA expects this issue to be resolved shortly.

Subpart B. Summary and Response to Written Comments Received During the Comment Period

Written Comment 1: (Letter from Concerned Citizen to EPA, July 25, 2006) *Similar to comments received during the public meeting, a local resident is concerned about the water quality and lack of public water infrastructure in the Floodgate Road area. She suggests that EPA should use a portion of the $90 million allocated for the BROS remediation to supply public water to residences and businesses in the Floodgate Road area.*

EPA Response: (Reference should be made to the response to Oral Question 2). The concerned citizen notes that Floodgate Road homes have tested high for such substances as iron and magnesium (but no volatile organic contaminants). EPA has learned that some area residents have installed expensive water filtration systems to correct taste and odor problems while others have been provided with bottled water. While it is recognized that secondary standard water quality issues are prevalent throughout the Floodgate Road area, as explained more fully above, they are not related to releases from the BROS site. Consequently, EPA is not authorized under CERCLA to respond to such issues.

Written Comment 2: (Letter from Grass-Roots Environmental Group, August 3, 2006) (Regarding the agricultural field adjacent to the BROS property which is currently planted with grapes) *The grapes in multiple locations on the site, as well as multiple types of grapes, should be tested, especially since no data has been presented to demonstrate that contaminated groundwater is not impacting the grapevine roots. The environmental group strongly recommends that all wells within a two-mile radius of the footprint of the groundwater plume be tested and that data be provided to all residences within that area as well as to the Township of Logan.*

Grape Agricultural Field Issue:

A number of efforts are underway to prevent impacts to the agricultural field west of the BROS property which has been used for various crops over the last few years. EPA previously tested peaches from trees planted in the area, when the field was used for this orchard crop. That testing found no impact to the peaches. The peach trees had a shallow root system which did not penetrate to the zone of contamination.

In the field area, the surficial soils are free of BROS constituents. The contamination is present at depth and is associated with LNAPL or oily liquid floating on the water table (at a depth of 8 to 10 feet below the ground surface). The crops in the field are irrigated with surface water which was tested during the RI and found to be free of BROS constituents.

In addition, the RI and post-RI work performed by EPA have delineated the extent of LNAPL contamination in the agricultural field. Based on that delineation, a no plant area or carve out has been agreed to by the Vineyard owner. Therefore, at present, no grapevines are growing above areas known to be underlain with LNAPL.

During the design of the LNAPL and shallow groundwater remediation program, additional data will be collected in the field area to verify the extent and types of any contamination in that area. Also, in response to the comment, EPA will further evaluate the root zone depth of the grapevines to ensure that they do not extend into the area of contamination. If data regarding the uptake of contaminants in the vines is inconclusive, representative samples of grapes from the vines closest to the BROS contamination source will be collected and analyzed.

Well Sampling Issue:

The BROS RI included extensive sampling efforts including the installation and sampling of more than 50 monitoring wells, completing an area-wide residential well survey, and sampling residential wells proximal (or adjacent) to the BROS plume. Homeowners were provided with the sampling data.

Currently, to the best of EPA's knowledge, no wells within the footprint of the BROS plume are in use for potable water supply, and institutional controls are in place to prevent the installation of new wells. All wells immediately proximal to the plume have been sampled, and efforts are underway to provide public water service to those homes which could potentially be impacted (downgradient wells). While additional testing will be performed during the design phase and the actual remedial effort, based on a thorough understanding of the extent of site-related groundwater contamination, EPA does not believe it is necessary to sample every home within a two-mile radius of the plume.

Within the scope of the agency's community involvement program, local governmental officials have been kept apprised of site activities. EPA, along with the Settling Defendants, have worked closely with town officials regarding water quality issues and water line extensions, as well as provided them with copies of all pertinent project documents.

Written Comment 3: (E-mail from Local Governmental Official) *I ask that the EPA consider the additional measure of extending a potable water line to the residents and businesses in the area of Floodgate Road.*

EPA Response: This comment is addressed in the response to Subpart B - Written Comment 1 and Subpart A - Oral Question 2.

EWA

Mr. Ronald Naman
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007-1866

August 3, 2006

Re: Bridgeport Oil and Rental Services
Comment Submission

Dear Mr. Naman,

On behalf of Edison Wetlands Association (EWA), I would like to submit the following comments and recommendations to the U.S. Environmental Protection Agency (U.S.EPA) regarding the Bridgeport Oil and Rental Services (BROS) Superfund Site.

Edison Wetlands Association, founded in 1989, is a grassroots non-profit dedicated to protecting human health and the environment through conservation and ensuring the timely and thorough cleanup of hazardous waste sites across New Jersey.

As you know, the BROS Site has sediment, sludge, soil, surface and groundwater contaminated with oil and grease, PAHs, PCBs, pesticides and VOCs. The Cedarvale Vineyards, which are located on the northwest corner of the site, have existed since 2003. The U.S.EPA has informed us that the grapevine roots do not grow down to the groundwater aquifer, and therefore EPA sees no reason for any concerns with grape contamination.

According to New Jersey Department of Environmental Protection, the contaminated groundwater plume encompasses a significant portion of the vineyard property. The grapes in multiple locations onsite, as well as multiple types of grapes, should be tested, especially since no data has been presented to demonstrate that contaminated groundwater is not impacting the grapevine roots.

EWA's primary concern on this site and the dozens of other contaminated sites we deal with is human health. In fact, at BROS, the majority of the complaints and comments raised at the July 25th public meeting were community demands to test the local wells. At that meeting, the U.S.EPA mentioned that they didn't "think" the contamination emanates to these specific residences through the swamps or in the groundwater. However, as you know, issues of potentially contaminated drinking water demand more evidence than guesswork, particularly when known health hazards like PCBs and VOCs are involved. The people who live close to this Superfund Site deserve a peace of mind rooted in solid data.

Edison Wetlands Association, Inc. ♦ 2035 State Hwy. 27 ♦ Suite 1190 ♦ Edison, New Jersey 08817
Telephone 732-287-5111 ♦ Fax 732-287-5129 ♦ www.edisonwetlands.org

As such, EWA strongly recommends that the U.S.EPA test all wells within a two mile radius of the footprint of the groundwater plume. In the interest of public knowledge and participation, we also recommend that the U.S.EPA provides the data results to all the residences within that area, as well as to the Township of Logan.

On behalf of EWA, I thank you for the opportunity to submit our comments and welcome any questions or further discussions you have regarding the Bridgeport Oil and Rental Services Site.

Sincerely,

Melanie Worob

Melanie Worob
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Please respond to
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To RonaldM Naman/R2/USEPA/US@EPA

cc 'Mayor Minor' <fminor@logan-twp.org>, Senator Stephen Sweeney <ssweeney@co.gloucester.nj.us>, Linda Oswald <linda@logan-twp.org>

bcc

Subject BROS Site Public Comment Submission

History: This message has been forwarded.

Township of Logan
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Bridgeport, NJ 08014
Telephone (856) 467-3424 Fax (856) 467-1061

Mr. Ronald Naman
Remedial Project Manager
USEPA Region II
290 Broadway
19th Floor
New York, NY 10007-1866

Dear Mr Naman:

Please accept our appreciation for the thoughtful consideration that has been placed in developing the remedial plan for the BROS site. The complexity of the contamination represents extremely difficult challenges in both characterizing the site and also in approaching the remediation for the site. I feel that the approach to the remediation is sound. It addresses source issues that are available for removal and incorporates a combination of technologies and techniques for dealing with the more recalcitrant areas of contamination.

I would, however, ask that the USEPA consider the additional measure of extending a potable water line to the residents and businesses in the area of Floodgate Road.

I understand that conventional wisdom and investigative techniques have demonstrated this area to be outside of the plume boundaries and migration pathways. Every day I encounter residents of that area of the Township that have lived in fear of the repercussions of their proximity to one of the most notorious Superfund sites in the country. No amount of scientific discussion will assuage their fears. As much as I understand the investigative approach and its findings, I still find it difficult to entirely address their arguments. I've outlined some of the questions that I've heard below:

- How do you know that it's not going to wind up in our drinking water?
- They didn't know that it was as bad as it is before, why should we trust them now?
- How can you tell me that my water looks bad, smells bad and that site has nothing to do with it?
- We've lived with that site in our backyards for all of these years, while it was being studied and ignored. They're spending all of this money to clean it up, it's going to take over 40 years, and they can t run a water line so we can have clean water, too.

I have discussed groundwater pathways and exposure risks with these residents. I have explained to them how high iron content will discolor their water. I have had outside experts discuss these same issues. All of the discussions are meant with resentment and fear.

I have given the matter quite a bit of reflection, from both a scientific perspective and an emotional perspective
The fact of the matter is, we can't say with 100% confidence that these areas never have been, or will not

potentially be impacted. I'm not reacting from an emotional perspective with that comment, although I understand that it may be interpreted that way. I've drawn my conclusions from the science that we deal with every day in cleaning up contaminated sites. Think of the advances in investigative, computer modeling and analytical techniques that have developed over the last twenty years. Now think back twenty years before that and then twenty more. We cannot be so conceited to think that we have perfected them. Sixty years ago, far before RCRA, we were still dumping waste into the ground and the water and thinking that the problem was solved. For that matter, thirty years ago we were still routinely doing the same thing.

One thing that we can depend upon is that for all of the progress we believe we have made, there are things to come tomorrow that we could never have imagined a few years back. There will be new potential carcinogens found; new exposure pathways will be identified; new exposure limits will be established. Some portion of the truths that we know today with regard to contaminant migration and behavior will be replaced by entirely different truths.

Logan Township residents have shown stoic resolve in dealing with a monstrosity of a site in our backyard for many years. We have been accommodating, to every extent possible, the progress of the cleanup of the site. I am appealing to USEPA, on behalf of the residents, to repay that resolve and cooperation by considering, in contrast to the funds dedicated to this issue, a very small, but very meaningful, accommodation.

Sincerely,

Lyman J. Barnes
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Ronald Naman
Remedial Project Manager
U.S. Environmental Protection Agency
Region 2
290 Broadway, 19th Floor
New York, NY 10007-1866

July 25, 2006

Dear Sir:

As a sixty year plus resident of the Repaupo section of Logan Township, I was pleased to read the BROS site is being reviewed for remedial groundwater cleanup. Too many years have passed with no information having been communicated to the residents residing within the contaminated bounds of the BROS site.

Past actions as we know have caused some irreversible damage to the soil and groundwater in the Repaupo section. The EPA attempted to remedy this in the past with a public water supply(Pennsgrove Water Company) to the Repaupo area, although the wells were not proven contaminated at that time. This was done to prevent a possible health catastrophe at a future time. This was the right course to take and the affected residents were very grateful. This alleviated any possible future contamination from the BROS site in that section of Logan Township.

A Public Health Assessment of BROS, dated August 22, 2005 addresses the flow of groundwater contamination in the Repaupo section. It describes the two most contaminated wells in the Upper PRM aquifer which lies North-Northwest of the site. VOC's were detected in several test wells. The compounds were PCB's, pesticides, benzenes, etc. Your report estimated the plume of contamination has extended 5,000 feet down gradient of the BROS site. This gives cause for alarm for many residents not connected to the public water system, due to what I consider an oversight on the part of the EPA during the installation of the public water system to Repaupo. We are also residents of the Repaupo section that were completely excluded.

Residents of Floodgate Road are North West of the BROS site. A distance of 2.1 miles. These residents depend on private wells, most are shallow and less than 200 feet in depth. There are approximately eleven homes and four businesses on Floodgate Road and Route 44 that have no public water supply. There are approximately twenty seven residents and over 200 employees working at the businesses, such as Godwin Pumps of America and R.E. Pierson Inc. One business, The Bridgeport Speedway is open to the public on weekends and serves over 300 persons. Their water supply comes from private wells. Business owners serving the public and employees must have their well water supply tested per DEP regulation to continue to operate. A public water supply is desperately need in this area to eliminate any possibility of a future water contamination that could affect hundreds of persons.

The residents have repeatedly requested a public water supply from the Township of Logan Council. To date, they have tested the wells from two outside faucets from homes on Floodgate Road. The results showed no VOC's, but high concentrates of iron, magnesium etc. Both of these homes have expensive water treatment filtration systems, so the test result reports of actual groundwater contamination can not be considered valid. Bottled water is supplied to the

residents on Floodgate Road by the Township of Logan, as it has since the beginning of the BROS site. This is greatly appreciated, but it is not the way to resolve the situation completely. We feel the problems we have experienced may be directly related to the illegal and irresponsible actions of the responsible parties and therefore we also should be compensated by supplying us with a public water system.
In your Public Health Assessment Report you address the issue of "Resident Well Pathways". The main point being the plume of contamination may have already done it's damage over the past twenty years or more. To avoid the possibility of any future contamination to these present wells, it would be feasible to continue your public water line from Repaupo Station Road under Route 44 and down Floodgate Road with a loop back to residents on Route 44. This would be a positive preventive measure.

In your "Conclusions" of your Public Health Assessment it states "Currently, the past exposure of *these residents north and west of BROS, originally exposed to site related contaminants has* been eliminated or reduced. This was accomplished by providing affected residents with a approved public water supply". This sounds great, but all affected residents may not have been protected from the "toxic soup" of BROS. Monies could be spent on test wells of our area properties. This is not only very expensive, but a waste of time. One can not see the future and predict with absolute certainty that a plume of contamination will never affect the residents of Floodgate Road and area. Therefore extend the public water system to Floodgate Road area and prevent this from ever occurring.

The EPA has been allocated $90 million dollars for the treatment of the groundwater at the BROS site. On be-half of the residents of Floodgate Road and area, I suggest the EPA also consider utilizing a portion of these funds to supply public water to the only residents and businesses in the Repaupo area of Route 44 and Floodgate Road. This would ensure the all persons affected will never have to again worry about well water and its possible "killer contaminants". This would be a long awaited "complete closure" *of the job the EPA started to protect* Logan Township Residents from the BROS site.

Yours truly,

Sarah Redrow

Sarah Redrow

cc: Logan Township Mayor & Council

Representative Robert Andrews

Gloucester County Board of Chosen Freeholders

ATTACHMENT 2

PUBLIC MEETING TRANSCRIPT

BRIDGEPORT RENTAL AND OIL SERVICES

BRIDGEPORT RENTAL & OIL SERVICES

PUBLIC MEETING

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Transcript of Proceedings

The Logan Township Municipal Building
125 Main Street
Bridgeport, New Jersey

July 25, 2006
7:05 P.M.

A P P E A R A N C E S:

RONALD NAMAN - Remedial Project Manager

JOHN S. FRISCO - Deputy Director, Emergency and Remedial Response Division

KENNETH MCGILL - Client Service Manager, CH2MHill

DARLENE LOWRANCE,
RPR, CSR and
Notary Public

\- - -

ESQUIRE DEPOSITION SERVICES
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MR. NAMAN: Welcome. We're going to get started with a few instructions here. My name is Ron Naman. I'm the EPA Region 2 Remedial Product Manager for the Bridgeport Rental and Oil Services Superfund Site.

I'm here tonight to present EPA's proposed plan or preferred remedy for the Phase 2 remedial program at the site.

Also in attendance to answer any questions you might have about this particular Superfund site or Superfund program, in general, is John Frisco. John is the region's Superfund Program Manager, so he's in charge of all the sites in the region.

For this particular project, the State of New Jersey is the support agency. The Bridgeport site is also known as the BROS site, so you'll hear me referring to it in that vein.

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The BROS site is what EPA commonly calls or refers to as a Settling Defendant or responsible party lead site.

So even though EPA is the lead federal agency, a lot of the work and especially the recent technical investigatory work, including the remedial investigation and the feasibility study was conducted by the BROS technical committee, and a couple of those folks are in attendance tonight.

All the work that they did was done under the oversight of EPA, so we've approved all of their work plans and all of the documents that they submitted to EPA.

I also would like to thank the Mayor, Counselman Barnes and Ms. Oswald, your town clerk. She helped us set the room up and work out the logistics for tonight's meeting.

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And without further ado, I just want to turn this over to John for a few introductory comments and then we'll get into the process of describing the Superfund community participation process and some information on the remedial investigation and then the feasibility study, which is when you really hear about what our proposed or preferred remedy is for moving forward with the Phase 2 work at the site.

MR. FRISCO: As Ron said, I'm John Frisco. I manage the Superfund remedial program for EPA, which covers all of New Jersey, all of New York and some other territories.

I also was -- had been involved with this site, you know, way back when, when -- I'm sure some of you folks remember -- when it was a lagoon and lots of tanks and we had lots of problems.

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We are going to be talking tonight about our proposed approach or solution for cleaning up the remaining contamination on the site.

And for those of you that had been around through the years, you know that, more than a decade ago, EPA constructed a mobile incinerator on the site and, over about a four-year period, incinerated the contents of that large waste oil lagoon.

We removed the tank farm. We had about 100 tanks and vessels that were storing chemicals on the site. There was underground piping.

I mean, this site actually appeared in National Geographic on more than one occasion. It kind of illustrated, you know, what a Superfund site looked like. I mean, it had all of the graphic things that people have -- have actually come to fear when you mention the word Superfund.

Those actions we took some years back -- they removed the oil lagoon. They removed the tanks, cleaned up some groundwater, probably removed about 90 percent of the contamination or about 90 percent of the problems.

What's left is some soil on the site that is still contaminated, some residual oil that's below the ground surface.

When we went ahead with the incineration project, we couldn't quite get all of the oil out of the lagoon. Some of the deeper stuff was too difficult to get with the equipment we had back

then, so the thought always was that we would need to come back and maybe mop up some day, so this is part of that.

Also, back in the early '70s, the oil lagoon actually overflowed its dike and some of that oil, which was highly contaminated, flowed into the wetlands adjacent to the site.

Part of this proposal is also to now remove those contaminated sediments from that wetland area.

And, lastly, and probably most significantly is the groundwater is contaminated, both under the site and extending for about a half a mile from the site.

The contaminants that were in the lagoon kind of -- some of them, you know, migrated down into the groundwater and now have kind of moved off of the property

boundary, so what we're going to be talking about tonight is now how to address all of these pieces, the wetland contamination, the residual oil below the ground surface and this groundwater contamination now that has migrated some distance away.

As Ron said, we have a settlement with a number of the parties responsible for this contamination. A settlement was reached some years back whereby these parties reimbursed the EPA for much of the cost of the incineration operation.

They also will be responsible for implementing the actions that we will ultimately select for the remaining contamination on the site.

Also, as Ron said, this is our proposed solution to dealing with this remaining contamination.

We want your input before we make a final decision.

This proposed plan, which is on the back table, summarizes what we know about the site and the actions that we anticipate taking to finish cleaning it up.

Your comments tonight will be recorded by a court reporter. You can also write to us. You can send an E-mail, write to Ron's web address with comments.

We'll keep the comment period open until August 11th. So before we make a final decision on what to do next, we're going to make sure we consider all the input from you folks here.

And with that, I'm going to turn it back to Ron. He'll go through a presentation, including some of the earlier photos, a number of which I took during the initial lagoon cleanup, and those of you that were here will recognize it.

And the site doesn't look anything like that today, but -- despite the fact that a lot of the bad stuff is gone, there's still a little bit left we need to deal with and that's why we're here, to make sure we, you know, don't leave until we've got as much out of the ground as we can possibly get.

So with that, we'll go back to Ron. Again, after Ron's presentation, we'll open it up for questions. If there's a burning question during the presentation, interrupt and we'll take it right away.

MR. NAMAN: We're going to get into a lot more detail of what John just spoke of. And if you really want even more detail, you'll have to read through the

proposed plan.

It's actually a pretty lengthy proposed plan. It's about 30 pages long and there's a lot of very good information in there.

Let's get started with some of the administrative requirements. We are issuing this proposed plan as part of our public participation responsibilities under CERCLA, specifically under Section 117-(a) of CERCLA, which was issued in 1980, and it was amended under the SARA legislation in 1986. And we're also issuing this under the National Contingency Plan, Section 300.430(f)(2).

The proposed plan summarizes information which can be found in a whole lot greater detail in what we call the Administrative Record. There are copies of he Administrative Record in the

repository here.

You can go see the town clerk. She's got a copy of all the documents that essentially provide the backup or the support information for why we made this decision. And there's also a repository in New York, in our main file room at 290 Broadway in New York City.

As John mentioned, we rely on your input when selecting an effective remedy for any Superfund site and, of course, the BROS site. We hope to get your comments within the 30-day comment period which began on July 12th and ends on August 11th, days you should remember.

We did send out a number of mailings and put it in a couple of news ads to apprise you of the comment period and of this meeting, so we're glad you folks

turned out to find out what was going. I hope you received them in a timely manner.

I also put a little form in the back. There's a form with some blank lines on it. If you wish to jot something down and submit a comment tonight, we'll certainly accept that as well after the presentation.

And perhaps, during the presentation, we'll answer a lot of your questions. We've thought long and hard about the remedial decision recommendations we're presenting tonight.

As John mentioned, however, we will make changes based on comments if they're going to result in a change that we believe is for the betterment of the site.

We will also provide responses to the comments that we receive during the comment period in something we call a responsiveness section of the Record of Decision and the Record of Decision is the official document -- the official decision document for the site.

Of course, you're all aware of where the site is located. We're in Gloucester County. The site is located in Logan Township. We're located about 2 miles south of the Delaware River.

The site includes both on-property and off-property areas where site-related contamination has come to be located, which is one of the main definitions of Superfund. We're not just looking at a specific property owner. If site -- if contamination has left the site, it gets included in the overall definition of the site.

The on-property area is comprised of about 30 acres. It's

located just south of Cedar Swamp Road and Route 130 and north of Route 295.

The off-property area includes over 500 acres of upland area, open water, emergent and forested wetland and a significant land mass hydrogeologically downgradient where contaminated groundwater has come to be located. And we'll describe that as we go through this presentation.

But, basically, we have the BROS facility, which is the old Berolli property, which is located within the boundaries of the black line here.

We also have the area where we have groundwater contamination, which is defined by this blue line, and that's all encompassing above the shallow and the deep groundwater contamination; and

then the wetland areas that were impacted by offsite migration, which is detailed in the green barriers, and this includes both areas of Little Timber Creek Swamp and Cedar Swamp, which is across Route 130.

This is just an aerial of the -- pretty much the same -- the same area. The on-property area and immediate area surrounding the site were formerly used for sand mining operations.

The sand mining activities resulted in three pond areas being created, as you can see on the aerial here, one of which was located on the old Berolli property, which was subsequently used for the disposal of oily liquids and drums.

The other two ponds are known as Swindell Pond -- that's the more easterly or the pond to

the right -- and Gaventa Pond. I guess there's some of the -- Gaventas are in the audience here.

Little Timber Creek Swamp and Little Timber Creek lie east of the BROS property and much of the surrounding area is designated as agricultural or rural residential property.

It's a little bit difficult to see. And unfortunately, if I turn the lights off, all the lights will go off.

Basically, you have the 30-acre old Berolli property, which used to be an impoundment or sand mining pond.

We have Swindell Pond to the south and Gaventa Pond to the southwest; this agricultural field to the west of the property, Little Timber Creek, Little Timber Creek Swamp to the east of the property, Route 130 to the north and Route 295 to the south.

For the younger generation, back in the '60s and '70s, the site's prominent feature was the 13-acre waste oil lagoon, which replaced the former sand mining pond, and the large tank farm was also present on site. There was about 100 tanks, as John mentioned.

And the agricultural area that I was talking about, which was west of the old lagoon, which is kind of like on the forefront of this particular picture, has been used for agricultural uses for a long period of time.

Up to a few years ago, it was used as a peach orchard. And we actually were a little bit concerned about potential uptake through the soil contaminants, so we tested the peaches and it turned out that the peaches were

fine. There was no BROS-related contamination in the peaches, so that was a good thing.

As I'll detail when we're discussing the remedial investigation findings, while the waste lagoon was active, contamination was migrating downward into the sandy aquifer soils, below the site, creating a potential drinking water contamination issue, both on and off the property.

And as this picture depicts, you can certainly see that this lagoon served as a significant source of contamination.

And this is one of the more infamous pictures from the site. This is one of the pictures that was -- I think it might have even been on the cover of Newsweek.

Also, in the late '70s, during a storm event, the eastern

berm or dike of the lagoon was breached and the lagoon liquids discharged into Little Timber Creek and swamp.

This is an infrared aerial. It's a little bit hard to see because of the -- it's not dark enough here. But, essentially, over in this area, the berm on the lagoon broke and it discharged all material into the wetland over here.

And as you can see, there's nice vegetation in this red infrared shot over here, but this whole aerial over here is essentially a devastated area where all the vegetation was wiped out.

And subsequently to this release impacting this area, of course, there's a conduit. There's some piping that goes under the roadways to the north of

the site and that allowed the contamination to leave the site in a northerly direction and go over towards Cedar Swamp.

But we do have some good news. We've accomplished an awful lot in the way of site remedial cleanup and risk reduction over the past years. And as John mentioned -- in fact, about 90 percent of the overall mass of contamination at the site was removed during the Phase 1 effort.

Unfortunately, the remaining 10 percent, as we're going to discuss tonight, under the heading of Phase 2 Activities, there's still a considerable amount of work to be done. And what I'm going to do real quickly here is just summarize some of the work that we've completed to date.

The Phase 1 actions completed to date included

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providing alternate water supply for 15 homes north of the BROS property. That was the first immediate area where we thought there were going to be impacts to the public water supply.

There was also demolition of the 100 tanks and off-site disposal of material that were in the tanks and the tank materials themselves. And then, finally, excavation incineration of the 13-acre waste oil lagoon.

The water infrastructure was in place by the end of 1985. This is just a shot of us taking down the tank farm that existed on the site. This is completed by 1988.

And, finally, just another shot of the lagoon after we had brought the level of the liquid down somewhat and discovered, lo and behold, that there were lots of drums in the lagoon which, I

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guess, EPA initially didn't realize. In fact, I guess it was over 5,000 drums present in the lagoon that required off-site disposal.

We also thermally destroyed, through the incineration process, about 172,000 tons of hazardous waste and -- and then on-site treatment -- well, groundwater plant that we built that treated about 200 million gallons of wastewater.

What else did we do? Over the past few years, due to some site concerns that were raised during the remedial investigation, EPA undertook activities to excavate 300 drums and about 4,000 cubic yards of contaminated soil from two drum pits that were located east of the former lagoon.

Those drum pits were over in this area over here, kind of just

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outside of the wetland area of concern.

We also evaluated and piloted a Light Non Aqueous Phase Liquid or LNAPL recovery program and then we also demobilized the abandoned wastewater treatment plant that was used during the Phase 1 remedial activities.

We just did that, actually, about a year or a year and a half ago, so you folks might have seen some activity over at the site.

MR. FRISCO: Just to clarify, the LNAPL is the oil that's residual, below ground, that we didn't get when we first implemented the incineration project.

MR. NAMAN: Unfortunately, there's lots of oil still remaining there. And, in fact, the LNAPL pilot system that we started has blossomed into a

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pretty sizable passive LNAPL recovery operation. And over the last two-and-a-half-to-three years, we've actually recovered over 11,000 gallons of waste oil from the site that was essentially free-phase liquids that were floating on top of the water table.

This is a shot of some of the drums that we took out.

Actually, drums that we took out of the ground that were east of the former lagoon were not very hazardous. It was some type of very smelly resinous material, but it didn't have a whole lot of -- in the way of hazardous compounds in it.

And here's a shot of the passive oil collection system that we've installed on the site and are currently operating. You might see there's a number of little sheds, little shacks, up towards the northern end of the site, if you would drive by on Cedar Swamp Road or Route 130, in that area.

Essentially, these petroextractors, which are nothing more than belt systems that go across the water table and -- and the oil attaches onto the belt and it leaves the water behind and then the oil gets scraped off into the drums. These devices are housed in those little sheds that we have on the property.

And, finally, a couple of other measures to control or reduce risks have included turning over the small land mass south of the property and Swindell Pond area to the New Jersey Green Acres Program. That's a positive.

We've -- I guess the BROS technical committee has had some

ongoing dealings with one of the local landowners here, carving out an area in the field adjacent to the site so we don't have plantings there until we figure out exactly what's going on over in that area and we conduct whatever remedial actions need to take place over there.

And we've also installed or been installing public waterlines to those residents that are proximal to the groundwater plume which is emanating from the site, and I'll show you a picture of that in a moment.

We also have some institutional controls already in place at the site. In accordance with the consent decree, the site settlement that John had mentioned, we've placed deed restrictions on the on-property area, essentially the old Berolli

property.

And we've also established a -- what the State of New Jersey calls a Classification Exception Area or Well Restriction Area which prohibits folks from going out and just installing drinking water and even monitoring wells on any of the property without the DEP and EPA being aware of that and approving of those activities.

And these activities certainly do provide a certain measure of risk reduction by preventing current and potential and even future contact with contaminated drinking water, and that's certainly a big issue for this site.

On this particular figure, the yellow area is the area where we had previously, back in the day, installed those 15 new water service connections. And the ones

that are either completed a date recently or going in are along Hendrickson Mill Road and Swedesboro-Paulsboro Road. And, I guess, there's a couple of other locations out in this area.

And, essentially, we wanted to make sure that anyone that was proximal to the area where the groundwater plume is is on public drinking water.

And, finally, just to give you an idea of the scale of this particular project, it's certainly one of the more infamous Superfund sites across the country. We've already spent in the neighborhood of $200 million in effort to clean up the site.

Well, let's briefly, hopefully, as quick as I can, go over the remedial investigation activities and then we'll talk about the feasibility study.

The Phase 2 remedial investigation was completed to gather data regarding the types and extent of the remaining contamination at the site.

The work was broken down into two major work categories known as the groundwater work and the wetlands work.

Lots of detailed study and investigation was conducted, including a cultural resource surveyor study. We did geophysical studies to see if there was anything dirty in the ground, a number of specific source area investigations, soil investigations, hydrogeological investigations, sediment tests and investigations. We sampled biota, just to name a few. We actually did more than that.

And all this environmental data collection has allowed us to

evaluate site human health and ecological risks and then move forward with the feasibility site, which is really more about addressing what the potential cleanup alternatives might be for the problems that we have at this site.

The results of the RI indicated that there weren't really any cultural resource issues of concern. I think we did find a couple of old spoons and a couple of, you know, pottery shards over in the adjacent farmstead, but nothing really to speak of.

But we do have a number of issues. We've got some hot spot soil areas that we need to address. We've got lots of Light Non Aqueous Phase Liquid areas where we have free-phase liquids and stuff that's tied up with the

soil that we need to address.

And we, of course, have had this extensive groundwater plume, which is both present on and off the property, and the sediment contamination in the Little Timber Creek which needs to be addressed.

Just to give you an idea of the breadth of the work that was done, there was at least 49 or 50 new monitoring wells installed.

On top of that, we did a great number of LNAPL delineation borings. I think the Settling Defendants put in at least 50. I know EPA put in, at least, another 50 more. There were 85 soil borings put in.

We analyzed almost 270 or 280 Light Non Aqueous Phase Liquid samples, collected over 450 samples from the wetlands, collected 63 fish and small mammal tissue samples, installed a number

of -- I think 15 test pits to see what was buried in a couple of areas where we had some geophysical anomalies, performed a number of aquifer tests to see how the aquifer was reacting and where the groundwater was going.

So I think we have a very good handle on the characteristics of the site, where the waste is and where the waste is going.

We also sampled or analyzed for a wide range of parameters. This wasn't just focusing -- because we knew that there was PCBs at the site -- just focused in on specific chemicals.

It was a broad-brush approach when we first started; testing for volatile organics and semi-volatile organics and metals and pesticides and PCBs and metals until we finally homed in on what some of the few contaminants of concern were.

We also did a lot of what we call geochemical testing, things like specific gravity and viscosity on the oils and a few other tests in that general regime. And as a result, we've identified various media which have site-related chemicals of concern.

From a broad based approach, we see the following: We have volatile organic contamination found at levels of concern in soils, LNAPL and shallow and deep groundwater; semi-volatile organic compounds primarily an issue in groundwater; PCBs, a concern in LNAPL; and metals and PCBs drive the concern in the sediments.

And we also have -- I'll talk about in a minute -- a couple of specific areas that are perhaps of more concern or of the highest

concern. There's one area in groundwater where we have a very low ph condition due to some of the practices that occurred at the property in the past.

And this table is in the proposed plan as well. The various chemicals of concern are present in specific areas of concern about the site.

As I mentioned, these include soil hot spots, areas with free and residual LNAPL, shallow groundwater concerns, deep groundwater concerns, both on and off property, and the sediment areas over in Little Timber Creek.

The two areas that I mentioned before, the specific areas where we have greater concern, we call these principal threat areas. It's a particular term that EPA likes to use.

That's the area where we

have free phase NAPL, and the other one is this area of low ph material which is at the base of the second aquifer, and I'll kind of go over in a minute what we're talking about when we start using the term aquifers.

Just to give you an idea of where some of these soils and specific hot spot areas are -- and this figure is also provided in the proposed plan. I'm not going to go over all of them.

There are a number of soil hot spots: A couple areas where we have a little seep going out, former seep, into Gaventa pond; a little area in the corner here that we're going to clean up; a little spot just south -- outside the fence of where the old lagoon used to be that needs to get cleaned up.

And these two hot -- soil

hot spot areas where we also have LNAPL concerns, and that's Hot Spot 1 and Hot Spot 2.

And once again, these things are in much greater detail in the proposed plan, if you want to get more information.

Next, to -- following up on some of the Settling Defendants preliminary LNAPL investigatory work, EPA decided to conduct some studies of our own. The results indicated that the LNAPL was much more extensive than we initially believed.

Things change in the environment. When the water table is down -- we have drought conditions -- sometimes you see things. When the water table comes up -- and things like oil tend to float on it -- you see other types of conditions.

So this took us a lot of

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time, a number of years, to truly understand what was going on with the oil situation on the property.

We installed a number of recovery trenches based on the data that we collected and we have five of those oil extraction gizmos that I showed you in the picture before.

And once again, to date, we've extracted over 11,000 gallons of contaminated oil and there was probably in the order of about 100,000 gallons of oil in the ground of which maybe 40 or 50 percent of that is recoverable.

And it's certainly one of the things that we're going to task the party that does the cleanup out here to be mindful of and go after in the way of a cleanup action.

The primary area of concern in the wetland: There's lots of

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areas -- a large area that is impacted in both Little Timber Creek and Cedar Swamp.

The Little Timber Creek area is the more critical, the area of more -- of higher concern, and primarily in what we call Little Timber Creek Swamp Area 2.

And this area is primarily a concern based on the high lead, PCB and BTEX levels. Benzene, toluene, ethyl benzene and xylene that we find out in that area.

And we'll talk more about this picture when we get to the actual cleanup activity.

And to give you an idea of what's going on in shallow groundwater, this is just one of the many figures that are included in the remedial investigatory documents.

One of the higher areas of concern that we have is located

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between two of the monitoring wells on site, Monitoring Well 32 and Monitoring Well 26, which are kind of in the middle of the property.

This particular figure depicts a large area of concern where we have chlorinated compounds and the isopleth of the contour lines that we show here are showing the distribution of one of the chlorinated solvents, trichloroethene.

For the most part, the shallow groundwater contamination issue is concentrated on the property, though, so it will certainly be a little bit more manageable than some of the off-property areas.

And for the deeper groundwater, the extent of this plume is quite large. I will show you a graphic -- three-dimensional

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graphic in a minute on how this stuff actually got off site.

But we see contamination in two of the local aquifers on site, the Upper Potomac Raritan Magothy and the Upper Middle Potomac Raritan Magothy aquifer.

This figure depicts the plume based on the concentrations of BTEX and TCE, the contaminants which essentially lead -- are the outmost ones for the BROS plume.

There's lots of other compounds that are present in the plume. We did have an inquiry a few years back regarding the presence of bis-2 chloro ethyl ether. It certainly is a compound of concern at the site. We're aware of that.

We know where its presence is; but it does appear to us, from all the studies that we've done, that TCE and the BTEX compounds are the ones that lead the plume, and this is essentially the fingerprint of the plume.

So you see it's about 2400 -- maybe a little bit over 2400 feet off the BROS property, flowing in a southeasterly direction.

There is another Superfund site in the area. There's the chemical Leaman Superfund site. That is farther to the southwest.

Don't confer (sic) some of the terminology that we're talking about here about aquifer zones and what's going on at this site with some of the things that are going on over there.

The stratigraphy is different. The groundwater regime over there is different and some of the chemicals of concern are a little bit different.

But overall, we feel we have

a very good handle on what's going on at the site. We have a good -- what we call a conceptual model of the groundwater system, of the flow patterns, where the contamination is present and where it went.

So just as a historical observation -- I mean, we had contamination in the lagoon on the property. There was -- combined with sulfuric acid in some cases, which was denser than water, which allowed a lot of this material to go downward.

The hydraulics in the area -- the flow is also downward for the most part. There are some areas where we have a little bit of upland; but for the most part, it's a downward flow regime, so all the contamination was dragged downward until it reached a clay layer that it couldn't penetrate.

There are some other clay layers in the area, but none of them are continuous throughout the area, so the stuff migrated downward until it reached this clay unit, and then it migrated with the general direction of groundwater flow to the southeast.

And this principal threat area -- the BROS technical committee and their documents have coined this area the PTZ.

It's this little area over here, where we have a lot of material sitting down at the base of that aquifer, and we want to aggressively go after -- remediating that, because it's just sitting there.

It's in a little pocket, so the groundwater flowing over it is tending to wick it off over time. And if we didn't do anything about it, it would essentially sit there

for a very long time.

Upon understanding the types and extent of contamination, the next step in the Superfund process was evaluating risks associated with the contamination, both human health and ecological risks were evaluated.

The human health risk process identified -- included identifying hazardous -- what the hazardous chemicals were, analyzing current and potential future exposure pathways, evaluating the toxicity of various chemicals and then characterizing the associated risks.

Volatile and semi-volatile organics were noted as the primary chemicals of concern and a wide range of exposure scenarios were evaluated during this risk process, including groundwater use, agricultural use of groundwater, potential contact with contaminated materials by trespassers, potential workers at the site.

And there's a great amount of information or detail in a separate document that was prepared, which is known as the Human Health Risk Assessment document, and I believe that's an appendice (sic) to the remedial investigation as well.

In summary, the highest areas of risk include groundwater use from selected areas, potential impacts from vapors released into a future building if it were to be constructed on the property and contact with these Light Non Aqueous Phase Liquids.

For the ecological risk assessment, a similar process was undertaken. Lead and PCBs were identified as the primary

chemicals of concern. These had adverse effects on both vegetation and animals.

And once again, the highest risk was associated with that more highly contaminated area that was termed the DeManifestis Zone or DMZ. That was that brown shaded area on the figure of the wetland that I showed you. I'll show you again in a moment.

That particular area is characterized by lead levels exceeding 1,000 parts per million and elevated PCB concentrations.

More good news. Even though we do have some human health risks at the property, the potential for exposure is very low due to all of the steps we've taken to protect the public, and these include the installation of new water supply infrastructure and adopting the various institutional controls

that I mentioned before to include deed restrictions on the property and limiting the installation of wells in the area.

And for the wetland areas, we really didn't see too much in the way of significant human health risks due to the exposure scenarios. It's a limited access wetland.

And there are some ecological risks that do require management, so we're going to be talking about an aggressive management approach for the wetland area.

Now let's look at what some of these measures are that we're planning on taking.

The feasibility study looked at a wide range of alternatives to meet our goals in restoring groundwater to its classified use as a drinking water aquifer and

reducing both off and on-property soil levels to allow the site for reuse, most likely under a non-residential scenario.

A list of preliminary alternatives was screened to come up with a manageable list of alternatives which underwent what we call a detailed analysis.

According to the National Contingency Plan, we've got a set of nine criteria that we look at.

These include evaluating the alternatives for overall protection of human health and the environment, compliance with applicable or relative and appropriate standards, regulations, things of that nature, the long-term effectiveness and permanence of the implemented remedy, its ability to reduce toxicity mobility and volume through actual treatment rather than just removing the stuff from the property, short-term effectiveness, the ease of implementability (sic) of the alternative, the cost of the alternative and also support agency and community acceptance.

Here's what the preferred alternative looks like. We are proposing a set of alternatives which combines technologies within an adaptive management approach to address both impacted media as well as the post-lagoon residuals.

The work will include hot spot soil management through cover and drainage improvements; improved water budget management using phytoremediation techniques, essentially planting trees that like to suck up a lot of water, so it will hold the water in place rather than allowing it to seep

into the ground and seep through the chemicals and get down into the groundwater system; enhanced biodegradation and the various institutional controls.

We're going to manage the Light Non Aqueous Phase Liquid issue through covering drainage improvements, limited property excavation in selected areas; once again, improved water budget management, and enhanced LNAPL coverage through something we call bioslurping. I'll describe what that process is in a minute.

But, essentially, it's like a combination of vacuum extraction of the oil through a tube and -- but that will also act kind of like a soil vapor extraction unit. It's going to suck vapors out of the ground when it's not sucking oil and it's also going to suck some of the shallow groundwater

out of the ground.

Also, the oil at the site has varying properties. We see everything from oil that looks like mineral spirits -- it's very light. It's almost clear. It flows pretty well -- to stuff that looks like burnt motor oil, to stuff that is much more viscous, almost like a Number 5 fuel oil, even getting towards like bunker oil and tar. There's all kinds of oil at this property.

So we're also amending the bioslurping technology in specific areas, if the bioslurping technology isn't enough, with a steam injection process.

For the shallow groundwater, we're looking at management through residual source remediation controls, improved water budget management, groundwater extraction concurrent

with the LNAPL system that I just mentioned, natural attenuation and some of the institutional controls that are in place.

For deep groundwater management, we're looking at in-situ chemical oxidation treatment and enhanced biodegradation in conjunction with source area pumping and treatment.

So this will not be a straight pumping -- you probably heard the term pump-and-treat system where you just suck water out of the ground and you either treat it and discharge it locally or you send it off site someplace.

We're going to do more than that. We're going to pump a lot of water out of the ground, but we're also going to try to do some in-place treatment with chemical oxidants, things like hydrogen peroxide or perhaps potassium permanganate.

And for the wetlands area, we're looking at sediment excavation with ex-situ treatment and off-site disposal. There will be some areas where we'll also apply some sorptive agents to keep whatever remaining contaminants in place, backfilling, some monitored natural remediation.

And then, ultimately, once we do whatever excavatory (sic) activities we're proposing in the wetland, we would then go in and restore the wetlands. We'd have a nice wetland left in its place.

The overall estimated cost for these activities is about $91 million. Now, that's 91 new million dollars, not the 187 plus that we've already spent cleaning up the lagoon and some of the other waste on site.

And we also have a

contingency plan built into the remedy. Even though the BROS technical committee did treatability studies to ensure that the chemical oxidation process was going to work at the BROS site, there are some parties that think that it's a bold attempt because we're doing it perhaps deeper than some people have done at some other -- other sites, so we put in a contingency remedy to do what we call hydraulic containment pumping.

So should the chemical oxidation process somehow fail us and not complete the remedy to our expectation, then we would continue to pump groundwater out of the ground to maintain the extent of the groundwater plume.

What won't happen, as John mentioned -- I'm sure one of the things -- when we talked to some

of the council people and the Mayor the other day, we just wanted to alleviate any fears that we're not proposing any large-scale thermal technologies like an incinerator for the BROS site. I know that was of some concern in the past, like you're going to put this thing up and it's never going to leave here. That, indeed, is not the case here.

There will be a lot of activity at the site, however. We're going to have to build a small groundwater treatment plant.

There's going to be lots of truck traffic involved with the wetlands excavation and removing materials from the site and truck traffic going in and out for the various installations of some of the other hardware that I will talk about in a minute for the

LNAPL and the groundwater remediation. And you will also see us doing some work on the surface, improving drainage to eliminate potential impacts from infiltration through contaminated media.

And you will see us, perhaps, planting -- doing some of this phytoremediation technology through the use of trees. We will be planting a lot of trees at the site.

And, actually, EPA is undertaking a pilot study right now when -- when the BROS technical committee brought this concept to our attention, we wanted to make sure that what they were proposing was valid, so some of the EPA folks that work for the environmental response team in Edison have been out at the site planting various kinds of trees to

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see what the water uptake is going to look like and see what kind of trees are actually going to grow on the property.

And for your information, just a little graphic of what the bioslurping system looks like, so -- there's going to be lots of wells in the ground.

This particular well for bioslurping is going to have a suction tube in it that's going to take that oil that's floating on top of the water table off and -- and as it depletes the amount of water that's floating on the water table, it will suck the vapors out of the ground in the unsaturated zone; or if the water table should rise and the oil go above the actual suction tube, it will suck some of the contaminated groundwater out of the ground as well.

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And this is what the bioslurping system looks like. Once again, it's not a lot of large hardware, but these will be numerous installations of this type of hardware, so some tanks and vessels and pumps and things like that nature and generators to actually operate the equipment.

And this is just an example of what the array of bioslurping units might look like. We may have as many as 40 or 50 units operating at one time, so there's going to be a lot of hardware on the site.

And this will take a number of years to actually complete these activities. It's not like we're going to put these bioslurpers out there for a couple of months and that's going to resolve the problem.

It's probably going to be a

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multiple-year scenario for the clean up of the amount of oil that we believe can be cleaned up at the site.

And for the groundwater treatment, a similar type of action where we're going to have a number of both injection and extraction wells for the chemical oxidation system.

This is just a -- one of the figures from the FS depicting where the lines of chemical oxidant injector wells might be and how many might be in individual lines. So you can see we're talking about many hundreds of injection wells potentially being on site.

And I believe there's one more. Yeah, and this is just another figure showing where the extraction wells might be and the number of extraction wells.

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And, of course, these are all going to have to be piped back to a treatment plant that's going to be on site, so there's going to be some piping and some other hardware associated with this action.

But what is this all going to accomplish? It's going to accomplish a great deal.

As you're aware, when I showed you that first figure of the extent of the contamination at the site, we want to pull that plume back in and the deep water groundwater remediation is going to take time.

I am going to show you a schedule in a minute. You'll see, when we go over that, there's a lot of activities that are going to take place in, perhaps, the first five to eight years.

They will have the biggest

impact on the contaminant reduction at the site, but there will be multiple treatments of this chemical oxidant agent and pumping over a number of years. And, in fact, in order for us to bring that plume back to the on-property area could take a very long time. It could take over 30 years for us to do that.

And this is just a figure of a couple of arrows on here showing where the plume lies with no slurp reduction. If we do the slurp reduction that we're proposing at the site and do the pumping and chemical oxidation and LNAPL depletion and all these things that we're talking about -- and I certainly hope we can actually even beat this schedule, but this is one of the model results that the Settling Defendants submitted.

This is the year 2039. And

based on a 90 percent source reduction, we can see that that contour line is moving back dramatically.

This is the one ppb line that was previously way out here and we're going to be drawing that 10 ppb line, at this point in time, back to 295.

And I think we can optimistically say that it will probably be even better than this. I think the performance will be better than this. We'll be drawing that line back much farther towards the property.

And for the wetland areas, I mentioned that figure before where we saw the contours for lead. That's where we also have the highest concentration of BTEX compounds and PCBs.

What we're proposing is an actual excavation activity. In

the dark brown area on this figure is the area that we would be actually going in and doing our excavation activity.

So once again, in summary, we anticipate excavating about 17,500 cubic yards of material from the wetland and then restoring the wetland, going to manage the soil, the shallow groundwater and LNAPL, plan on installing about 230 injection points, 72 bioslurper extraction points and perhaps a few thousand trees may get planted on the property.

For the deep groundwater, we're going to install over 50 extraction wells and 300 injection wells and conduct multiple rounds of treatment. And we're pretty optimistic that this process is going to work very well for us, but it will take time.

Now, I certainly don't believe that this is any final schedule for the project, but this is a preliminary schedule or time line that was put forth by the BROS technical committee in their FS document.

And as I mentioned, you can see a lot of these activities are going to take a lot of time because it's an iterate process.

We're going to put chemicals in the ground that are going to help to treat the groundwater. We're going to pump out.

We're going to observe what happens over a certain period of time, then we're going to go back and look for the areas that perhaps weren't as amenable to the treatment as possible and redose them so we can get more action going in those areas.

This will take a number of

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years to complete and we will certainly pay a lot more detail to the actual timing or true schedule once we get to the design stage and pilot stage on a lot of these activities.

Once again, in closing, this is our preferred program. It includes a number of sequenced activities. It allows us to be flexible about a number of applications of various chemicals and durations of programs.

We think it's an incredible, good program for this particular site and the kinds of compounds and the geology and stuff like that that we have at the site.

And what I am certainly sure of is that we've made significant progress at the BROS site. Unfortunately, we don't have time to really go through -- John has a whole sequence of past pictures

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from the site and some of them were just amazing, the amounts of material that were taken out from that former lagoon.

But we've certainly seen an awful lot of progress; 90 percent of the material already removed, 10 percent left, and I think we've got a handle on how we're going to manage that 10 percent.

And, certainly, we can look forward to in the future -- I know it's a very viable property. It's a crossroad of two major, you know, transportation routes and perhaps, down the road, we'll be seeing some viable use for the property.

Just a couple of other notes. There's always concerns when a potential responsible party is the person preparing the remedial investigation, the feasibility study documents.

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I just wanted to let you know that EPA actually started an RI -- the RI process before the settlement was done on the BROS facility.

It was conducted by a reputable consulting firm directly for EPA and many of the conclusions that they came to were followed up by the Settling Defendants and their data supports what was -- the data that was previously collected.

We also had the site evaluated by EPA's National Remedy Review Board, which is a panel of experts from across the country. John also sits on the Board.

It's an incredibly wise group that gets to see all of the remedial actions that are proposed for sites across the country, and so they have a good handle on what works and what doesn't work.

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And they have given us their blessing. In general, except for a few minor things, they approved of our preferred approach for the site.

Unless John has any other comments, what we want to do at this point is we want to open the official record to receive your comments and questions.

Once again, we have a court stenographer taking all of this information down. If you could, please state your name and make sure we have your contact information in the back.

And once again, you can also respond to us in a number of different ways. My E-mail address and my telephone number are on a number of the documents.

If for some reason you can't get ahold of me, you can always call EPA and ask for John Frisco.

Everyone in the region knows who John is.

We would like to receive any comments that you have by the August 11th deadline. I've also put some forms in the back. You can hand in your comments tonight.

And I think that about does it for me. So we will open up the floor at this time if anybody has any comments, questions.

MR. FRISCO: Now, that was a pretty detailed technical presentation. I think what -- when I look back at this site, it's probably the most technically challenging site that EPA has cleaned up under the Superfund program.

With that large oil lagoon with a mix of chemicals in it, it was the first PCB incinerator permitted in the State of New Jersey.

There was more stuff in there than, you know, we thought when we started the project. We thought that, maybe, 100 drums or so in there. As it turns out, there were 5,000.

The good news is that some of them still had the names of the companies on them, so that did enable us to go back and help get this 200 plus million dollar settlement.

To get the rest of the stuff out -- we don't want to dig up the whole site again and try to get out this floating oil that's, you know, sitting below the surface, so we're going to use some new innovative approaches that aren't that intrusive and, you know, just stick these little pipes down in the ground and -- you know, you basically want to extract the rest of that oil because that -- that

oil that's sitting down there is a problem. It leeches into the groundwater and it allows the groundwater contamination to expand.

So rather than do it the old fashion way, we're going to try to do it a little bit more surgically efficient. So, hopefully, we'll be able to suck a lot of that oil out. Some of it that's real thick, we may have to heat up a little bit so it flows better.

In the old days, we pumped all the groundwater out of the ground and we treated aboveground and then, in some cases, reinjected.

We're going to try here an innovative approach, again, trying to treat the groundwater in place and inject into the groundwater, you know, chemical additives that actually will allow the treatment

to occur underground as opposed to pumping it all out of the ground.

Biodegradation has come a long way over the years. We're going to try to do that in place.

So what we've got here is a lot of new technologies that we're going to apply. However, we'll still be doing some old fashion pump and treat to, you know, make sure we get some bad groundwater out of the ground before we even start those new technologies.

And so we've got really a combination of innovative and conventional techniques that we're going to be applying to get the rest of this stuff treated and/or removed from the ground. If the --

MR. ROBERT PAZ: I've got a question.

MR. FRISCO: Yeah.

MR. ROBERT PAZ: If it's a

half a mile in diameter now or radius now, what is it going to be a year from now? How do you arrive at a half a mile as of now?

MR. FRISCO: By measurements.

MR. ROBERT PAZ: And that's what it will be for probably a year or two --

MR. FRISCO: Right.

MR. ROBERT PAZ: -- so how far will it be then? Answer the question.

MR. FRISCO: We know how far it's gotten to date. We know the rate that it's moving.

MR. ROBERT PAZ: What is the rate?

MR. FRISCO: It's -- it's essentially relatively stagnant at this point.

MR. ROBERT PAZ: Does it move at all?

MR. FRISCO: It's gone about

the half a mile and it seems to be staying about there, but we don't want to leave it there. I mean, the intent is to bring it back, you know, into the site.

But we think this combination of innovative and conventional techniques would be the best overall plan for this site. It allows, again, some of the latest thinking to come into play.

The intent is to -- anything off that property -- it's to restore that groundwater so someone can put a well in it and turn on the tap and drink that water. That's the goal.

THE REPORTER: Excuse me, sir. I need your name.

MR. ROBERT PAZ: Harry Smith (sic).

MS. REDROW: I have a question. My name is Sarah

Redrow. I live on Flood Gate Road.

THE REPORTER: Can you spell your name?

MS. REDROW: R-E-D-R-O-W.

In reference to the Cedar Swamp section of the study, how many test wells were done and in what distance from the site, from the Cedar Swamp area?

MR. NAMAN: We collected between 400 and 500 samples out in those wetland areas. There weren't any wells per se put in, but a lot of sediment sampling --

MS. REDROW: Can I ask why --

MR. NAMAN: -- was done.

MS. REDROW: -- no wells -- because, see, we live in that area and we all -- we did not get connected to your municipal water supply. And, in fact, I have formulated a letter which you will

receive.

My question is this: That Cedar Swamp area feeds into the Repaupo Creek. I live right on the Repaupo Creek, as well as my neighbors do. We all have wells.

We cannot and will not drink the water. We have had -- the township has had the wells tested a couple of times, my well and a neighbor's, but the problem with that is the fact that our wells -- we have an enormous water treatment system within our homes. We still cannot drink our water. We still cannot do our laundry.

And you say -- I don't know -- in my opinion -- first of all, I think we should have been connected at the same time that the Repaupo section was, regardless if you found a plume there or not.

But if the Cedar Swamp was

affected at that time, what is there to say that that groundwater in the Cedar Swamp has not flowed into the Repaupo Creek and has not and is not in our groundwater and why were we not tested down at the lower end of the township?

MR. NAMAN: Well, certainly, we have to make distinction between the surface water and sediment and the groundwater.

And, first, the groundwater issue is that you folks are hydrogeologically upgradient or in a different area from impacts from the BROS site. There's no connection to your area from what's going on in the groundwater at the BROS site.

MS. REDROW: How can you say that when the Cedar Swamp is in complete -- to our area? We are affected by the Cedar Swamp and the flow of the water and in the

Cedar Swamp area.

MR. NAMAN: I understand your concern --

MS. REDROW: There's a recharge basin -- or was -- before contamination for all the groundwater in the area.

MR. NAMAN: Yeah. We do have some monitoring wells on the northern side of the properties. We do have an awful lot of data from Cedar Swamp. The levels are much lower over there. I don't think there's levels of concern in Cedar Swamp and sediment that would allow us to believe that there's an issue with groundwater contamination over there from that source.

MS. REDROW: But being the EPA, which is protection of "We the People," wouldn't it be more feasible to ensure that this does not happen in the future, that

this plume or this whatever you're going to pull out now or the Cedar Swamp area does not get worse to just connect Flood Gate Road and the residents of this section of Repaupo that were excluded when the first lines went in?

We're now talking about finishing up Hendrickson Mill Road, which is fine. I have no problem with that. I believe everybody should have Municipal water and I believe we should and I would like you to take it into consideration while you're doing this.

Once and for all, connect Repaupo, all of Repaupo. Don't leave us out there on the end and with a possible future damage. That's all I'm requesting.

MR. FRISCO: How close are you to the nearest connection to where --

MS. REDROW: Route 44. That's how close we are. And we're talking -- well, in my letter -- we're talking -- the Godwin Pumps of America is in there. Bridgeport Speedway is in there. R.E. Pearson is in there. Allied Energy is in there.

And there's approximately -- counting Route 44 and down -- about 27 residents. And onto Bridgeport Speedway, they're open to the public two to three times a week. And, I mean, you know, it makes no sense.

And Godwin Pumps employs approximately -- between them and Pearson -- a couple hundred employees and they're in the process of building a new office and another, you know, new facility.

And, I mean, you know, it doesn't make any sense that we,

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down there, the only part of Repaupo, was completely excluded.

All I'm asking is, you know, what can it take? A couple -- 500,000, you know, to loop us in? And not have to ever have to worry about it again.

MR. FRISCO: All right. Well, we'll --

MS. REDROW: And I have addressed the letter to you in that respect. Thank you.

MR. FRISCO: We'll evaluate it.

MR. NAMAN: Duly noted.

MR. WALTER: I have one question. George Walter, W-A-L-T-E-R, on Flood Gate Road.

Where is the nearest test well there on Flood Gate Road? Do you know? Has it been tested, monitored?

MR. NAMAN: Off the top of my head, I cannot tell you the

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closest to Flood Gate Road, but we have monitoring wells ringing the entire site.

MR. WALTER: We're maybe three-fourths of a mile away from --

MS. REDROW: We're 2.1 mile. I did it the other day.

MR. NAMAN: Yeah, see, you're outside the area of influence or impact from our --

(Whereupon, Mr. George Walter and Ms. Sarah Redrow begin speaking to each other outside of the court reporter's earshot.)

MR. NAMAN: See, the issue here is that you're -- from my perspective, at least, you are outside the area of concern from BROS contamination which is leaving the site.

And as John just mentioned, what we see over time, over the last few years, is a static or

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a -- perhaps, in some areas, even a shrinking condition rather than an expansion of this groundwater plume. So we're not looking outside of the areas that we know to be clean to try to find other areas farther away, because they are not impacted by the Bridgeport site.

MS. REDROW: My point is: You've done a terrific job from the beginning. I've been here from the beginning, unfortunately. And I am not objecting to anything that you've done. It's -- you know, of course, I didn't want the incinerator, but I learned to live with that and it was for the best.

My point is: You want a complete closure to this Bridgeport Rental site. All right, it may take 30 years. I'll have to come back in spirit to see it.

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But the point is: Why not, in order to get a complete closure, give these people down there -- you know, now and in the future -- peace of mind that they also can turn their tap water on and drink it and not have to worry about the township delivering them bottles of water, which they still do, by the way.

MR. FRISCO: You are receiving bottled water from the township?

MS. REDROW: Yes, we are. Yes, we are.

MR. NAMAN: Okay. Any other comments, questions or concerns?

MR. WALTER: Yes, I have one more question. I want to know how far the contamination has gone towards Woolwich Township.

MR. NAMAN: The contamination extends about 2400 feet southeast of the old Berolli property.

MR. FRISCO: That's about a half a mile.

MR. WALTER: Half a mile? And why -- I've seen pipes piled up out there near 295. What are they going to do? Interconnect there with Oak Grove Road and Hendrickson Mill Road?

MR. FRISCO: I'm not sure of the details.

MR. NAMAN: I am not sure what the question is.

MR. GLANCEY: He was asking about the plaintiffs (ph), Hendrickson Mill and Oak Grove Road and --

MR. NAMAN: This is Tom Glancey who works for the consultants that works for the BROS technical committee. They're the folks that are involved with putting this Hendrickson Mill Road loop in to --

MS. REDROW: That was part of the old agreement. Am I right?

MR. NAMAN: No --

MR. GLANCEY: No.

MR. NAMAN: -- this is something new that we've just recently done in the last --

MS. REDROW: That was for the old -- I thought it was three phases, where the waterline was going and that this was Phase --

MR. GLANCEY: This is something that we approached the township about three years ago, I think. Four years ago? And the township and --

MS. REDROW: All right. Where is the money coming from?

MR. GLANCEY: Well, two-thirds of it is coming from US EPA and the BROS technical committee and one-third is coming from the township.

(A discussion off the record occurred.)

MR. NAMAN: If you can just please speak up so the stenographer can hear you.

MR. GLANCEY: But that pipe has been sitting there while we wait for a New Jersey Department of Transportation permit.

MS. REDROW: Which just came in.

MR. GLANCEY: I hope.

MS. REDROW: From what I understand, wasn't it Tuesday night that they just approved that?

MR. GLANCEY: You know more than I do.

MR. BARNES: Lyman Barnes, councilman, Logan Township.

From what we're hearing, the DOT permit has been approved. We have not yet -- right, we have not yet received the -- when you were talking about the council meeting,

we were talking about the application that was made to do that.

Now, subsequent to that meeting, we've heard that the application has been -- although we haven't received it yet from DOT, that's the last piece that's required for the BROS technical committee to continue the work and finish the loop.

Am I correct, Tom?

MR. GLANCEY: Absolutely.

MS. REDROW: It sounds stupid, but tell me why we have to go under 295, why we didn't come right up Hendrickson Mill Road onto Oak Grove Road.

MR. GLANCEY: It's a very good question. The DOT would not allow that to occur, so --

MS. REDROW: That makes no sense. Well, I am not being smart. I mean, it's already coming up to Repaupo Road, going down Hendrickson Mill Road. All you had to do was shoot across the field and it's on Oak Grove Road.

MR. GLANCEY: We've been fighting with --

MS. REDROW: Why did we have to go under 295?

MR. GLANCEY: The only thing I can tell you is -- sometimes it is absolutely counterintuitive on the way things unfold.

Unfortunately, that was the decision that was made. There were a lot of -- there were a lot of technical issues that were resolved.

(A discussion off the record occurred.)

MR. ROBERT PAZ: Where does the waterline go to, where it stops at 295 now? We all know you have the forms of the roads. It's coming --

MR. GLANCEY: There is a dead-end main approximately 200 feet north of I-295 on Oak Grove Road. We are connecting in to that dead end with what's called a wet tap. Okay? No one will be without water for any period of time. Okay?

MS. REDROW: They all have wells anyhow.

MR. GLANCEY: Excuse me?

MS. REDROW: There's no water on Oak Grove Road, presently, anyhow.

MR. GLANCEY: On the other side of 295, correct.

MR. ROBERT PAZ: Where does it go to?

MR. GLANCEY: Okay. I can only answer one question at once.

It's going to start -- it starts there. It's going to be wet tapped. It goes towards -- beneath I-295 because the

New Jersey Department of Transportation would not let us use the overpass and put the pipe under there. Okay?

So we're spending hundreds of thousands of additional dollars to do this because they wouldn't let us do that. Okay?

It goes across, onto Hendrickson Mill Road, and goes the length of Hendrickson Mill Road all the way down to Swedesboro-Paulsboro Road and ties into the existing water main there. So -- and that's to answer your question --

MS. REDROW: So it's like a loop.

MR. GLANCEY: Yep, it connects the loop. It basically forms the loop.

MS. REDROW: Not to say you're right or wrong, but when I was involved with this many, many

moons ago -- this is why I am saying to you about this was part of -- when they put the waterline in to Repaupo, there was three -- supposedly, at that time, the EPA said there was three phases.

One was the Repaupo, the metropolis of Repaupo. The second was Swedesboro-Paulsboro Road and Hendrickson Mill and then the loop from Hendrickson Mill was supposed to come right on in to Oak Grove Road.

That -- and that's what I understood to be part of the original $220 million that was spent. That's why I didn't consider this new. I thought this was part of the old settlement for the -- I may be wrong, but --

MR. NAMAN: I am not aware of that.

MR. GLANCEY: I know -- if I may. I'm not sure I can. I was

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not involved in the project.

I know the township and the residents have been speaking about this since the original waterlines went in.

MS. REDROW: Right. Exactly.

MR. GLANCEY: Okay, so we had a need to put this waterline in. The township, obviously, had a need to put this waterline in, so did the residents, so that's why this happened.

MS. REDROW: Well, if you're getting money -- the remaining funds from the township, this has got to be funds that were already allocated years ago and put in there, I would say.

MR. GLANCEY: Well, they were allocated as part of a resolution that was passed, I think, two to three years ago. I don't know the exact date. It was

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September of 2002 or 2003.

MS. REDROW: Well, now I want the rest of it.

MR. NAMAN: Anyone else?

MR. FRISCO: Well, we'll hang around for a while anyway.

MR. NAMAN: I would like to just close the public meeting and our collection of your comments at this time. Once again, you can reach me in New York.

There's also information of something called the facts sheet that we have copies of in the back of the room and you can also access information on this site on the web, of course.

This is EPA's Superfund information system website. You can go into more detail and, periodically, we will be updating that website to give folks more information as to what's going on with the site.

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And with that, thank you all for coming.

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(Whereupon this portion of the public meeting was concluded at 8:15 p.m.)

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CERTIFICATE

I HEREBY CERTIFY that the proceedings and evidence noted are contained fully and accurately in the notes taken by me on the above matter, and that this is a correct copy of the same.

Darlene Lowrance, a
Federally-Approved Registered
Professional Reporter, Certified
Shorthand Reporter and
Notary Public
Dated: August 7, 2006

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abandoned 24:7
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