Superfund Program
Proposed Plan

U.S. Environmental Protection Agency
Region 2

American Cyanamid Superfund Site
Township of Bridgewater, New Jersey

February 2012

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred alternative for addressing the site-wide soils, groundwater, and the impoundment contents that have not yet been remediated with the exception of Impoundment 1 and 2 at the American Cyanamid Superfund Site (Site) and provides the rationale for those preferences.

Out of the existing 27 impoundments identified at the Site, 16 were determined to be potentially contributing to groundwater contamination and, therefore, deemed necessary to be addressed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund). Excluding Impoundments 1 and 2, there are six impoundments remaining on the Site that have not yet been addressed under CERCLA. These six impoundments were evaluated in a Comprehensive Site-wide Feasibility Study along with site-related soil and groundwater. The impoundments have been found to be contaminated with mainly volatile organic compounds (VOCs), semi-VOCs, and metals. Groundwater underlying the Site and nearby areas, not currently used as a source of drinking water, is contaminated with metals and VOCs, such as benzene, chlorobenzene, ethylbenzene, and xylene as a result of previous Site activities. Site-wide soils mainly contain polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and chromium.

The U.S. Environmental Protection Agency (EPA) is proposing active measures to address the contaminated impoundments and site-wide soils as the preferred alternative, along with a groundwater recovery and restoration action. EPA is recommending Remedial Alternative 4A, identified as Consolidation/Treatment/ Soil Cover and Stabilization/Capping with Hydraulic Control/Treatment of Groundwater.

This Proposed Plan summarizes the data and rationale considered in making this recommendation. This document is issued by EPA, the lead agency for Site activities. EPA, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency for Site activities, will select the remedy for the Site after reviewing and considering all information submitted during a 45-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the information presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of CERCLA. This Proposed Plan summarizes information that can be found in greater detail in several reports included in the Administrative Record.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
February 16, 2012– March 31, 2012, U.S. EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
March 8, 2012 at 7:00 P.M.
U.S. EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Somerset County Vocational and Technical High School, 14 Vogt Drive, Bridgewater, New Jersey.

For more information, see the Administrative Record at the following locations:

U.S. EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212)-637-4308
Hours: Monday-Friday, 9 AM to 5 PM

N.J. Department of Environmental Protection
401 East State Street, Trenton, New Jersey

Bridgewater Township Library
1 Vogt Drive, Bridgewater, New Jersey

SITE DESCRIPTION

The Site, located in the central portion of New Jersey, is within the southeastern section of Bridgewater Township, Somerset County. It is bounded by Main Street to the north, the Raritan River to the west and south, and Interstate 287 to the east, as shown on Figure 1.

The Site encompasses approximately 435 acres and was used for numerous chemical and pharmaceutical manufacturing operations during the past 80-plus years. The facility was originally built in 1915 as Calco Chemical Company to manufacture intermediate chemicals and dyes. The plant expanded over the following 60 years to become one of the nation's largest dye and organic chemical plants, resulting in the production of thousands of chemical products. The majority of the expansion at the plant occurred after American Cyanamid purchased the facility in 1929 and was driven by the large increase in demand for chemicals in the United States, particularly during and immediately after World War II. The large increase in manufacturing capacity during the period from 1930 through 1970 required more buildings, support services, and disposal capabilities. As a result of past activities at the facility, a number of waste storage and disposal areas, referred to as "impoundments," were constructed. In addition, the surrounding soils and groundwater were eventually impacted. Throughout its more than 75-year manufacturing history, numerous organic and inorganic chemical raw materials were used at the facility to produce products including rubber chemicals, pharmaceuticals, dyes, pigments, chemical intermediates, and petroleum-based products.

The Site is generally divided into two main portions. The Main Plant area refers to that portion of the Site property within a flood control dike, and the Flood Plain area refers to that portion outside the flood control dike. Approximately 50% of the Main Plant was used for production activities over the time the facility was active. Impoundments cover approximately 10 to 15% of the Main Plant area. The remaining 35 to 40% was used for storage of general equipment, raw material, and finished product, as well as incidental waste disposal. The majority of the Flood Plain, which consists of approximately 80% of this area, contains impoundments, while the remaining 20% continues to be virtually undisturbed. A map of the Site can be found in Figure 2.

The Hill Property, also considered a part of the Site, is 140 acres located in the northeastern portion of the Site. The Hill Property was separated from the former Main Plant area of the Site since it consisted of a research laboratory and administrative buildings. In December 1990 (amended March 1992), a Baseline Site-wide Endangerment Assessment (BEA) Report established that there are no current or future unacceptable risks to human health and the environment associated with the Hill Property. Based on this finding, no remedial action was required other than the implementation of a Classification Exception Area (CEA) and a Well Restriction Area (WRA) for the groundwater.

In June 1999, all manufacturing ceased at the Site. By the end of November 2000, almost all buildings on-site were demolished.

In December 1994, American Home Products Corporation purchased the American Cyanamid Company. In December 2002, American Home Products Corporation changed its name to Wyeth. In October 2009, Wyeth was purchased by Pfizer Inc. and became a wholly owned subsidiary of Pfizer. Title to the Site property is held by Wyeth Holdings Corporation (Wyeth).

SITE HISTORY

Preliminary investigations completed in 1981 verified that approximately one-half of the Site was utilized to support manufacturing, waste storage, or waste disposal activities, and that contaminated source areas were confined primarily to the main plant area and in the on-site waste storage areas (impoundments). Twenty-seven impoundments are believed to have been constructed for disposal purposes. Of the 27, 16 were identified to be CERCLA classified impoundments since they were used for storing by-products of rubber chemical production, dye production, and coal tar distillation, as well as for disposal of general plant waste and demolition debris. These impoundments were originally estimated to contain 877,000 tons of waste material. Hence, these impoundments, along with identified areas of contaminated soils, are the primary focus of current remedial activities. Both media have been found to be sources of groundwater contamination. On September 8, 1983, the site was placed on the National Priorities List (NPL).

The 16 impoundments being addressed under CERCLA have been identified using numbers, which include: Impoundments 1, 2, 3, 4, 5, 11, 13, 14, 15, 16, 17, 18, 19, 20, 24, and 26. More specifically, these sixteen CERCLA impoundments:

- were re-evaluated as part of the 2012 Comprehensive Site-wide Feasibility Study (Impoundments 3, 4, 5, 13, 17, and 24);
- are being re-evaluated as part of an ongoing Focused Feasibility Study due to their complexity, location, and volume (Impoundments 1 and 2);

- are currently undergoing remediation (Impoundments 15 and 16);
- were remediated in accordance with CERCLA closure plans (Impoundments 11, 14, 18, 19, 20, and 26).

Note: Impoundments 9, 10, and 12 were never used for waste disposal. Impoundment 21 was used to contain emergency fire water and Impoundments 22 and 23 were used to contain river silt from the facility's former river water settling operation. Lagoon 6 and Impoundments 8, 9A, and 25 were closed and classified as Treatment/Storage/Disposal (TSD) facilities pursuant to regulations issued under the Resource Conservation and Recovery Act (RCRA). Lagoon 7 is in the process of being closed in accordance with RCRA closure plans.

American Cyanamid entered into an Administrative Consent Order (ACO) with NJDEP (referred to as the 1988 NJDEP ACO) in May 1988 to address the sixteen impoundments, site-wide contaminated soils, and groundwater. In addition to the regulatory requirements established under the 1988 NJDEP ACO, a New Jersey Pollutant Discharge Elimination System/Discharge to Groundwater (NJPDES/DGW) permit was issued in 1987. This permit required American Cyanamid to conduct extensive groundwater monitoring on a quarterly basis and continue pumping bedrock production wells, at a minimum rate of 650,000 gallons per day. This action was designed to capture groundwater contamination within the Site boundaries.

In May 1994, American Cyanamid and NJDEP executed an ACO Amendment (1994 NJDEP ACO Amendment) which incorporated the existing groundwater pumping and monitoring requirements of the NJPDES/DGW permit and included additional groundwater monitoring requirements for the Impoundment 8 RCRA Facility.

Due to the complexity, size, and nature of contamination at the Site, all impacted and affected impoundments, site-wide soils and groundwater were originally separated into seven Operable Units (OUs). A summary of the specific OUs and their status are as follows:

OU1 (Group I): Impoundments 11, 13, 19, and 24

A Corrective Measures Study/Feasibility Study (CMS/FS) was completed for the Group I Impoundments in 1992 and the Record of Decision (ROD) was signed in September 1993. The remedies for Impoundments 11 and 19 were completed in November 1997 and November 1995, respectively. The remedial activities scheduled for Impoundments 13 and 24 were suspended in 2004 pending the completion of a remedy review report (Impoundment Remedy Appropriateness Evaluation, 2005) and a subsequent Comprehensive Site-wide Feasibility Study report (2012).

OU2 (Group II): Impoundments 15, 16, 17, and 18

The CMS/FS for Group II Impoundments was completed in Nov 1993 and the ROD was signed in July 1996. The remediation of Impoundment 18 was completed in April 1998 per the selected remedy. The remedy for Impoundments 15 and 16 was modified by NJDEP with an Explanation of Significant Differences (ESD) on November 30, 1998. The ESD selected an alternative remedy consisting of recycling of the material (iron oxide) within both Impoundments 15 and 16. The recycling started in the spring of 2000 and is ongoing with an expected completion in 20 years. The remedial activities for Impoundment 17 were suspended in 2004 pending the completion of a remedy review report (Impoundment Remedy Appropriateness Evaluation, 2005) and a subsequent Comprehensive Site-wide Feasibility Study report (2011).

OU3 (Group III): Impoundments 1, 2, 3, 4, 5, 14, 20, 26

The CMS/FS for Group III Impoundments was completed in November 1997. A ROD followed in September 1998. As part of the 1998 ROD, EPA designated Impoundment 8 as a Corrective Action Management Unit (CAMU) in accordance with RCRA regulations.

The remedial activities for Impoundments 1 and 2 were suspended in 2004 and are being re-evaluated as part of a separate Focused Feasibility Study (FFS) due to the nature of their contents and their complexity. Remediation of Impoundments 3, 4, and 5 was suspended in 2004 pending the completion of a remedy review report (Impoundment Remedy Appropriateness Evaluation, 2005) and a subsequent Comprehensive Site-wide Feasibility Study report (2011). Impoundments 14 and 20 were remediated under CERCLA per a 2007 ESD and completed in August 2010. Impoundment 26 was excavated, solidified with cement, placed in the Impoundment 8. Remediation of Impoundment 26 was completed under CERCLA in May 2002.

OU4: Site Soils

A 1992 Surface Soil Remedial/Removal Action Program was completed addressing areas of soil contamination that pose a potential risk to worker health and safety. The program included excavation and off-site disposal of PCB-contaminated soil, excavation and disposal of PAH-contaminated soil, capping of another PAH-contaminated area, as well as placement of a geotextile, soil, and vegetative cover over a

chromium-contaminated area. This program, along with plans for an OU4 Surface Soils ROD, was suspended in 2004 and has been re-evaluated as part of the Comprehensive Site-wide Feasibility Study.

OU5: Site Groundwater

In accordance with the NJDEP ACO, a groundwater monitoring program was established and included site-wide groundwater pumping and monitoring. To control groundwater contamination related to the Site, Wyeth operates bedrock production wells with pumping at a minimum rate of 650,000 gallons per day and monitors groundwater quality on a semi-annual basis. The groundwater monitoring program was re-evaluated as part of the Comprehensive Site-wide Feasibility Study (2011). This program, including the frequency of groundwater monitoring events, will be reassessed throughout the remedy selection process with completion expected during site-wide Remedial Design activities.

OU6: Hill Property

In July 1996, a no further action with monitoring and institutional controls ROD was issued by NJDEP for this portion of the Site. As a result of the ROD and to maintain water use restrictions, NJDEP established a CEA/WRA for the Hill property, which was closed in June 2008 after residual groundwater contamination was recovered. The site-wide CEA/WRA is currently being developed with NJDEP. The Hill Property portion of the Site was deleted from the NPL on December 29, 1998. The Hill Property has been redeveloped for commercial use (i.e., retail stores, a professional baseball stadium, and a commuter/stadium parking lot).

OU7: Site-related Wetlands

A Baseline Ecological Risk Assessment (BERA) was completed in January 2005 and a Human Health Risk Assessment (HHRA) for the Flood Plain was completed in December 2006. Site-related wetlands were re-evaluated as part of site-wide soils in the Site-wide FS.

Non-CERCLA Impoundments (RCRA)

Lagoons 6 and 7 and Impoundments 8 and 9A are being addressed under RCRA. The Impoundment 8 Facility was developed into a RCRA Subtitle-C landfill in May 1991. The design included a triple liner, leachate detection and collection system and groundwater monitoring system. All of Lagoon 6 and approximately 95% of Lagoon 7 soils and silts have undergone remediation through excavation/solidification and were placed into Impoundment 8. Impoundment 8 accepts only site-related materials defined under RCRA Subtitle C landfill requirements. Impoundment 9A was closed in-place by installing a double synthetic liner capping system.

Comprehensive Site-wide Feasibility Study

In Spring 2004, Wyeth submitted several documents to EPA and NJDEP seeking a suspension of remedial design and remedial action work on the OU3 remedy and proposed to reassess the entire Site through a Comprehensive Site-wide Feasibility Study. In its proposal, Wyeth stated that the remedy selected for the OU3 impoundments could not be performed as intended based on technical infeasibility. The difficulties mentioned included the impracticability of containing air emissions within permissible levels, a schedule to complete was estimated at 15 to 20 years, and a major cost escalation of over 100% higher than the original estimate provided in the September 1998 ROD. Based on these issues and the belief that previous decisions may also benefit from a comprehensive review, Wyeth proposed to reassess the OU3 remedial action and the other ROD remedies; complete the remedial investigations/studies for site-wide soils, groundwater, and wetlands; and evaluate potential future-use plans for the Site. All phases were to be combined into a single comprehensive program.

Impoundment 1 and 2 Focused Feasibility Study

In 2009, both EPA and NJDEP agreed to separate Impoundments 1 and 2 from the Site-wide Feasibility Study and site-wide remedy decision. Due to the highly complex nature of the contaminants within Impoundments 1 and 2 and their location in the flood plain, a Focused Feasibility Study is currently being performed on these impoundments with its own specific remedy to follow.

Corrective Action on Groundwater Discharges

In Fall 2010, Wyeth performed a site-wide inspection of the facility to note any environmental-related concerns. As a result, Wyeth observed groundwater discharge (referred to as seeps) from the Site banks in the vicinity of Impoundments 1 and 2 into the Raritan River. After sampling was performed and laboratory analysis was completed in December 2010, it was determined that the seeps contained up to 20,000 parts per billion (ppb) of benzene.

In February 2011, EPA and Wyeth developed an Interim Mitigation System (IMS) plan to immediately address the seeps while a longer term solution could be discussed, planned, and implemented. The IMS plan required the installation of activated carbon-filled sand bags along the River at the seep discharge points. These carbon bags continue to remain in place until the completion of a longer term solution expected in Spring 2012.

As part of a more effective engineered solution to address the seeps, Wyeth signed an Administrative Order on Consent (AOC) with the EPA on July 19, 2011 to address the seeps adjacent to Impoundments 1 and 2. The AOC required Wyeth to design and construct a Groundwater Removal System to intercept and capture or otherwise prevent releases of groundwater originating from the Site into the Raritan River. Wyeth proposed the construction of an interception trench along the Site banks of the Raritan River in the vicinity of Impoundments 1 and 2. The water captured in the interceptor trench would be treated and then discharged to Cuckhold's Brook after treatment. Both EPA and NJDEP have agreed to this approach and it is currently underway.

SITE CHARACTERISTICS

The area surrounding the Site is an urban mixture of industrial and residential uses. The American Cyanamid Site is currently zoned for industrial use. The 435-acre Site is fenced and contains a large vacant factory-style building and a few small vacant buildings. The property is covered with a mixture of vegetation and asphalt patches. The surrounding community is serviced by a public water supply that is not connected with the contaminated groundwater beneath the Site.

Based on information provided in previous studies and reports, Site areas of concern include: impoundment contents, Main Plant soils, Flood Plain soils, and site-related groundwater.

Impoundment Contents

The locations of the impoundments are shown on Figure 2. Out of the 27 impoundments constructed for waste storage or disposal, 16 were determined to potentially contribute to groundwater contamination and threaten human health and the environment. For a more comprehensive description and the current status of the impoundments, see Tables 1A-1F. These 16 impoundments are discussed as follows.

Previously Remediated Impoundments

Numerous impoundments have been remediated or partially remediated. The total area remediated (Lagoons 6 and 7; Impoundments 8 and 9A; Impoundments 11, 14, 18, 19, 20, 25 and 26; and portions of Impoundments 1, 2, 4 and 5) is approximately 79.8 acres, with an approximate volume of 1,089,100 cubic yards (CY) of waste material addressed. Of this amount, approximately 50,000 CY consisted of the highly mobile and toxic material from Impoundments 1, 2, 4, and 5. This material, which was considered to meet the definition of principal threat wastes (as defined by EPA under CERCLA), was treated on-site through recycling as a fuel source (*i.e.* destruction). Table 1 also provides the areas and volumes remediated by impoundment.

Impoundments 15 and 16 are currently undergoing remediation albeit on a slower pace. The current ongoing remedy for these impoundments is considered appropriate and consists of recycling/reuse of iron oxide. This remedy also includes the recycling/reuse of iron oxide located in a nearby area, referred to the former drying bed area. Therefore, Impoundment 15, Impoundment 16, and the former drying bed area are not included as part of this site-wide remedy, with the exception of a small portion of the former drying bed area which contains a tarry waste.

Remaining Impoundments

The total area of the impoundments yet to be remediated (Impoundments 1, 2, 3, 4, 5, 13, 17 and 24) is approximately 27.7 acres, with an approximate volume of 387,700 CY. As previously stated, Table 1 shows the contaminants of concern (COCs) per impoundment. Impoundments 1 and 2 are being completed under a separate FFS and remedial action.

Based on historical analytical data and information provided in previous studies and reports, the waste material in the remaining impoundments will generally require some form of control to eliminate direct contact exposures and migration to groundwater. Two additional exposure routes, inhalation or ingestion of dust or vapors, and physical movement of the materials beyond their location and subsequent contact with receptors, must also be addressed.

Site Soils

The term "Site soils" constitutes media that do not include impoundment contents or groundwater. The estimated total area of impacted surface and subsurface soils being addressed is approximately 284 acres; 194 acres in the Main Plant and 90 acres in the Flood Plain, with a total volume of approximately 3,339,000 CY.

Main Plant Soils

Approximately 50% of the Main Plant area was used for active manufacturing and production operations. The remainder of the Main Plant was used for equipment and material storage, and waste disposal. As previously noted, soil impacts within the Main Plant are widespread and include VOCs, SVOCs, and inorganics with no discernable patterns or distinct areas of specific contamination.

Flood Plain Soils

Manufacturing activities were never conducted within the Flood Plain. Disposal of wastes was limited to the impoundments, namely Impoundments 1, 2, 13, 15, 16, 17, 18, 24 and the former drying bed area. Therefore, the impacted soils in the Flood Plain are likely the result of incidental contamination, and have no discernible or specific sources.

The recent suspected groundwater discharges observed during the 2010 field investigation activities are indicative of potential contamination in the flood plain from Impoundments 1 and 2. Flood Plain soils were evaluated during the BERA and HHRA. The adequacy of the Flood Plain data will be re-evaluated during the Remedial Design Phase.

Groundwater

Over the past 60 years, the Site originally withdrew water from the on-site bedrock production wells for use as non-contact cooling water in the production operations. In accordance with the 1982 and 1988 NJDEP ACOs (as amended in 1994), the current average withdrawal of over 650,000 gallons per day results in groundwater flow inward from the perimeter of the Site toward the pumping wells. This system contains the majority of the existing groundwater contamination within the Main Plant area of the Site. Recovered groundwater is discharged to the adjacent Somerset-Raritan Valley Sewerage Authority (SRVSA) wastewater facility for subsequent treatment and eventual release into Cuckhold's Brook.

Site groundwater quality is currently monitored as part of a semi-annual monitoring program. Historical data is generally clustered around the impoundments, because this is where much of the past work at the Site was focused. In November 2005, as part of the Groundwater Remedial Investigation (RI), a site-wide round of groundwater samples was collected with the objective of obtaining a site-wide understanding of groundwater quality conditions.

The contaminants found most frequently at concentrations above New Jersey Groundwater Quality Standards (GWQS) and Federal Maximum Contaminant Levels (MCLs) in the overburden aquifer are as follows:

- VOCs: benzene, chlorobenzene, toluene, and xylene
- SVOCs: aniline, 1,2-dichlorobenzene, and 1,4-dichlorobenzene

Overburden groundwater concentrations of VOCs and SVOCs are higher than those detected in bedrock groundwater. The contaminants found most frequently at concentrations above the groundwater standards in the bedrock aquifer are as follows:

- VOCs: benzene, chlorobenzene, toluene, xylene, 1,2-dichloroethane, carbon tetrachloride, trichloroethene, and tetrachloroethene
- SVOCs: 1,2-dichlorobenzene and 1,4-dichlorobenzene

In both the overburden and bedrock aquifers, inorganic contaminants found at concentrations above either the GWQS or MCLs included manganese, iron, and arsenic. Other inorganic contaminants were occasionally found above the standards, although these were typically at concentrations close to the GWQS.

Overburden groundwater migrates horizontally due to natural hydraulic gradients near Cuckhold's Brook and the Raritan River, as well as vertically due to induced hydraulic gradients from pumping of production wells. As noted above, pumping of the production wells hydraulically controls bedrock groundwater north of the Port Reading rail line. A groundwater elevation contour map for the overburden aquifer is shown in Figure 3. Bedrock groundwater present south of the Port Reading rail line is not hydraulically controlled by the pumping of the production wells and discharges to the Raritan River.

GEOLOGY AND HYDROGEOLOGY

Geology

The Site is situated in the New Jersey Piedmont geomorphologic province, which is an area of rolling, low-lying terrain interrupted only by the Watchung Mountains, about 1.5 miles to the north. Overall, the Site is generally flat, with a natural slope and direction of approximately 2% to the south-southeast toward the Raritan River. The following paragraphs discuss the generalized stratigraphy of the Site.

Surface geology

The natural soils of the Site are a mixture of sand, silt, and clay (loam). Man-made fill/general solid wastes and disturbed soil and gravel also exist at ground surface in portions of the Site.

Geology of unconsolidated deposits

The general area of and around the Bound Brook facility is covered by naturally occurring unconsolidated sediments ranging in thickness from 5 to 30 feet. These sediments are either the weathering product (residual soils) of the underlying bedrock, or they are fluvial deposits related to the adjacent Raritan River.

The unconsolidated deposits are composed of a silt and clay sequence, a sand and gravel sequence, and a weathered shale layer. The silt and clay sequence acts as a hydraulic barrier, which can prevent the migration of contaminated groundwater due to its low permeability. The sand and gravel sequence underlies the silt and clay sequence, but it also penetrates upwards into the silt and clay sequence in some locations. The weathered shale layer underlies the sand and gravel sequence. The weathered shale layer was created by weathering of bedrock and consists of shale and siltstone fragments in a clay matrix. This layer acts as a low permeability boundary between the overlying deposits and the underlying bedrock. When viewing the overburden deposits from a site-wide perspective, it can be seen that the entire sequence of overburden deposits (silt and clay, sand and gravel, and residual soil) tend to be present across the Site, although the silt and clay layer is not continuous across the Site.

Bedrock geology

The unconsolidated deposits are underlain by bedrock. This bedrock layer is part of the Passaic Formation, which consists of a series of reddish-brown shale, siltstone, and fine-grained sandstone units. The bedrock contains highly fractured zones which allow vertical groundwater flow. These bedrock fractures control the composition and distribution of the overlying water-bearing units and the groundwater flow regime in the overburden aquifer system.

Hydrogeology

A principal objective for understanding the Site hydrogeology is to understand the potential for movement of Site contaminants from source areas. The chemistry data and interpreted distribution of key marker compounds indicates that there are a few reasonably well-defined areas of contamination in overburden groundwater as opposed to one or more gradational plumes. This distribution is likely caused by the generally downward hydraulic gradients between the overburden and the bedrock which is significantly influenced by the bedrock pumping at wells PW-2/PW-3. The overall transport of overburden impacts is horizontal, likely within the sand and gravel unit at the base of the overburden, until a hydraulic connection is made between overburden and bedrock. Across most of the Main Plant Area, impacts are further transported in the bedrock co-located with structural bedding plans and migrate within the overall capture of the groundwater collection system.

INVESTIGATION SUMMARY

The impoundments and contaminated soils are the primary focus of current remedial activities since they have been found to be the contributing sources of groundwater contamination. An Impoundment Characterization Program was completed in 1990, which was intended to fulfill the requirements of an RI for the impoundments. A Soils RI was completed in May 1992 to characterize and delineate contaminated soils. Subsequent to the Impoundment Characterization Program, three CMS/FS reports were completed for the three impoundment groups between 1992 and 1997. RODs were issued for these impoundment groups consistent with the remedial alternatives recommended in the CMS/FS reports and remedial actions were completed in accordance with their respective RODs for Impoundments 11, 14 , 18, 19, 20, and 26.

Remedial activities were suspended in 2004 pending the completion of a remedy review report. The remedy review report, referred to as the Impoundment Remedy Appropriateness Evaluation, was completed in July 2005 and concluded that the conditions for Impoundments 1, 2, 3, 4, 5, 13, 17, and 24 had changed, in some cases significantly, since their respective RODs were issued.

In 2005, a Data Adequacy Review (DAR) was completed to assess the adequacy of existing soil and groundwater data assembled through previous investigatory and monitoring programs at the Site. The DAR Report concluded that there was sufficient existing data related to Site soils and impoundment materials, but additional groundwater investigation was necessary to adequately characterize groundwater for the evaluation of remedial alternatives. Following the completion of a Groundwater RI Report in February 2006, NJDEP requested that additional monitoring wells be installed and additional data be collected. A Supplemental Groundwater RI Report, which included this additional data, was approved by NJDEP in February 2008; therefore, it was concluded that sufficient groundwater data exists for the completion of the Comprehensive Site-wide FS.

On March 16, 2010, EPA presented the proposed alternatives of the Comprehensive Site-wide FS to EPA's National Remedy Review Board (NRRB) to evaluate the appropriate remedy for the remainder of the Site. As a result of this review, an additional alternative was developed in response to the NRRB's advisory recommendations. The preferred remedy presented in this Proposed Plan reflects this new alternative and NRRB input.

NATURE AND EXTENT OF CONTAMINATION

Impoundment Contents

Of the six impoundments discussed previously and being addressed in this Proposed Plan, there are two general types of impoundments being addressed:

- Those used to dispose mainly process wastes.
- Those used to dispose wastewater sludge.

Impoundments 3, 4, and 5 were used for mainly process waste disposal, and Impoundments 13, 17, and 24 were used for disposal of wastewater sludge. VOCs, which are relatively mobile in the environment and are present in the impoundments, have been found in both the overburden and bedrock groundwater aquifers.

Overburden groundwater at the Site naturally flows toward the Raritan River and its tributaries. Under current conditions this natural groundwater flow direction is maintained only for the southern and eastern portions of the overall Site area. Bedrock groundwater pumping has resulted in local areas on-site with lower water table surface elevations, referred to as depressions, which indicates that groundwater flows downward into the bedrock aquifer at some locations. Bedrock groundwater pumping has also resulted in areas with elevated water table levels, referred to as mounds, specifically located in the northern and southern parts of the Site. The water table mounding directly influences the overburden groundwater towards the depressions thereby extending the overall capture of overburden groundwater by the bedrock extraction wells (PW-2 and PW-3). In addition, previous and current data indicates that overburden groundwater continues to migrate into the bedrock over most of the Site. Although part of overburden groundwater is discharging to Cuckhold's Brook, the results of the Main Plant overburden groundwater investigation indicated no significant impacts. The groundwater in the Impoundment 1 and 2 area is currently being addressed as part of the Removal Action and a separate pre-design investigation is being performed.

In 1985, a report prepared by Camp Dresser & McKee (CDM) indicated that overburden groundwater may be drawn downward into the bedrock system by production well pumping. As confirmed by the Groundwater RI, this capture is strongest in the northern areas of the plant and weakens to the south. Any VOCs present in overburden groundwater in northern areas of the Site, therefore, tend to be captured by the pumping wells. The impoundments where the disposal of production wastes and wastewater treatment sludges took place can act as potential sources of contamination to groundwater.

In the areas south of the Main Plant, bedrock groundwater that is not captured by the pumping wells eventually discharges to the Raritan River. Bedrock groundwater in the areas of Impoundments 1 and 2, and Impoundments 17 and 24, (all of which are south or southwest of the Main Plant), is outside the zone of influence of the pumping wells. Contaminants present in the bedrock groundwater in these areas discharge to the river. Bedrock groundwater concentrations in these areas, however, are generally lower than those detected in overburden groundwater. The quality of the bedrock in this area and, groundwater discharges to the river from the bedrock aquifer are subject to ongoing evaluations.

VOCs contained in impoundments may be released to the atmosphere through volatilization from impoundment solids or impoundment water covers. As previously noted, the physical characteristics of the impoundments do not allow for the contents of these impoundments to be transported by surface water runoff, thus significant overland transport of the chemicals of interest with stormwater runoff does not occur.

Site Soils

In general, chemicals in the environment are likely to behave in rather specific ways. Chemicals such as PCBs or most heavy metals have an affinity to bind to material with high organic carbon content such as certain types of soil or sediment. Substances retained in soils are exposed to additional transport mechanisms. These include overland transport with stormwater runoff, atmospheric transport with dusts, biodegradation, and bioaccumulation in soil biota.

Other chemicals such as VOCs tend to either migrate towards groundwater or volatilize to the atmosphere.

Past leaks and spills have impacted soils generally in the production area of the Main Plant as well as soil areas in the western portion of the Site, also referred to as the West Yard. The environmental fate and transport of chemicals associated with the leaks and spills depends on the conditions described in the previous paragraphs. Chemicals in the Main Plant area reaching the overburden groundwater would be expected to migrate to pumping wells or, in those instances where groundwater is not controlled by the pumping wells, to the Raritan River. As noted in the Baseline Endangerment Assessment, 1992, contaminated soils may also serve as a source of contaminant movement into surface water and to the atmosphere. However, preliminary remediation activities have addressed the issue of soil contaminant migration in terms of erosion or volatilization processes and stormwater runoff.

Preliminary activities used to address these migration pathways were the addition of clean fill and gravel and paving some areas within the Main Plant. In addition, soil contamination is contained within the flood control berm surrounding the Main Plant area, generally preventing stormwater runoff from leaving the Main Plant area, as noted earlier. Runoff is collected and currently stored in Lagoon 7, thus preventing off-site migration of contaminants into surface waters by erosion and subsequent sedimentation processes. Chemical migration from both impoundments and soils to the groundwater is a primary transport mechanism at the Site. Dust generation, volatilization, and surface water runoff are considered secondary transport mechanisms at the Site.

Groundwater

Overburden groundwater with contaminant concentrations above the GWQS where discharge is not controlled by the current bedrock pumping system is found in the following areas:

- between Impoundments 1 and 2 and the Raritan River to the south and Cuckhold's Brook to the west;
- between Lagoon 7/Impoundment 24 and the Raritan River to the southwest;
- between Impoundment 24/Lagoon 6 and New Jersey American Water to the south;
- between Impoundments 3, 4, and 5 and Cuckhold's Brook to the southwest; and
- between the Main Plant and Cuckhold's Brook to the south.

Organic chemical contaminants detected above the GWQS are present in bedrock groundwater north of the rail line. Main Plant bedrock groundwater is captured by production wells PW-2 and PW-3 and, therefore, is controlled and limits migration off-site.

Bedrock groundwater present south of the rail line is not captured by pumping of the production wells. Based on a review of bedrock groundwater monitoring analytical data, and with an understanding of groundwater flow (i.e., as bedrock groundwater approaches the Raritan River, flow paths are upward), groundwater impacts are primarily evident downgradient of Impoundments 1 and 2.

The bedrock zone of capture is not consistently attained near the southwest corner of Lagoon 7 and Impoundment 24, and water quality results obtained from near the southwest corner of Impoundment 24 indicates concentrations of VOCs, SVOCs, and inorganics above water quality standards.

SCOPE AND ROLE OF ACTION

In order to remediate Superfund sites, work is often divided into OUs. The American Cyanamid site is divided up into eight OUs:

- OU1: Impoundments 11, 13, 19 and 24
- OU2: Impoundments 15, 16, 17 and 18
- OU3: Impoundments 1, 2, 3, 4, 5, 14, 20 and 26
- OU4: Site Soils
- OU5: Site Groundwater
- OU6: Hill Property
- OU7: Site-related Wetlands
- OU8: Impoundments 1 and 2

Note: The site-wide remedy presented in this Proposed Plan combines all previous OUs (OU1-OU7) and is being addressed under the existing OU4. As previously discussed, Impoundments 1 and 2 are being addressed separately and a new OU8 was recently created.

RODs have been signed for OU1 (9/28/93), OU2 (7/12/96), OU3 (9/28/98), and OU6 (7/12/96).

In June 2004, all ongoing remedial activities at the Site, with the exception of the groundwater capture system, were suspended pending the completion of a remedy review report to evaluate the appropriateness of the remaining impoundment remedial programs. Based upon this report, referred to as the 2005 Impoundment Remedy Appropriateness Evaluation, it was recommended that a Comprehensive Site-wide Feasibility Study be conducted.

Therefore, Wyeth undertook completion of a Comprehensive Site-wide Feasibility Study designed to address all remaining contamination within the various media on-site under a single comprehensive program. The final study would then be used for a site-wide ROD.

ENFORCEMENT

American Cyanamid entered into ACOs related to investigation and remediation at the Site with NJDEP in 1982 and 1988 to address the 16 impoundments, site-wide contaminated soils, and groundwater. The 1988 NJDEP ACO was amended in 1994 which incorporated the existing site-wide groundwater pumping and monitoring requirements of the NJPDES/DGW permit and included further groundwater monitoring requirements for the Impound 8 Facility.

In December 1994, American Home Products Corporation purchased the American Cyanamid Company and assumed full responsibility for environmental remediation as required under the NJDEP ACO for this Site. In December 2002, American Home Products Corporation

changed its name to Wyeth. In October 2009, Wyeth was purchased by Pfizer Inc., and became a wholly owned subsidiary of Pfizer.

NJDEP was the lead agency for the Site until March 2009, when EPA assumed the lead role.

On July 19, 2011, Wyeth entered an Administrative Settlement Agreement and Order on Consent (EPA AOC) with EPA requiring Wyeth to design and construct a removal system engineered to intercept and capture contaminated groundwater in the overburden and prevent it from seeping into the Raritan River.

SUMMARY OF SITE RISKS

Baseline Risk Assessment

As part of the Site investigation process, a baseline risk assessment was conducted to determine the current and future effects of contaminants on human health and the environment.

A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a Site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water and sediment uses. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

Human Health Risk Assessment (HHRA)

The potential non-carcinogenic hazards and carcinogenic risks associated with potential exposures to the impoundments, surface soil, and groundwater were evaluated in the BEA (BB&L, 1992) for the Main Plant and the HHRA (O'Brien & Gere, 2006) for the Flood Plain. EPA Region 2 prepared a streamlined HHRA in February, 2010 which evaluated additional pathways.

The objective of the streamlined HHRA was to determine the cancer risks and non-cancer hazards associated with exposure to contaminated surface soil (main plant area), groundwater (overburden and bedrock) and the impoundments. Since the current zoning of the Site is industrial, the streamlined HHRA evaluated the following receptors: Site workers exposure to surface soil and the impoundments. The groundwater is a designated potable water supply; therefore, the residential exposure pathway was also evaluated.

The maximum detected concentrations in each medium were compared to their respective Regional Screening Level (RSLs). The surface soil RSLs are based on a

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one in ten thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one in ten thousand to a one in a million excess cancer risk. For noncancer health effects, a "hazard index" (HI) is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site.

worker's direct exposure (via ingestion, inhalation, and dermal contact) while working at the Site (25 years). Since the groundwater at the Site is classified by NJDEP as a potable water supply, the RSLs represent a resident's exposure to groundwater contamination over a lifetime.

In general, the industrial worker's exposure to surface soil and the impoundments exceeded the acceptable risk range and the non-cancer hazard threshold of 1, and benzene, naphthalene, PCBs, arsenic, chromium, benzo(a)pyrene, and benzo(a)anthracene are the risk drivers. The trespasser's exposure to surface soil within the main plant area is at the upper bound of the acceptable risk range for chemicals in which cancer is the most sensitive health endpoint (attributable to benzo(a)anthracene and Total PCBs). However, the non-cancer threshold of 1 has been exceeded for several metals, notably cobalt, antimony, chromium, and lead detected in the surface soil. The cancer risks and non-cancer hazards associated with a resident's exposure to groundwater exceeded the acceptable risk range and the non-cancer threshold of 1, with thallium, manganese, cyanide, chlorobenzene, and 1,2-dichloroethane contributing most significantly to the non-cancer hazard. The risk drivers for a resident's exposure to groundwater are 1,4-dichlorobenzene, benzene, 1,2-dichloroethane, chloroform, 4-chloroaniline, aniline, bis(2-ethylhexyl)phthalate, and naphthalene. Receptors with reasonable maximum exposure (RME) cancer risk values above the acceptable risk range and receptors with non-cancer RME exposures greater than the non-cancer threshold of 1 are shown in Tables 13 and 14 of the Comprehensive Site-wide FS. It should be noted that other media (sediment and surface water) were not evaluated as part of this streamlined human health risk assessment, which could underestimate the cancer risks and non-cancer hazards. In regards to possible floodplain trespasser risks, an evaluation will be completed to determine if an additional risk assessment will be required during the Focused Feasibility Study for Impoundments 1 and 2. Overall, the streamlined risk assessment indicates that exposure to site-related contamination results in an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6}, as well as NJDEP's acceptable cancer risk level of 10^{-6}. Therefore, site-related contamination poses an unacceptable human health risk to current and potential future receptors.

Ecological Risk Assessments

Ecological risks at the Site were addressed in two documents: the BEA approved by NJDEP and EPA in 1992, and the BERA in 2005. In the Qualitative Ecological Assessment section of the BEA, the results of a site-wide habitat survey, as well as evidence from direct field observations, were compared to the Natural Heritage Data Base (NJDEP, 1991). The assessment indicated that, with the exception of the great blue heron, the on-site habitat does not support threatened or endangered species. Impoundments 13, 17, and 24 were not included in either the 1992 BEA or the 2005 BERA because the contents of these impoundments were scheduled to be remediated under the OU1 and OU2 RODs.

The most significant potential exposure pathway identified in the BEA involves aquatic biota exposure to Raritan River water. Site groundwater discharge mass loading calculations suggest that exposure to concentrations of Site chemicals of interest resulting from groundwater discharge is unlikely to affect the health and diversity of aquatic biota in the Raritan River.

REMEDIAL ACTION OBJECTIVES

The following remedial action objectives (RAOs) address the human health risks and environmental concerns at the American Cyanamid Site. The RAOs are organized into three categories: principal threat waste, soil/impoundment material, and groundwater.

Principal Threat Waste:

- Remove or treat material that meets the definition of principal threat waste, to the extent practical, and
- Prevent current or potential future migration of material that meets the definition of principal threat waste from the Site that would result in direct contact or inhalation exposure, to the extent practicable.

Material that meets the definition of principal threat wastes exist at the Site that could pose potential risk of

WHAT IS A "PRINCIPAL THREAT"?

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes an expectation that EPA will use treatment to address the principal threats posed by a Site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund Site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

exposure if appropriate remedial actions are not implemented. Principal threat waste is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Without additional remedial action, there is the potential for these materials to migrate from their current locations to other on-site or off-site areas where unacceptable direct contact or air emission risks may result.

Soil/Impoundment Material:

- Prevent or minimize human and ecological exposure to contaminants in soils and impoundment materials at levels above relevant risk-based remediation criteria, and
- Prevent or minimize sources of groundwater impacts (*i.e.,* reduce chemical loadings to groundwater) resulting in long-term improvement of groundwater quality and eventual achievement of applicable regulatory standards.

Per the Site-wide FS and the HHRA, the soils and impoundments contain contaminants at concentrations in excess of regulatory criteria. The risk assessments (human health and ecological) concluded that in certain areas, exposure pathways (specifically direct contact and/or inhalation) between receptors and these contaminants are potentially complete and that the potential risks from exposure to these contaminants exceed acceptable levels. Outside of the Main Plant area, the risks are limited to isolated, relatively small areas.

Groundwater:

- Restore, as practicable, the overburden and bedrock aquifers within the area of attainment to its expected beneficial use and to concentrations below Federal MCLs and/or New Jersey GWQS within a reasonable period.
- Eliminate the migration of contaminants exceeding federal MCLs and/or NJ GWQS in the overburden and bedrock aquifers beyond the point of compliance through a combination of source actions and hydraulic controls to the extent practicable.

Groundwater at the Site contains contaminants at concentrations in excess of NJ GWQS. Although a groundwater collection system is in place that pumps on average about 20 million gallons per month, there is currently groundwater migrating from the Site. While it is not technically feasible to eliminate residual sources of groundwater impacts so as to allow for termination of hydraulic controls in the foreseeable future, source control and eventual restoration of groundwater quality are important objectives of this Proposed Plan.

Note: The area of attainment is defined by EPA Guidance: Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2) as "the area of the plume outside the boundary of any waste to be managed in place as part of the final remedy, *i.e.*, the point of compliance, and inside the boundaries of the contaminant plume." The point of compliance for the Site is defined as the edge of the waste management area in accordance with EPA Guidance: Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, June 26, 2009.

Remediation Goals

To meet the RAOs defined above, EPA has identified remediation goals to aid in defining the extent of contaminated media requiring remedial action. In general, remediation goals establish media-specific concentrations of Site contaminants that will pose no unacceptable risk to human health and the environment. Remediation goals have also been developed to establish criteria to define the source areas deemed principal threats for the Site, areas for which EPA has concluded treatment should be considered as part of the remedy.

In addition, to develop remedial alternatives for the Site, impacted media are characterized based on the actions required to minimize potential exposures to human and ecological receptors.

These potential exposures consist of:

- Direct contact with impacted media and their contaminants (referred to as "direct contact control")
- Inhalation or ingestion of impacted media or their contaminants, including those that emit dust or vapors at unacceptable levels (referred to as "vapor control" [airborne contaminants])
- Physical movement of media beyond their containment areas that could result in contact by receptors (referred to as "movement control" or "migration control").

Likewise, potential adverse ecological impacts resulting from the remedial alternatives need to be assessed. Based on the data collected to date, impoundment contents, soils, and groundwater will require some form of control to address the potential exposure pathways. Addressing these exposure routes by providing direct contact, vapor,

and movement control, as appropriate, will result in applying different remedial approaches across the Site.

Below is a summary of the remediation goals for source areas; most notably the impoundments as well as some areas within the Main Plant soils, Flood Plain soils and groundwater established in the Site-wide FS.

Remediation goals for source areas, site-wide soils, and groundwater are presented in Tables 2A-2D.

Source Area Remediation Goals

Within the FS, the Source Area Remediation Goals are also referred to as areas requiring movement control and vapor control. Numerical criteria were developed to aid in defining the extent of contaminated media requiring movement control. The visual observation of tarry substances will also be utilized to identify areas requiring movement control, regardless of whether these tarry substances exceed the numerical criteria.

After reviewing the previous remedial investigations, 2006 Human Health Risk Assessment, and the Site-wide FS, EPA has identified that the sludges and tarry substances in Impoundments 3, 4 and 5 require a remedy for movement and vapor control. Additionally, some soils within the Main Plant, generally concentrated in the western portion of the Site, will also require movement control. A portion of the former drying bed was also identified as an area in the Flood Plain that would warrant movement control. Pre-design investigations will be conducted to confirm the identified areas and further delineate areas containing principal threat waste.

Site-wide Soil Remediation Goals

Within the FS, the Source Area Remediation Goals are also referred to as areas requiring direct contact and, in some select areas, vapor controls. Risk-based soil remediation goals were developed based on the potential exposure risks for ingestion, dermal contact, and inhalation human health exposure pathways. Industrial worker exposure was evaluated as a human health exposure pathway. Soil remediation goals were selected based upon consideration of these risk-based concentrations and promulgated NJDEP Non-Residential Direct Contact Soil Remediation Standards. NJDEP Impact-to-Groundwater Soil Screening Criteria were also evaluated as “To-Be-Considered” criteria.

Soils that exceed the soil remediation goal values, but do not constitute source areas, can generally be managed in place with engineering controls (capping) and proper land-use restrictions. As described earlier, soils/impoundment contents in the Main Plant area have concentrations that warrant the limiting of direct contact. This includes soils/impoundment contents in the entire Main Plant area, with the exception of soils underneath Impoundments 14, 21, and 26, which have either never been used for waste disposal or were previously remediated. Existing data also indicates that some form of direct contact control is warranted in portions of the Flood Plain area. This includes Impoundments 13, 17, and 24, but not the impoundments that were never used for waste disposal (9, 10, 12, 21, 22, 23), were previously remediated (11, 18, 19, and Lagoon 6), are in the process of being closed in accordance with RCRA closure plans (Lagoon 7), or are currently being remediated (15 and 16). Additionally, direct contact control is required for the former drying bed, as well as the isolated area located between Impoundment 13 and the railroad tracks that was identified as a potential risk in the HHRA and BERA. Regarding the Site soil areas requiring vapor control, there are locations within the Main Plant soils with contaminant concentrations exceeding screening criteria. Data for the Flood Plain area indicates that vapor control is only warranted in the tarry waste portion of the former drying bed area. These areas are identified on Figures 8-10 within the Comprehensive Site-wide FS for reference.

Groundwater Remediation Goals

Remediation goals were developed for groundwater based on the RAOs discussed earlier. The more stringent of the EPA federal MCLs, NJDEP groundwater quality criteria, NJDEP MCLs, and site-specific, risk-based concentrations was selected as the remediation goal. Consistent with the RAOs for groundwater, these remediation goals will be used for developing use restrictions and other actions to prevent exposure, and for assessing potential restoration and containment of the groundwater.

SUMMARY OF REMEDIAL ALTERNATIVES

Common Elements

Many of these alternatives include common components. Because any combination of remedial alternatives will result in some contaminants remaining on the Site above levels that would allow for unrestricted use, a review of the remedy will be conducted every five years, at minimum. In addition, institutional controls such as a deed notice or restrictive covenant would be required for the property as one component of maintaining the long-term protectiveness of the implemented remedy.

All the alternatives, with the exception of the no further action alternative, include soil capping and institutional controls to prevent exposure to low-level waste and residual concentrations of chemicals of concern.

A total of seven of the eleven original alternatives were carried through the screening process presented in the Comprehensive Site-wide FS. Please refer to Tables 24-33 of the Comprehensive Site-wide FS for a more detailed discussion of all the remedial alternatives.

Alternative 1 - No Action

Capital Cost:	$0
Annual O&M Costs:	$0
Total Present Worth:	$0
Implementation Timeframe:	Not Applicable

The NCP requires that a "No Action" alternative be developed as a baseline for comparing other remedial alternatives. Under this alternative, no action would be taken to remediate impacted soils and impoundment contents or groundwater at the Site. The current bedrock pumping system would be turned off. This alternative would only involve long-term monitoring of groundwater quality through a sampling program. Alternative 1 does not include institutional controls.

Alternative 2 – Limited Action

Capital Cost:	$683,283
Annual O&M Costs:	$32,399,257
Total Present Worth:	$33,082,537
Implementation Timeframe	
Soils/Impoundments:	*Not Applicable*
Groundwater:	*30 Years*

Under this alternative, implementation of institutional controls as described above would be implemented. Groundwater monitoring would continue to be performed as a basis for evaluating the CEA and well restriction area (WRA) and assessing the added value of the bedrock pumping system on impacted groundwater. Restrictions placed on the Site to limit its future use would be accomplished by recording in the property deeds that potentially hazardous media may be present and that use restrictions have been imposed. Should this alternative be implemented, the potential addition of monitoring wells to supplement the current monitoring scheme would be evaluated as part of the remedial action design development.

Alternative 3 – Soil Cover and Stabilization/Capping with Hydraulic Control/Treatment of Groundwater

Capital Cost:	$87,976,060
Annual O&M Costs:	$49,973,383
Total Present Worth:	$137,949,443
Implementation Timeframe	
Soils/Impoundments:	*10 Years*
Groundwater:	*30 Years*

This alternative would provide a combination of containment caps over impacted areas at the Site to control the potential for exposure to impacted soils/impoundment contents.

Main Plant Soils, Flood Plain Soils, and Impoundments

For areas identified as requiring direct contact control, a 24-inch soil cover would be utilized to provide a barrier to prevent direct contact exposure with impacted media. This soil cover system would be an engineered cap designed and constructed to withstand the effects of up to a 500-year flood event. Appropriate controls and engineered mechanisms will be included to safe guard against scouring, erosion or other effects from being constructed in a floodplain. In addition, a strict inspection and maintenance program will be developed as part of the ongoing operation plan for the soil cover system.

For the material located in the flood plain (Impoundments 13, 17, and 24), an ecological risk assessment would be conducted during the remedial design phase to identify if any material requires relocation and consolidation in the Main Plant in areas requiring direct contact control.

For areas identified in the FS as requiring both vapor and movement control, a multi-layer engineered cap would be used. Measures would be employed in accordance with New Jersey requirements for vapor control as part of future construction. Where additional structural stability is needed to support a multi-layer cap (namely impoundment contents), stabilization, or a similar physical process as determined to be appropriate during the conceptual design phase, would be employed prior to capping. This is anticipated to consist of the use of standard construction technologies such as the addition of amendments,

stabilizing agents, and/or the installation of physical structure (i.e., geogrids).

Groundwater

The groundwater component consists of collection of bedrock groundwater within the Main Plant. While the existing bedrock groundwater collection system provides hydraulic control over much of the Main Plant groundwater, the effectiveness of the bedrock groundwater collection system can be improved to better achieve the groundwater RAOs. Conceptual improvements to the bedrock collection system include placing the primary extraction well(s) in a more central location of the impacted bedrock and placing targeted bedrock groundwater extraction wells to address more localized impacts, such as in the vicinity of Lagoons 6 and 7/Impoundment 24. Additional details of these improvements would be developed during remedial design. This remedy also includes institutional controls that would prohibit potable use of groundwater at the Site.

Additionally, localized collection of overburden groundwater in specific areas would be included, as required, to prevent migration of contaminants not currently captured by the existing collection system. Possible areas where localized overburden groundwater collection could be placed are:

- between Impoundments 1 and 2 and the Raritan River to the south (if not addressed as part of the ongoing removal action)
- between Lagoon 7/Impoundment 24 and the Raritan River to the southwest, and extending around to the area between Impoundment 24/Lagoon 6 and NJ American Water Company to the south
- between the Main Plant and Cuckhold's Brook to the south and extending around to the southwest.

Based on the information presented in the groundwater RI Report and Supplemental RI Report, the following presents the proposed collection component for these areas:

- Recovery system (trenches, wells, and/or containment walls) around Impoundments 1 and 2 and between these impoundments and the Raritan River.
- Recovery system (trenches, wells, and/or containment walls) to collect impacted overburden groundwater along the north side of the Main Plant flood berm, north of Cuckhold's Brook and the rail line.
- Recovery system (trenches, wells, and/or containment walls) trench between Lagoon 7/Impoundment 24 and the Raritan River to the southwest, and extending around to the area between Impoundment 24/Lagoon 6 and New Jersey American Water to the south.
- Bedrock pumping well or a series of wells in the Lagoon 7 Area to capture bedrock groundwater not currently collected by the existing bedrock pumping system.

The waters collected at the Site will be appropriately treated or pre-treated, as necessary, for subsequent discharge in accordance with appropriate requirements. Treatment may occur on the combined waste stream or on individual streams as determined to be necessary. At this time, it is anticipated that discharge would be either to SRVSA, directly or following pre-treatment, or directly to surface water following on-site complete treatment.

Alternative 4 – Consolidation/Soil Cover and Stabilization/Capping with Hydraulic Control/Treatment of Groundwater

Capital Cost:	*$129,530,494*
Annual O&M Costs:	*$ 49,973,383*
Total Present Worth:	*$179,503,877*
Implementation Timeframe	
Soils/Impoundments:	*10 Years*
Groundwater:	*30 Years*

This alternative would provide a combination of caps over impacted areas at the Site to control the potential for direct contact with impacted soils/impoundment contents with the addition of excavation of the Flood Plain areas and consolidation in the Main Plant.

Main Plant Soils, Impoundments 3, 4, and 5
Includes same remedies as Alternative 3 with the exception of the Flood Plain area.

Flood Plain Soils and Drying Bed Area
The areas identified in the FS requiring direct contact, movement, and vapor control would be excavated and consolidated at the Main Plant in areas where the same types of controls are warranted.

Impoundments 13, 17 and 24
For the material in Impoundments 13, 17, and 24, an ecological risk assessment would be conducted during the remedial design phase to identify if any material requires relocation and consolidation in the Main Plant in areas requiring direct contact control.

Groundwater
Includes the same groundwater remedy as described in Alternative 3.

Alternative 4A – Consolidation/Treatment/Soil Cover and Stabilization/Capping with Hydraulic Control/Treatment of Ground Water

Capital Cost:	*$154,224,898*
Annual O&M Costs:	*$49,973,383*
Total Present Worth:	*$204,198,282*
Implementation Timeframe	
Soils/Impoundments:	*10 Years*
Groundwater:	*30 Years*

This alternative would provide a combination of caps over impacted areas at the Site to control the potential for direct contact with impacted soils/impoundment contents, which is one of the primary RAOs for the Site, with the addition of excavation of the Flood Plain areas and consolidation in the Main Plant. In addition, this alternative would address principal threat wastes found in the Main Plant areas and Impoundments 3, 4, and 5 by consolidating them in Impoundments 3, 4, and 5 and treating these materials before solidification and capping, thereby also addressing the RAOs. See Figure 4 for details on this alternative.

Main Plant Soils, Impoundments 3, 4, and 5
Includes same remedies as Alternatives 3 and 4 with the exception of the Flood Plain area and treatment of principal threat wastes.

For impoundment areas meeting the definition of Principal Threat Wastes, (namely, the contents of Impoundments 3, 4 and 5), *in-situ* solidification/stabilization (S/S), or a similar physical process, as determined to be appropriate during the conceptual design phase, would be employed for the full depth of the impoundment material prior to capping (the actual depth of treatment will be established and confirmed during the remedial design phase).

For Main Plant soils outside of the impoundment limits that meet the definition of Principal Threat Wastes, the material would be excavated to its full depth (confirmed in the remedial design phase) and consolidated within Impoundments 3, 4, and 5 for subsequent treatment with those wastes. These excavated areas outside Impoundments 3, 4, and 5 would then be backfilled and covered with the multi-layer engineered cap discussed above.

Flood Plain Soils and Drying Bed Area
The areas identified in the FS requiring direct contact, movement, and vapor control would be excavated and consolidated at the Main Plant in areas where the same types of controls are warranted.

Impoundments 13, 17 and 24
For the material in Impoundments 13, 17, and 24, an ecological risk assessment would be conducted during the remedial design phase to identify if any material requires relocation and consolidation in the Main Plant in areas requiring direct contact control.

An evaluation would be conducted during the remedial design phase to identify those soils that could potentially meet the definition of Principal Threat Wastes. This evaluation would consist of first identifying areas where constituent concentrations, based on existing data, are above those presented within EPA's Soil Screening Guidance, when adjusted to 1×10^{-3} risk (future Site user). Following this, field investigations (*e.g.,* air sampling) would be conducted to verify the potential air risks. Those areas subsequently identified as potential Principal Threat Wastes (*i.e.*, presenting a 1×10^{-3} risk based on measured concentrations in the breathing zone) would be excavated and consolidated in the Impoundments 3, 4 and 5 area for subsequent treatment with those materials (see below). Excavation extent and depth would be determined based on sampling data in the breathing zone. These excavated areas outside Impoundments 3, 4 and 5 would then be backfilled and covered with the multi-layer engineered cap discussed above. Additionally, any future structures constructed within areas requiring vapor control at the Site would include a vapor mitigation system, as required.

Groundwater
Includes the same groundwater remedy as Alternative 3.

Alternative 5 - Consolidation/Capping and In-Situ S/S with Hydraulic Control/Treatment of Groundwater

Capital Cost:	$257,918,074
Annual O&M Costs:	$49,973,383
Total Present Worth:	$307,891,457
Implementation Timeframe	
Soils/Impoundments:	*20 Years*
Groundwater:	*30 Years*

This alternative would consist of a combination of technologies to address soils/impoundment contents.

Main Plant Soils, Impoundments 3, 4, and 5
In the areas identified in the FS requiring direct contact control, a 24-inch soil cover would be utilized to provide a barrier to prevent direct contact exposure with impacted media. This soil cover system would be an engineered cap designed and constructed to withstand the effects of up to a 500-year flood event. Appropriate controls and engineered mechanisms will be included to safe guard against scouring, erosion or other effects from being constructed in a floodplain. In addition, a strict inspection and maintenance program will be developed as part of the ongoing operation plan for the soil cover system.

Impoundments 3, 4, and 5 and a few areas located in the Main Plant area have been identified as requiring vapor and movement controls. These impoundments/areas would utilize *in-situ* S/S as a means to reduce contaminant mobility. During S/S activities, emissions would be collected and treated to the extent practicable.

Flood Plain Area (including soils, Impoundments 13, 17 and 24, and drying bed area)
The areas identified in the FS requiring direct contact control would be excavated and consolidated at the Main Plant.

Groundwater
Includes the same groundwater remedy as Alternative 3.

Alternative 7 - Consolidation/Capping and Ex-Situ Low Temperature Thermal Desorption (LTTD) and S/S with Hydraulic Control/Treatment of Groundwater

Capital Costs:	$774,315,057
Total Estimated O&M Costs:	$ 49,973,383
Total Present Worth:	$824,288,040
Implementation Timeframe	
Soils/Impoundments:	*> 25 Years*
Groundwater:	*30 Years*

This alternative would consist of a combination of technologies to address soils/impoundment contents.

Main Plant Soils, Impoundments 3, 4, and 5
In the areas identified in the FS requiring direct contact control, a 24-inch soil cover would be utilized to provide a barrier to prevent direct contact exposure with impacted media. This soil cover system would be an engineered cap designed and constructed to withstand the effects of up to a 500-year flood event. Appropriate controls and engineered mechanisms will be included to safe guard against scouring, erosion or other effects from being constructed in a floodplain. In addition, a strict inspection and maintenance program will be developed as part of the ongoing operation plan for the soil cover system.

Main Plant Soils, Impoundments 3, 4, 5, 13, 17 and 24, and drying bed area)
In the areas identified in the FS requiring vapor and movement controls, soils/impoundment contents would be excavated and transported to a central area at the Main Plant for consolidation and staging. *Ex-situ* treatment would then be applied on-site, via LTTD and S/S. LTTD is designed to reduce concentrations of organics and other constituents that can be volatilized. S/S would be used to provide appropriate geotechnical properties for backfilling treated materials as well as having the potential added benefit of reducing the mobility of the remaining constituents.

Treated Materials:
Vapor Control: treated materials would be backfilled at the Main Plant
Movement Control: treated materials would be placed in the on-site RCRA facility, Impound 8. During S/S activities, emissions would be collected and treated, as practicable.

Flood Plain Area (including soils, Impoundments 13, 17 and 24, and drying bed area)
The areas identified in the FS requiring direct contact control would be excavated and consolidated at the Main Plant.

Groundwater
Includes the same groundwater remedy as Alternative 3.

Alternative 11 – On-Site/Off-Site Treatment with Hydraulic Control/Treatment of Groundwater

Capital Costs	$ 1,750,292,506
Total Estimated O&M Costs	$ 49,973,383
Total Present Cost	$ 1,800,265,890
Implementation Timeframe	
Soils/Impoundments:	*> 25 Years*
Groundwater:	*30 Years*

This alternative would consist of a combination of technologies to address soils/impoundment contents.

The main plant soils, flood plain soils, and all impoundment contents would be excavated and consolidated/staged at the Main Plant. *Ex-situ* treatment would then be applied on-site, via LTTD and S/S. Treated materials from areas at the Main Plant and Flood Plain where only direct contact control is warranted would be backfilled at the Main Plant, while treated materials from areas warranting vapor control would be placed in the on-site RCRA facility, Impoundment 8.

For areas identified in the FS requiring movement control, soils/impoundment contents would be excavated and transported to either an off-site incineration or recycling facility for treatment or beneficial re-use. During S/S activities, emissions would be collected and treated, as practicable.

Groundwater
Includes the same groundwater remedy as Alternative 3

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy, (see table below, Evaluation Criteria for Superfund Remedial Alternatives). This section of the Proposed Plan describes the relative performance of each alternative against the nine criteria, noting how each compares to the other options under consideration. A Detailed Analysis of Alternatives can be found in the FS Report.

1. Overall Protection of Human Health & the Environment

Alternative 1 is used as a baseline for comparison of the alternatives and is designed to represent baseline conditions at the Site and would not meet the RAOs established for the Site. Alternative 2, by comparison, would be protective of human health and the environment for groundwater currently captured by the existing groundwater control system and SRVSA treatment, and would employ access restrictions and institutional controls to address potential exposures to other media and transport mechanisms, but would not meet RAOs for principal threat wastes and groundwater outside the current capture zone. Alternatives 3, 4, 4A, 5, and 7 include capping of material requiring direct contact control and groundwater collection/treatment, and, therefore, would be protective of human health and the environment. Alternatives 3 and 4 include capping of materials requiring vapor and movement control, which would prevent exposure to impacted materials. Alternative 4A would also prevent exposure to impacted materials through capping, as well as treatment for the most-highly mobile materials, which would reduce toxicity and mobility of contaminants. Alternatives 3, 4, 4A, 5, 7, and 11 each meet the RAOs for principal threat wastes. However, alternatives 3 and 4 accomplish this primarily through containment while 4A, 5, 7, and 11, accomplish this primarily through treatment. Alternatives 5 and 7 include treatment of vapor and movement control material in both the Main Plant and Flood Plain as an element of protection of human health and the environment; however, their treatment components are not proven for all Site contaminants and RAOs may not be met for these contaminants. Alternative 11 removes the material requiring movement control from both the Main Plant and Flood Plain for off-site treatment/ disposal, while treating direct contact and vapor control material on-site which would be protective of human health and the environment. However, capping, groundwater control and treatment-based remedy components essentially provide equivalent protection of human health and the environment by eliminating potential exposure pathways.

2. Compliance with ARARs

Applicable or Relevant and Appropriate Requirements (ARARs) would not be met for Alternative 1. ARARs would not be met for groundwater outside the current capture zone of the existing groundwater collection system or for soils/impoundments for Alternative 2. ARARs would generally be met for the remaining alternatives. However, more significant issues would be associated with location- and action-specific ARARs (e.g., stream encroachment, wetlands, flood hazard, etc.) in the Flood Plain for Alternatives 4, 4A, 5, 7, and 11; chemical-

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are legally applicable, or relevant and appropriate to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of 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.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
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.

and action-specific ARARs associated with NJ Air Pollution Control Regulations may not be met for Alternatives 5, 7, and 11; and Alternative 7 would not meet the chemical-specific ARARs associated with the Treatment Objectives established in the Group III ROD/CAMU and LDRs.

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence do not apply to the baseline conditions represented by Alternative 1. By comparison, Alternative 2 would provide an effective long-term remediation for groundwater within the current capture zone of the existing bedrock groundwater pumping system, but would not specifically address other media or groundwater outside the current capture zone. The groundwater remedy components for Alternatives 3, 4, 4A, 5, 7 and 11 provide similar effectiveness of groundwater control over the long-term, and remedies that would be functionally permanent with proper maintenance. Capping of material requiring direct contact control associated with Alternatives 3, 4, 4A, 5, and 7 would be effective over the long-term in controlling potential direct contact exposure. A cap is functionally permanent with proper maintenance. Alternatives 3, 4, 4A, 5, 7, and 11 would result in making the Site available for beneficial community reuse, although the time required to achieve this would be longer for Alternatives 5, 7, and 11, compared to Alternatives 3, 4, and 4A. Alternatives 4 and 4A also utilize treatment of material and/or consolidation which would provide additional permanence over Alternative 3. Treatment associated with Alternatives 5, 7, and 11 has not demonstrated effectiveness for the full range of contaminants, which would likely prolong schedules and increase time before RAOs would be obtained, if they would be attained at all.

4. Reduction in Mobility, Toxicity or Volume through Treatment

Alternative 1 would provide no reduction in mobility, toxicity or volume. For Alternative 2 mobility, toxicity and volume of contaminants in groundwater within the capture zone of the existing groundwater collection system would be reduced, but not reduced outside the existing capture zone, or in other media. Groundwater collection and treatment associated with the remaining alternatives (3, 4, 4A, 5, 7, and 11) would control mobility of contaminants through capture, would reduce the volume and toxicity of contaminants through treatment and would be permanent. Capping associated with Alternatives 3, 4, and 4A would reduce mobility via control of vapor, movement and infiltration. *In-situ* S/S associated with Alternatives 3 and 4 would reduce contaminant mass through media transfer and mobility through binding the treated mass and limiting infiltration. LTTD and S/S associated with Alternatives 4A, 5, 7, and 11 would reduce contaminant mass through the treatment and capture of contaminants; however, S/S associated with Alternatives 4A, 5, 7, and 11 would increase the total volume of material.

5. Short-Term Effectiveness

No short-term effects would be anticipated with implementation of Alternatives 1 or 2, and the implementation timeframes for both would be immediate. The duration of implementation for Alternatives 3, 4, and 4A would be relatively short. The implementation duration for Alternatives 5, 7, and 11 would be relatively long (over 20 years). Implementation of the remedial actions associated with Alternative 3 would be minimally disruptive, resulting in minimal short-term impacts and would be limited in wetland, ecological habitat and flood plain areas. Implementation impacts would occur in wetlands, ecological habitat and floodplain with implementation of Alternatives 4 and 4A; however, enhancement of existing, non-impacted wetlands and habitats and/or creation of new wetlands/habitats would be employed to mitigate impacts. Implementation of excavation, consolidation, and treatment activities associated with Alternatives 5, 7, and 11 would result in large-scale intrusions and material disturbances, increasing the opportunity for emission generation and material release to the environment with commensurate complexity in implementation of effective controls. Additionally, such large-scale intrusions as associated with Alternatives 5, 7, and 11 would result in destruction of existing wetlands and habitats; and, temporary, but detrimental, disruption of habitat and flora/fauna communities would occur in surrounding areas during implementation; however, enhancement of existing, non-impacted wetlands and habitats and/or creation of new wetlands/habitats would be employed to mitigate impacts.

Increases in truck traffic through the local community would occur during construction of Alternatives 3, 4, 4A, 5, 7, and 11. However, trucks would be carrying only S/S admixtures, clean fill and construction materials with implementation of Alternatives 3, 4, 4A, 5, and 7, while trucks would be carrying the most highly contaminated material from the Site to off-site treatment/disposal sites with implementation of Alternative 11. The potential for exposure to workers during construction for Alternative 3 would be minimal due to the minimally invasive nature of the construction. However, worker exposures would be increased with implementation of Alternatives 4, 4A, 5, 7, and 11, due to the increase in generation of air emissions related to excavation, consolidation and treatment.

6. Implementability

A review of the implementability of Alternatives 1 and 2 is not applicable since either no action is taken or the actions are largely already complete. Equipment, materials and personnel necessary to implement Alternatives 3, 4, 4A, 5, 7, and 11 are typically available in the marketplace; however, qualified contractors that would implement the types of remedial projects associated with Alternatives 5, 7, and 11 may not be available or accessible for the entire duration of construction due to their relatively long implementation timeframes. Additionally, the treatment components of Alternatives 5, 7, and 11 for the Site material are unproven.

Capping and groundwater collection/treatment associated with Alternatives 3, 4, 4A, 5, and 7 are proven, reliable technologies and would be readily constructed and maintained. Stabilization associated with Alternatives 3, 4, and 4A utilize proven geotechnical technologies; however, variability of materials on-site could require additional treatment and affect intermediate milestones in a construction schedule. Alternatives 3, 4, and 4A rely mainly on capping; however, Alternative 4A provides more protection through relocation of the Impoundment material in the floodplain to the Main Plant. Alternative 4A offers additional protection by also excavating materials which could meet the definition of principal threat waste with subsequent consolidation and treatment of material (*In-situ* S/S). *In-situ* S/S associated with Alternative 5 may prove difficult due to locations, nature of material and surroundings (*i.e.*, flood plain, wetlands, etc.). Monitoring for Alternatives 2, 3, 4, 4A, 5, 7 and 11 would be effective in identifying successful operation of the remedy. Although proven technologies, due to the range of contaminants to be addressed, extensive pre-design testing would be required for the treatment technologies employed with Alternatives 5, 7, and 11.

The excavation of material proposed in Alternatives 4, 4A, 5, 7, and 11 would trigger LDRs consequently, CAMU requirements would apply. The remaining capacity in Impoundment 8 may not be sufficient to receive treated material volumes resulting from implementation of Alternatives 7 or 11. Invasive construction activities in the regulated flood plain may increase the time required prior to initiation of the remedies employed by Alternatives 4, 4A, 5, 7, and 11. Regulatory review and approvals would be required from local, state and federal agencies; these would be of a standard, routine nature for Alternatives 3, 4, and 4A but would be more extensive for Alternatives 5, 7, and 11. Failures/iterations relative to S/S and LTTD associated with Alternatives 5, 7, and 11 could cause construction delays and may result in ARARs not being attained. Alternatives 3, 4, and 4A have the ability to implement additional remedial actions if necessary. However, following S/S associated with Alternatives 5, 7, and 11, any additional manipulation of material would be more difficult.

7. Costs

The estimated capital cost, O & M, and present worth cost are discussed in detail in the Feasibility Study. The cost estimates are based on the best available information. Alternatives 1 ($574,000) and 2 ($33.1 M), No Action and Limited Action, respectively, would incur the least cost to implement. Alternative 3 would cost $138 million. Alternative 4 ($180 M) would cost 30% more than Alternative 3. Alternative 4A ($205 M) would cost 49% more than Alternative 3 and 14% more than Alternative 4. Alternatives 5 ($308 M) and 7 ($825 M) are significantly more costly, at more than two and almost six times more costly than Alternative 3, respectively. Alternative 11 ($1.8 B) would be the most costly, at more than twice the cost of the next most costly (Alternative 7), and would be at least an order of magnitude higher in cost than other alternatives that meet the RAOs.

8. State/Support Agency Acceptance

The State of New Jersey concurs with EPA's preferred alternative as presented in this Proposed Plan.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision, the document that formalizes the selection of the remedy for the Site.

PREFERRED ALTERNATIVE

Based upon an evaluation of the remedial alternatives, EPA recommends Alternative 4A as the Preferred Alternative. Alternative 4A has the following key components: Consolidation/Treatment/Soil Cover and Stabilization/Capping with Hydraulic Control/Treatment of Ground Water.

Alternative 4A is both a treatment- and a containment-based alternative consisting of proven technologies that would be effective in controlling and reducing the risks associated with the exposure pathways identified at the Site. The use of engineered capping systems would effectively control direct contact (soil cover in Main Plant and excavation and relocation of Flood Plain material to the Main Plant) and minimize the release of contaminants into the air (multi-layer cap for vapor control in Main Plant and Flood Plain). Additionally, excavating the materials in the Flood Plain

warranting movement control, and consolidating them at the Main Plant for *in-situ* S/S, as necessary, and multi-layer capping would address movement beyond those containment areas. *In-situ* S/S would reduce contaminant mass through media transfer (enhanced desorption), capture of the emissions, and destruction in a vapor treatment system. *In-situ* S/S would also serve to reduce mobility of contaminants through the binding of treated mass and the limiting of infiltration through the less permeable, treated waste material.

Although excavation of materials from the Flood Plain would remove the potential risks associated with the potential exposure pathways in those areas, there would be risks associated with excavation activities. These could include air emission and dust generation, damage to existing ecological systems, worker safety, and control of construction activities (*i.e.* erosion, materials storage, etc.) within a floodplain.

Hydraulic controls provided by improved collection/treatment of bedrock and overburden groundwater coupled with institutional controls that prohibit potable use of on-site groundwater would achieve the groundwater RAOs and would provide for protection of human health and the environment. The continued use of the groundwater extraction and treatment system, supplemented by additional measures to contain, and collect overburden groundwater in select areas, would provide for protection of human health and the environment by containing impacted groundwater.

This alternative would be readily implementable using conventional technologies, would be potentially cost effective, and would return the Site to beneficial reuse as soon as practicable with an estimated implementation timeframe of approximately 10 years for impoundments and soils and approximately 30 years for groundwater..

Excavating the impoundments in the Flood Plain and consolidation of the material on the Main Plant with placement of a soil cover will prevent direct contact exposure and the placement of a multi-layered engineered cap where required will provide vapor and movement control. The remedy would also be effective in reducing the risk of impoundments in the flood plain being compromised by any flooding.

The Preferred Alternative is believed to provide the best balance of tradeoffs among the alternatives based on the information available to EPA at this time. EPA believes that the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The preferred alternative can change in response to public comment or new information.

COMMUNITY PARTICIPATION

EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The dates for the public comment period, the date, location and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. Written comments on the Proposed Plan should be addressed to one of the Remedial Project Managers listed on the right.

EPA Region 2 has designated a public liaison as a point-of-contact for the community concerns and questions about the federal Superfund program in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands. To support this effort, the Agency has established a 24-hour, toll-free number that the public can call to request information, express their concerns, or register complaints about Superfund.

For further information on the American Cyanamid Superfund Site, please contact:

Joseph Battipaglia	Cecilia Echols
Remedial Project Manager	Community Involvement Coordinator
(212) 637-4384	(212) 637-3678
battipaglia.joseph@epa.gov	echols.cecilia@epa.gov

Written comments on this Proposed Plan should be mailed to Mr. Battipaglia at the address below or sent via email.

U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

The public liaison for EPA's Region 2 is:

George H. Zachos
Regional Public Liaison
Toll-free (888) 283-7626
(732) 321-6621

U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837-3679

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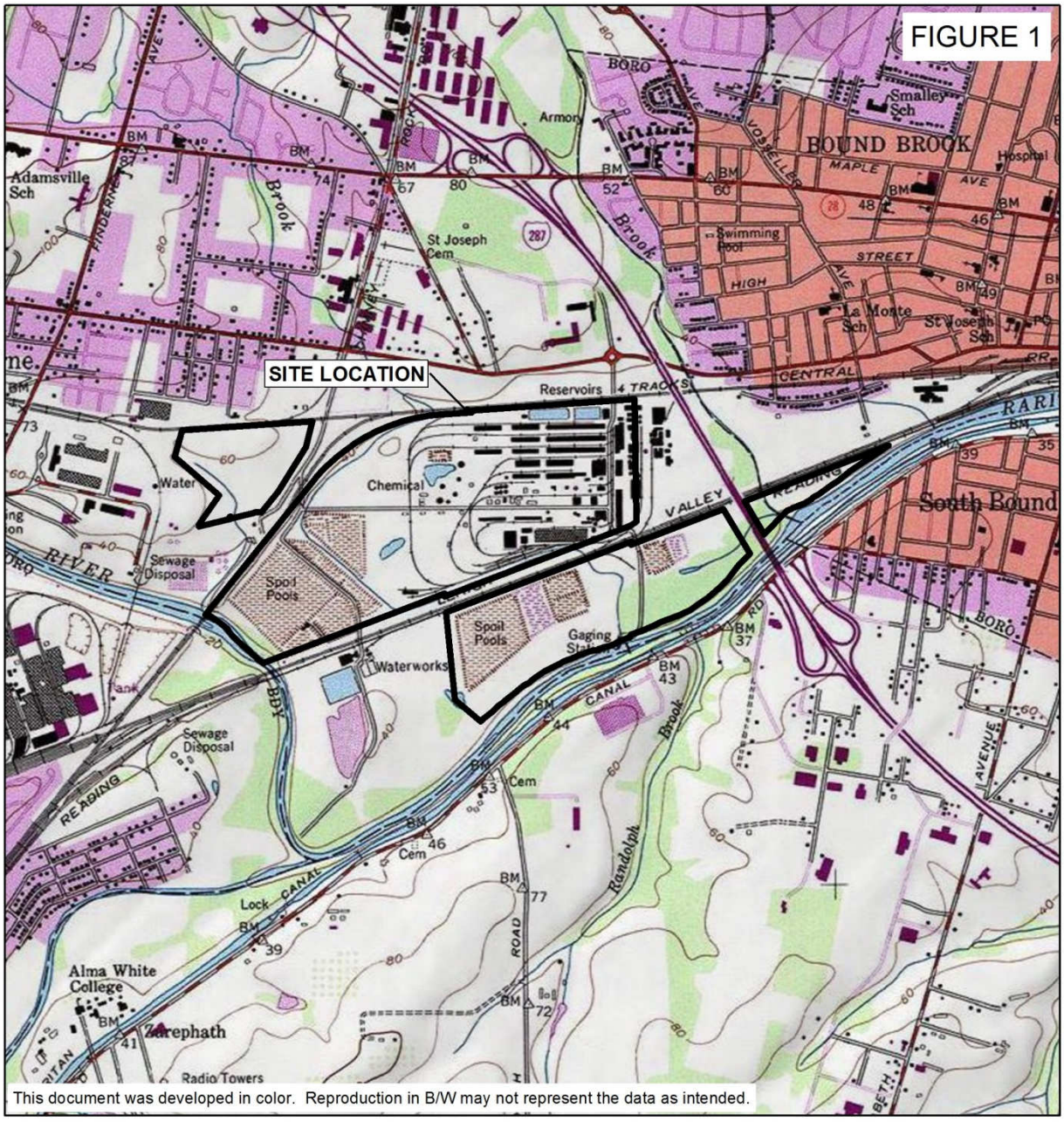
PLOT DATE: 12/12/2011 DRK

FIGURE 1



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ADAPTED FROM: BOUND BROOK, NEW JERSEY USGS QUADRANGLE

MAP LOCATION

WYETH HOLDINGS CORPORATION
AMERICAN CYANAMID
SUPERFUND SITE
SITE-WIDE FEASIBILITY STUDY

N

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

DECEMBER 2011
4529/47194

1:24,000

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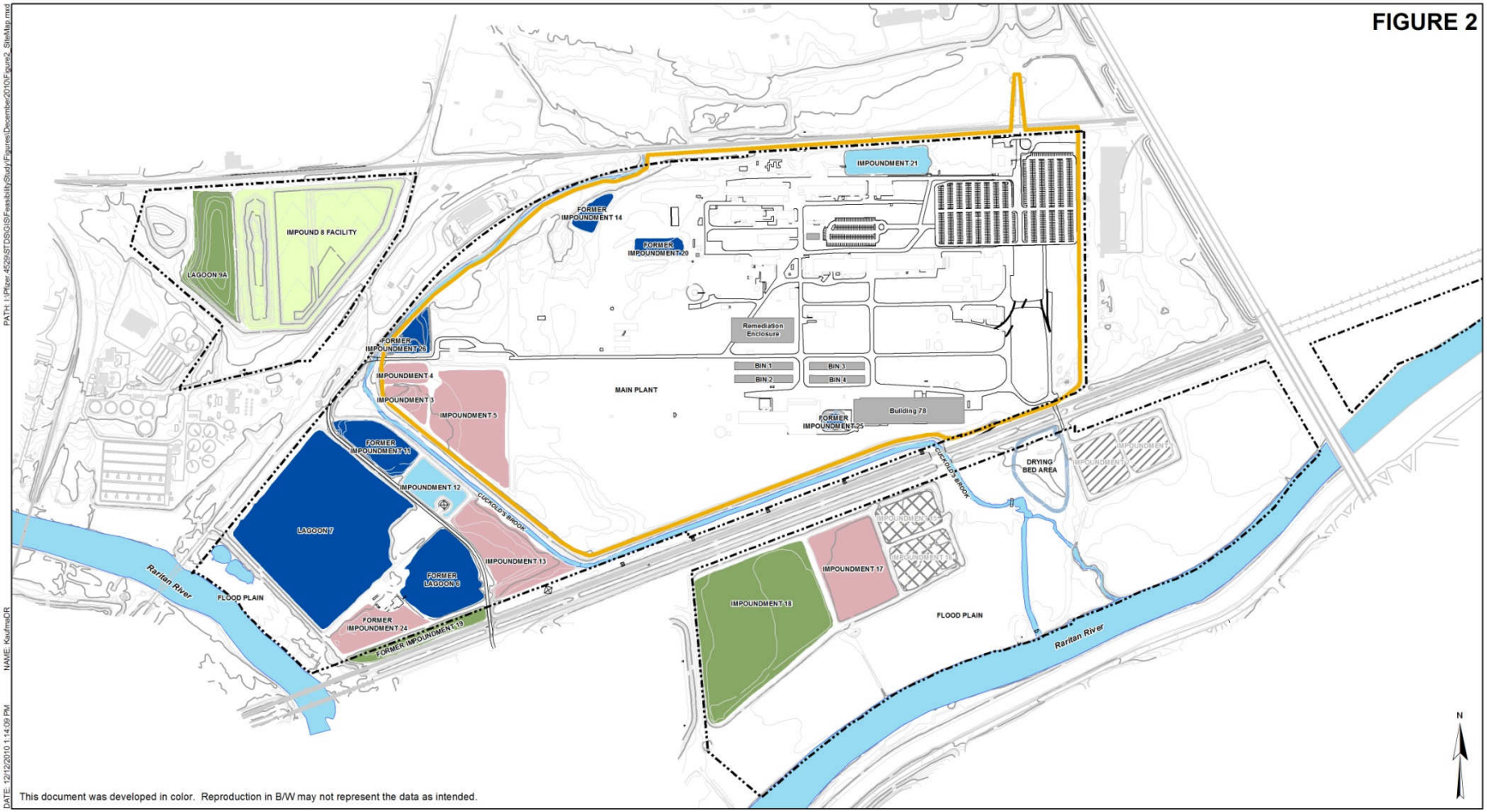
FIGURE 2



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Legend

- Approximate Property Boundary
- Flood Control Dike
- Drying Bed Area
- Impoundments to be Addressed
- Impoundments to be addressed but not Included in this SWFSR
- Impoundments Never Used for Disposal & Contain Water
- Remediated Impoundments / RCRA Lagoons & Contain Water
- Remediated Impoundments / RCRA Lagoons
- Impound 8 Facility
- Remediation on-going; not included in this SWFSR

WYETH HOLDINGS CORPORATION
AMERICAN CYANAMID SUPERFUND SITE
SITE-WIDE FEASIBILITY STUDY

0 300 600 1,200 Feet

SITE MAP

FILE NO.
4529/45863
DATE
DECEMBER 2011

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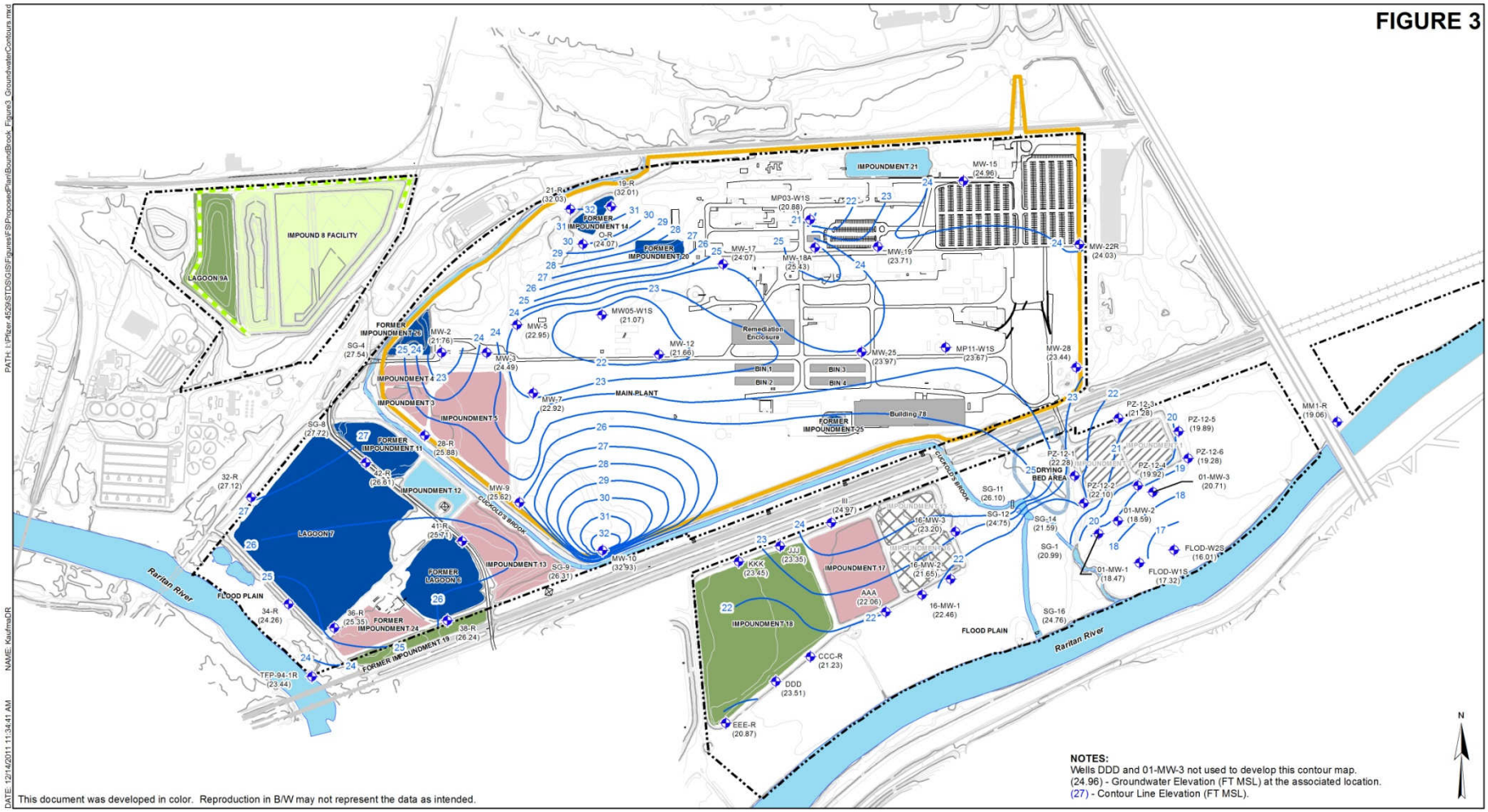
FIGURE 3



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NOTES:
Wells DDD and 01-MW-3 not used to develop this contour map.
(24.96) - Groundwater Elevation (FT MSL) at the associated location.
(27) - Contour Line Elevation (FT MSL).

N

Legend

- Stream Gauge
- Monitoring Well
- Groundwater Elevation Contours
- Groundwater Cut-Off Wall
- Flood Control Dike
- Approximate Property Boundary
- Drying Bed Area
- Impoundments to be Addressed
- Impoundments to be addressed but not Included in this SWFSR
- Impoundments Never Used for Disposal & Contain Water
- Remediated Impoundments / RCRA Lagoons & Contain Water
- Remediated Impoundments / RCRA Lagoons
- Impound 8 Facility
- Remediation on-going; not included in this SWFSR

WYETH HOLDINGS CORPORATION
AMERICAN CYANAMID SUPERFUND SITE
SITE-WIDE FEASIBILITY STUDY

0 300 600 1,200 Feet

OVERBURDEN WATER TABLE
AUGUST 10 & 12, 2010

FILE NO.
4529/45863
DATE
DECEMBER 2011

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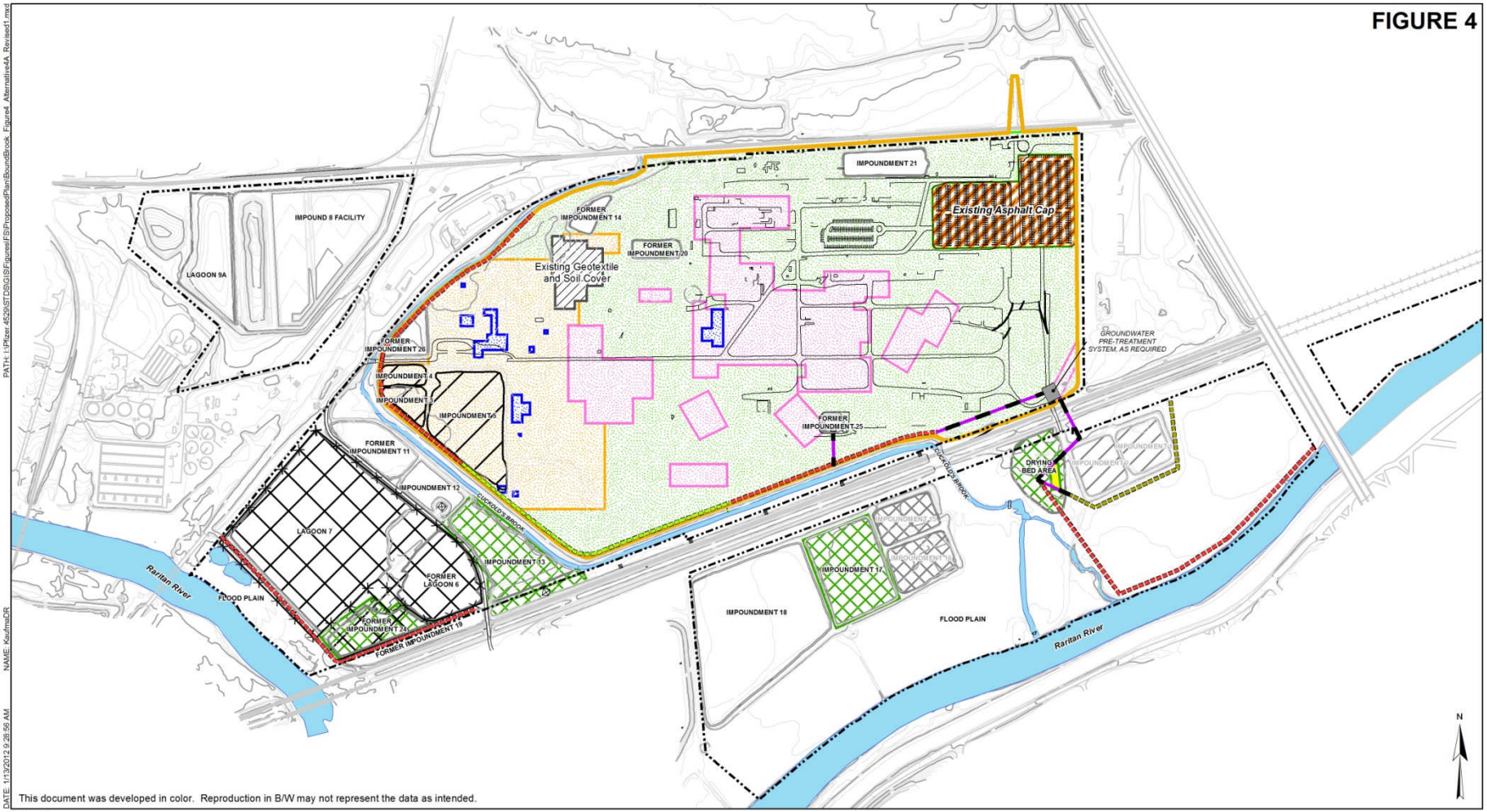
FIGURE 4



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DATE: 1/13/2012 9:28:56 AM

Legend

- Flood Control Dike
- Approximate Property Boundary
- Impoundment
- In-situ Solidification
- Proposed Area for Recovery Well
- Conveyance Piping
- Collection Trench
- Higher Gradient Section
- (Final Layout and Construction Details TBD During RA)
- Impoundments to be addressed but not included in this SWFSR
- Remediation on-going; not included in this SWFSR
- Existing Geotextile and Soil Cover Installed in 1992 for Worker Direct Contact Control - Further Control Not Required
- Existing Asphalt Cap Installed in 1999 for Hill Property Development - Further Control not Required
- Existing Fence with Water Cover for Direct Contact Control - Further Control not Required
- Excavation and Relocation to Impoundments 3, 4, & 5 - 2 Acres
- Soil Cover for Direct Contact Control - 113 Acres
- Excavation and Relocation to Main Plant for Direct Contact Control (Exc. of Imp. 13, 17, & 24 TBD by Eco. RA) - 20 Acres
- Multi-layer Cap for Vapor Control - 33 Acres (Final area based on inhalation risk greater than 10^-6)
- Multi-layer Cap for Vapor and Movement Control - 36 Acres
- Excavation and Relocation to Main Plant for Vapor and Movement Control - 0.2 Acres

WYETH HOLDINGS CORPORATION
AMERICAN CYANAMID SUPERFUND SITE
SITE-WIDE FEASIBILITY STUDY

0 300 600 1,200 Feet

ALTERNATIVE 4A
CONSOLIDATION/TREATMENT/
SOIL COVER AND STABILIZATION/
CAPPING WITH HYDRAULIC CONTROL/
TREATMENT OF GROUND WATER

FILE NO.
4529/47194
DATE
JANUARY 2012

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Table 1A: Summary of CERCLA Impoundments to be addressed in Focused Feasibility Study					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Impoundment 1	2.1	3.0 MG (Approx 26,900 CY Remaining)	Storage of sludges from the coal oil ("light oil") refining process	Approx 3.0 million gallons (MG) of light oil sludge (LOS) layer removed and recycled; solids not yet remediated, to be addressed in a separate FFS	benzene, toluene, xylene, 1,2-dichlorobenzene, naphthalene, nitrobenzene, arsenic, barium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc. pH less than 2
Impoundment 2	2.3	3.1 MG (Approx 26,700 CY Remaining)	Storage of sludges from the coal oil ("light oil") refining process	Approx 3.1 MG of light oil sludge (LOS) layer removed and recycled; solids not yet remediated, to be addressed in a separate FFS	benzene, toluene, 1,2 –dichlorobenzene, naphthalene, chromium, copper, lead, mercury, nickel, selenium, zinc. pH less than 2

Table 1B: Summary of CERCLA Impoundments Currently Undergoing Remediation					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Impoundment 15	2.8	58,750 CY (94,000 tons) remediated to date (Approx 39,050 CY Remaining)	Storage of iron oxide material resulting from iron use in aniline production	Remediation in progress - iron oxide materials being excavated and sent off-site for recycling	iron oxide, acetone, benzene, methylene chloride, xylenes, 4-chloroaniline, n-nitrosodiphenylamine, anthracene, naphthalene, phenanthrene, arsenic, copper, lead, zinc, PCBs
Impoundment 16	3		Storage of iron oxide material resulting from iron use in aniline production	Remediation in progress - iron oxide materials being excavated and sent off-site for recycling	iron oxide, acetone, benzene, methylene chloride, xylenes, 4-chloroaniline, n-nitrosodiphenylamine, anthracene, naphthalene, phenanthrene, pyrene, arsenic, copper, lead, zinc, PCBs

Table 1C: Summary of CERCLA Impoundments Addressed in this Proposed Plan					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Impoundment 3	1.3	Not Yet Remediated (Approx 30,200 CY Remaining)	Storage of organic tars from the distillation of coal oil and consolidation of construction material, general plant debris and fill material	Not yet remediated; being addressed as part of this Proposed Plan	benzene, toluene, xylene, naphthalene, n-nitrosodiphenylamine, 2-methylnaphthalene, 1,2-dichlorobenzene, nitrobenzene, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium, pH of 4-8
Impoundment 4	1	18,700 CY Remediated (Approx 4,300 CY remaining in Impoundment 4 and 110,330 CY remaining in Impoundment 5)	Storage of sludges and organic tars from various production processes	Approximately 3.8 MG of pumpable sludge removed and recycled; remaining material not yet remediated, being addressed as part of this Proposed Plan	benzene, toluene, xylene, 1,2- dichlorobenzene, naphthalene, pH of 1-3
Impoundment 5 (wet)	5.2		Storage of sludges and organic tars from various production processes	Approximately 3.8 MG of pumpable sludge removed and recycled; remaining material not yet remediated, being addressed as part of this Proposed Plan	benzene, toluene, xylene, n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, 1,2-dichlorobenzene, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium, zinc, pH of 3.7-9.0
Impoundment 5 (dry)	2.5	17,500 CY Remediated	Storage of sludges and, later, mixed fill materials (layered over the sludge)	Approximately 33% excavated, solidified and placed in Impound 8; remaining material not yet remediated, being addressed as part of this Proposed Plan	benzene, toluene, xylene, n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, 1,2-dichlorobenzene, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium, zinc, pH of 3.7-9.0
Impoundment 13	3.9	Not Applicable (N/A) (Approx 55,000 CY Remaining)	Storage of lime and disposal of wastewater treatment sludges	Being addressed as part of this Proposed Plan	benzene, toluene, ethylbenzene, xylene, chlorobenzene, acenaphthalene, fluorine, 2-methylnapthalene, naphthalene, 1,2,4-trichlorobenzene, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, pH of 6.5-9.0
Impoundment 17	6.2	N/A (Approx 69,300 CY Remaining)	Storage of primary sludge from settlement of lime-neutralized effluent from on-site wastewater treatment	Being addressed as part of this Proposed Plan	acetone, toluene, ethylbenzene, and xylene, chlorobenzene, 1,2,4- trichlorobenzene, benzo(a)anthracene, bis(2-ethyl hexyl)phthalate, naphthalene, n-nitrosodiphenylamine, chromium, copper, lead, nickel, zinc. pH of 7-8
Impoundment 24	3.2	N/A (Approx 65,000 CY Remaining)	Storage of lime for primary treatment and, later, storage for sludges and general plant wastes	Being addressed as part of this Proposed Plan	acetone, chlorobenzene, methylene chloride, toluene, xylene, dibenzofuran, 1,2-dichlorobenzene, 2-methylnaphthalene, naphthalene, arsenic, chromium, copper, iron, lead, nickel, pH of 7-12.7

Table 1D: Summary of CERCLA Impoundments with Remediation Completed					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Impoundment 11	2.6	25,000 CY	Disposal of sludges, furnace ash, and klinkers	Remediation completed; Closed with No Further Action per remedy selected in 1993 OU-1 ROD. Impoundment material removed and placed in Impoundment 8.	acetone, ethylbenzene, chlorobenzene, methylene chloride, toluene, xylenes, acenaphthalene, benzo(a)anthracene, fluorene, naphthalene, 2-methylnaphthalene, chromium, copper, lead, mercury, nickel, zinc
Impoundment 14	0.9	7,200 CY	Storage of organic tars	Remediation completed; Closed with No Further Action per remedy selected in 1998 OU-3 ROD. Impoundment material removed and placed in Impoundment 8.	benzene, toluene, xylene, n-nitrosodiphenylamine, naphthalene, 2-methylnaphthalene, 1,2-dichlorobenzene, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc
Impoundment 18	15.4	217,000 CY	Storage of primary sludge from settlement of lime-neutralized effluent from on-site wastewater treatment	Remediation completed; Closed with No Further Action per remedy selected in 1996 OU-2 ROD	acetone, chlorobenzene, 2-methylnaphthalene, naphthalene, 4-chloroaniline, acenaphthalene, benzo(a)anthracene, phenanthrene, bis(2-ethyl hexyl)phthalate, fluorene, arsenic, chromium, copper, lead, zinc
Impoundment 19	2.3	12,000 CY	Storage of lime for use in wastewater treatment	Remediation completed; Closed with No Further Action per remedy selected in 1993 OU-1 ROD. Impoundment material removed and placed in Impoundment 8.	benzene, ethylbenzene, chlorobenzene, methylene chloride, toluene, xylenes, 1,2-dichlorobenzene, 2-methylnaphthalene, naphthalene, 1,2,4- trichlorobenzene, arsenic, chromium, copper, iron, lead, magnesium, nickel
Impoundment 20	1.0	12,100 CY	Settling basin for on-site treatment of dye and pigment operation wastewater	Remediation completed; Closed with No Further Action per remedy selected in 1998 OU-3 ROD. Impoundment material removed and placed in Impoundment 8.	benzene, toluene, xylene, n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, 1,2-dichlorobenzene, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, cyanide, mercury, nickel, selenium, silver, vanadium, zinc
Impoundment 26	2.3	22,000 CY	Storage of organic tars and, later, construction material, general plant debris and fill material	Remediation completed; Closed with No Further Action per remedy selected in 1998 OU-3 ROD. Impoundment material removed and placed in Impoundment 8.	benzene, toluene, xylene, n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, 1,2-dichlorobenzene, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc

Table 1E: Summary of CERCLA Impoundments with No Remediation Required					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Impoundment 9	-	No Remediation Required	Never Used	No remediation required based on 1990 Impoundment Characterization Program	-
Impoundment 10	-	No Remediation Required	Never Used	No remediation required based on 1990 Impoundment Characterization Program	-
Impoundment 12	-	No Remediation Required	Never Used	No remediation required based on 1990 Impoundment Characterization Program	-
Impoundment 21	-	No Remediation Required	Contains emergency fire water	No remediation required based on 1990 Impoundment Characterization Program	-
Impoundment 22	-	No Remediation Required	Previously contained emergency fire water	No remediation required based on 1990 Impoundment Characterization Program; Impoundment was backfilled with clean fill	-
Impoundment 23	-	No Remediation Required	Previously used to collect river sediment from the facility's former river water treatment plant	No remediation required based on 1990 Impoundment Characterization Program	-

Table 1F: Summary of Impoundments Addressed under RCRA					
Impoundment	**Area (acres)**	**Volume Remediated**	**Description/Use**	**Current Status**	**COCs** *Please note that this list may not be exhaustive
Lagoon 6	5.5	113,500 CY	RCRA impoundment; addressed in accordance with approved RCRA closure plan	Remediation completed under RCRA. Waste in Lagoon 6has been removed, solidified, and placed in the Impoundment 8 Facility.	NA
Lagoon 7	20.9	241,400 CY	RCRA impoundment; in the process of being closed in accordance with approved RCRA closure plan	Remediation partially completed; Approx. 95% of waste in Lagoon 7 has been removed, solidified, and placed in the Impoundment 8 Facility.	NA
Lagoon 8	11.5	60.8 MG	RCRA impoundment; addressed in accordance with approved RCRA closure plan	Remediation completed under RCRA. Waste in Impoundment 8 [Old] has been removed, solidified, and placed in the Impoundment 8 Facility.	NA for Lagoon 8 (Old); Impoundment 8 Facility COCs: chloroform, tetrachloroethene, trichloroethene
Lagoon 9A	4.1	52,900 CY	RCRA impoundments; addressed in accordance with approved RCRA closure plan	Remediation completed under RCRA; Impoundment 9A (plant effluent sludge) was closed in-place by installing a double synthetic liner capping system	chloroform, 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, iron, manganese
Impoundment 25	0.2	1,600 CY	RCRA impoundments; addressed in accordance with approved RCRA closure plan	Remediation completed under RCRA Effluent Collection Basin for Plant Effluent (sludge removed and closed in 1988 with NJDEP approval)	NA

Table 2A: Impoundments

Direct Contact Control	
Numerical Values not Applicable	
Vapor Control (mg/kg)[1]	
Benzene	4.23
Toluene	11,110
Xylene	4,470
Chlorobenzene	2,590
Naphthalene	948
Movement Control[2]	
Tarry substances of Impoundments 3, 4, and 5 – Numerical Values not Applicable	

Table 2B: Main Plant Soils

Direct Contact Control (mg/kg)[3]	
Antimony	410
Arsenic	19
Benzo(a)anthracene	2.1
Benzo(a)pyrene	0.21
Cadmium	800
Chromium (total)	NC[4]
Chromium VI	5.6
Cobalt	300
Cyanide	20,000
Lead	800
Mercury	43
Nitrobenzene	24
Total PCBs	0.74
Xylene (total)	2,700
Vapor Control (mg/kg) [1]	
Benzene	4.23
Toluene	11,110
Xylene	4,470
Chlorobenzene	2,590
Naphthalene	948
Movement Control (mg/kg) [2]	
Benzene	4,460
1,2 Dichlorobenzene	98,400
n-Nitrosodiphenylamine	352,000
Nitrobenzene	12,300
Naphthalene	6,180

Table 2C: Flood Plain Soils

Direct Contact Control (mg/kg)[3]	
Chromium VI	5.6
Lead	800
Mercury	43
Vapor Control (mg/kg) [1]	
Benzene	4.23
Toluene	11,110
Xylene	4,470
Chlorobenzene	2,590
Naphthalene	948
Movement Control (mg/kg) [2]	
Benzene	4,460
1,2 Dichlorobenzene	98,400
n-Nitrosodiphenylamine	352,000
Nitrobenzene	12,300
Naphthalene	6,180

Table 2D: Groundwater

	NJ GWQS (µg/l)[5]	NJ MCL (µg/l)[5]	EPA MCL (µg/l)[5]
Benzene	1	1	5
1,2-Dichlorobenzene	600	NC	600
2-Methylnapthalene	30	NC	150
Naphthalene	300	300	0.14
Nitrobenzene	6	NC	0.12
n-Nitrosodiphenylamine	10	NC	NC
Toluene	600	1000	1000
Xylene	1,000	1,000	10,000

Notes:

(1) These values are preliminary and a more refined assessment method will be developed and implemented during the Remedial Design phase to appropriately delineate areas requiring vapor control.

(2) While numerical criteria were developed to aid in defining the extent of contaminated media requiring movement control, visual observation of tarry substances will also be utilized to identify these areas, regardless of whether the tarry substances exceed the numerical criteria.

(3) Soil remediation goals were selected based upon consideration of both risk-based concentrations and promulgated NJDEP Non-Residential Direct Contact Soil Remediation Standards. NJDEP Impact-to-Groundwater Soil Screening Criteria were also evaluated as “To-Be-Considered” criteria.

(4) NC denotes no criteria available.

(5) The more stringent of the EPA federal MCLs, NJDEP groundwater quality criteria, NJDEP MCLs, and site-specific, risk-based concentrations will be utilized as the remediation goal for groundwater.