RECORD OF DECISION

FOR AN INTERIM ACTION AT

UNIVERSAL OIL PRODUCTS

OPERABLE UNIT 2

BERGEN COUNTY, NEW JERSEY

U.S. Environmental Protection Agency

Region 2

August 2019

DECLARATION FOR THE RECORD OF DECISION

FACILITY NAME AND LOCATION

Universal Oil Products (Chemical Division)
Operable Unit 2
East Rutherford, Bergen County, New Jersey

EPA Superfund Site Identification Number NJD002005106

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selected interim source control remedy to address contamination within Operable Unit 2 (OU2) of the Universal Oil Products Site (UOP). OU2 includes the sediment in the wetlands, low-lying marshes, and waterway channels located on the west side of Murray Hill Parkway. Waterway sediment that is located on the east side of Murray Hill Parkway is being addressed in a separate interim action as part of the Ventron/Velsicol Superfund Site, for which EPA has already selected a cleanup plan.

The interim remedy was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. This decision document explains the factual and legal basis for selecting the remedy. The Administrative Record Index (see Appendix 3) identifies the items that comprise the Administrative Record for UOP OU2, upon which the selected interim remedy is based.

The State of New Jersey was consulted on the proposed remedy in accordance with CERCLA Section 121(f), 42 U.S.C § 9621(f). The State of New Jersey concurs with USEPA's selection of Alternative 3 for the waterways (removal of 2 feet of waterway sediment and backfill to the existing sediment surface elevation) in OU2 (see Appendix 4).

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy presented in this ROD is an interim action for source control in OU2 and will address contaminated sediment in the waterways on the west side of Murray Hill Parkway (including the Ackermans South Area). The selected remedy will remove the most contaminated layer of sediment and will lead to a reduction in contaminant levels in the surface water and biota within OU2, preventing the resuspension and transport of contamination to the surrounding marshes and downstream areas. The selected remedy is also consistent with the selected remedy for the adjacent Berry's Creek Study Area (BCSA) of the Ventron/Velsicol Site, which includes waterway sediment east of Murray Hill Parkway, maximizing opportunity for cooperative remedial efforts within the watershed.

The contaminants of concern (COC) for this action are polychlorinated biphenyls (PCBs).[1] The selected remedy requires the following components:

Sediment Excavation and Backfill:

- Bank-to-bank removal of the uppermost 2 feet of soft sediment within the proposed remediation footprint (plus 6 inches of over-excavation). Where less than 2 feet of soft sediment is present, all of the soft sediment will be removed. The selected remedy is expected to remove approximately 16,300 cy of sediment from the waterways.
- Backfill of the areas where sediment is removed. The backfill thickness will be equal to the thickness of sediment removed. In areas where contaminated soft sediment remains below the excavation depth, the backfill will serve to physically isolate this material. The work will include mitigation of the habitat disturbance caused by the remedial action.
- Removal activities will include removal and disposal of the Northern Channel culvert beneath Murray Hill Parkway, as well as 214 cubic yards (cy) of debris and sediment located within the culvert. The remedial design will consider whether there could be a flood mitigation benefit from leaving the culvert in place.

Dewatering and Off-Site Disposal: The excavated sediment will be dewatered, stabilized as necessary, and transported off-site for disposal at a permitted facility. It is expected that an on-site wastewater treatment plant will be constructed to treat contact water and supernatant from the excavation areas and to treat the dewatering effluent from the removed sediment.

Groundwater Discharge Monitoring: Monitoring will be conducted during the design to determine if contamination remaining in the shallow groundwater in OU1 areas is negatively impacting the sediment in OU2. If an unacceptable risk to the benthic invertebrate community is established, further investigations and an appropriate response action will be determined in the future.

Institutional Controls: Institutional controls (ICs), such as the existing New Jersey fish and crab consumption advisories, will remain in place. Additional restrictions will be established if necessary, including restrictions limiting certain construction activities to preserve the backfill surface, such as a deed notice, or for areas for which no deed exists, an equivalent notice, pursuant to New Jersey Department of Environmental Protection (NJDEP) requirements.

Post-Construction Monitoring: A post-construction performance monitoring and maintenance program will be implemented to monitor the success of the interim source control remedial action in the surrounding ecosystem and in the adjacent marshes and waterways that are hydrologically connected to OU2 and to provide any necessary maintenance to preserve the backfill.

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[1] The primary contaminants of concern for UOP OU2 are PCBs, which were detected in on-site surface water, sediment, and fish tissue (white perch). The human health risk assessment examined PCBs as Total PCBs, Total PCB Aroclors (commercial PCB mixtures historically used by industry), and Tetrachlorodibenzodioxin (TCDD) toxic equivalents (TEQ), which are specific PCB congeners that exhibit a dioxin-like toxicity. The ecological risk assessment also identified mercury, methylmercury, and chromium as contaminants contributing to an unacceptable risk (hazard quotient greater than 1) for sediment (waterways and marsh) and the turf mat.

The selected remedy is an interim action to prevent human and ecological exposure to contaminants and control the release of contamination from the sediments in OU2. Additional UOP remedial actions, including those for tidal marshes and discharging groundwater (if required), will be evaluated in future site decision document(s) based on the results of the monitoring associated with this interim source control action.

Principal threat waste is identified as source materials considered to be 1) highly toxic or highly mobile which cannot be reliably contained or 2) would present a significant risk to human health or the environment should exposure occur. While the COCs in the sediment act as a source of contamination to surface water and biota, these contaminants are not highly mobile and can be reliably contained, therefore they are not considered to be principal threat wastes. Although COC concentrations are high and the exposure point concentration (i.e., the statistical value calculated to represent a reasonable maximum exposure to both human and ecological receptors) indicates risk which exceeds acceptable levels, risk estimated for exposure to contaminants at UOP OU2 does not meet the principal threat waste threshold.

The environmental benefits of the selected remedy may be enhanced, during remedy design or implementation, by consideration of technologies and practices that are sustainable in accordance with USEPA Region 2's Clean and Green Energy Policy.

The estimated 30-year present worth cost of the selected interim remedy, with a seven percent discount factor, is $18,600,000.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1: Statutory Requirements

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed; complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus supports that statutory mandate. Subsequent actions will address fully the threats posed by conditions at UOP.

Part 2: Statutory Preference for Treatment

The selected remedy satisfies the statutory preference for treatment as a principal element of the remedy. Although the excavated sediment will be transported off-site for disposal, an amendment (e.g., Portland cement) will be added as needed to meet transportation and disposal requirements. The addition of an amendment will reduce the toxicity and the mobility of contaminants contained within the sediment, compared to untreated sediment. While treatment could be considered a secondary benefit of amendment addition for transportation and disposal requirements, the sediment will nonetheless undergo treatment, and the statutory preference will be met.

Part 3: Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, five-year reviews will be required to ensure that the remedy remains protective of human health and the environment.

The schedule for the five-year review was set at the start of remediation of the upland portion of the UOP Site (OU1). Five-year reviews for OU1 were issued on September 28, 2001; September 29, 2006; September 26, 2011; and September 27, 2016. Because this is an interim action ROD, review of this remedy will be ongoing as EPA continues to develop a final remedy for the UOP Site.

DATA CERTIFICATION CHECKLIST

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

- COCs and their respective concentrations are summarized in Section 5: Summary of Site Characteristics.
- Baseline risks for human health and the environment represented by the COCs are described in Section 7: Summary of Site Risks.
- Remedial Action Objectives are presented in Section 8, which provide a basis for determining if the cleanup has been conducted as described by this ROD.
- Current and reasonably anticipated future use assumptions used in the baseline risk assessment and ROD are provided in Section 6: Current and Potential Future Site and Resource Uses.
- Estimated capital, operation and maintenance (O&M), and total estimated costs, and the number of years over which the remedy cost estimates are projected are listed in Section 10.1.2: Balancing Criteria, 'Cost' subsection.
- Key factors that led to selecting the remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, and highlighting criteria key to the decisions) are described in Section 10: Comparative Analysis of Remedial Alternatives.

AUTHORIZING SIGNATURE

[signature] 8/12/19

Pat Evangelista, Acting Director
Superfund and Emergency Management Division

Date

DECISION SUMMARY

Universal Oil Products Site – Operable Unit 2

Bergen County, New Jersey

U.S. Environmental Protection Agency
Region 2
August 2019

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1. SITE NAME, LOCATION AND DESCRIPTION

The Universal Oil Products Site (U.S. Environmental Protection Agency [EPA] Superfund Site Identification Number NJD002005106) is located near the intersection of Route 17 and Paterson Plank Road in the Borough of East Rutherford, Bergen County, New Jersey (Figure 1). The Universal Oil Products Site (UOP) occupies approximately 74 acres, and was divided into two Operable Units (OUs):

- OU1: The Uplands portion of UOP is approximately 30 acres in size and is composed of developed land which has been filled with miscellaneous earthen fill, municipal solid waste, and rubble. The former UOP industrial facility, a specialty aroma chemical manufacturer and waste solvent recycler, was located on OU1. An active New Jersey Transit right-of-way for the Pascack Valley Line runs north to south through a portion of the Uplands. Segments of the New Jersey Sports and Exposition Authority's (NJSEA) Meadowlands Railroad and Roadway Improvement Project rail spur also run east to west through OU1. A portion of OU1 has been redeveloped as a commercial shopping center that is accessed via Route 17.
- OU2: The OU2 portion of UOP is approximately 44 acres in size, roughly 30 of which are designated as wetlands and consist of a former lagoon area, low-lying marshes, and waterway channels located on the west side of Murray Hill Parkway. This operable unit contains approximately 3,800 feet of tidal stream channels. A section of the NJSEA Meadowlands Railroad and Roadway Improvement Project rail spur crosses the former wastewater lagoon area of OU2.

The UOP Site is geographically located within the Berry's Creek Study Area (BCSA), an urban watershed that is an operable unit of the Ventron/Velsicol Superfund Site and is located within the Hackensack River Meadowlands (Figure 1). The 12-square mile (mi^2) BCSA watershed consists of approximately 1.6 mi^2 of tidal waterways and marshes (the "tidal zone"), and 10.4 mi^2 of highly-urbanized, upland areas that drain to the BCSA tidal zone. The marshes are dominated by *Phragmites australis*. The Hackensack River Meadowlands consist of approximately 8,400 acres of tidal marsh, including saltwater and freshwater tidal wetlands, freshwater non-tidal wetlands, uplands, and developed areas.

UOP is surrounded by highways and light industrial and commercial properties. The following facilities are located to the north of the UOP Site: the former Matheson Tri-Gas Products facility, a metals finishing facility, a truck and car repair shop, and a hotel. The east side of the UOP Site is bordered by Murray Hill Parkway, the south side by commercial properties, and the west side by New Jersey Route 17 (Figure 2).

The area addressed by this Record of Decision (ROD) consists of Ackermans Creek and its tributary waterways and the Ackermans South Area, as described further below:

- Ackermans Creek—main channel: This channel is the straight channel along the southern boundary of OU2. This channel flows through a 6-foot culvert beneath Murray Hill Parkway that connects OU2 to the BCSA. The former lagoon area is part of the main channel in the northwest corner of OU2.
- Northern Channel: This channel runs parallel to the Ackermans Creek main channel and the NJSEA Meadowlands Rail Spur, along the transition between UOP OU1 and

OU2. The channel is bisected by Murray Hill Parkway, and the eastern and western sides of this channel are not currently in hydraulic communication because the culvert is blocked by debris.

- Ackermans South Area: This tributary to Ackermans Creek runs along the Pascack Valley Line north to the confluence with the Ackermans Creek main channel.

The Remedial Investigation (RI) for UOP OU2 focused on contamination in waterway sediment associated with historical releases of hazardous substances. UOP OU2 and this ROD address the waterway sediment that is located on the west side of Murray Hill Parkway. Waterway sediment located on the east side of Murray Hill Parkway, while included in the UOP OU2 RI, will be addressed in a separate interim action as part of the BCSA (OU2 of the Ventron/Velsicol Superfund Site), for which EPA has already selected a cleanup plan. Ackermans Creek and its tributaries are connected to Berry's Creek, which drains into the Hackensack River.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1. Site History

UOP OU1 is the former location of industrial operations conducted by Union Ink Company and the former Trubek Laboratories, Inc. (Trubek). In 1860, prior to industrial development of the site, the NJ Pascack Valley Railroad constructed a rail line running roughly north to south that divided the OU1 property into two areas. Prior to 1930, several open ditches were excavated across OU2 and surrounding properties for mosquito control and land development. These ditches were connected to Ackermans Creek. A single factory building was constructed west of the railroad tracks by the Union Ink Company in 1930. The Union Ink Company manufactured printing inks, lacquers, enamels, coatings, and silk screening inks from 1930 to 1945.

Trubek leased a corner of the Union Ink building beginning in 1932 and operated an aroma chemical laboratory that produced a wide variety of organic intermediates for the fragrance and flavoring industries. Trubek gradually expanded operations, and UOP OU1 west of the railroad track was fully developed by 1959.

Trubek acquired Truland Chemical and Engineering Co., Inc. (Truland) of Union, NJ in 1955, and began development of the area east of the railroad tracks to accommodate the purchase. Truland constructed and operated a facility that recovered and purified alcohols and solvents from pharmaceutical and chemical company wastes. Trubek also constructed and began operating a wastewater treatment plant and two wastewater holding lagoons in 1956, which were located in the northwest corner of the current OU2. Between 1956 and 1971, routine handling of products and wastes and seepage from the wastewater lagoons resulted in the release of various hazardous substances to the upland soils and groundwater (OU1) and the tidal marshes and waterways (OU2).

In the 1950s through 1970s, organic chemicals produced by Trubeck and/or Truland at the Site included acetals, acids, alcohols, aldehydes, esters, ethers, ketones, and lactones. A report from the Federal Water Pollution Control Administration issued in 1969 indicated that UOP's products included fatty acid chlorides, benzyl acetate, aromatic organic chlorides, aromatic pharmaceutical products, benzyl alcohol, and aromatic aldehydes. In addition to these organic chemicals, inorganic acids, caustics, and metals, as well as chlorinated and petroleum solvents, were utilized in UOP manufacturing operations. Further, polychlorinated biphenyl (PCB)-based heat transfer fluids were used in vacuum stills from the 1950s into the 1970s.

Trubek fully absorbed the Truland division in 1962. Universal Oil Products Company purchased the facility from Trubek in 1963 and became the owner and operator of the facility. Universal Oil Products Company was renamed UOP, Inc. in 1975.

Between 1975 and 1979, The Signal Companies acquired UOP, Inc. Operations at the facility ceased in 1979, and the building structures were demolished in 1980. Only concrete slabs and a pedestrian bridge over the railroad track remained post-demolition. In 1985, The Signal Companies merged with Allied Corporation, becoming Allied-Signal, Inc. Following a merger and a series of name changes, Honeywell International, Inc. (Honeywell) became the owner of the property in 2002. UOP is currently a wholly-owned subsidiary of Honeywell.

The UOP property, less 17 acres of the OU1 Uplands west of the Pascack Valley Line, was sold to the NJSEA in December of 2006 for construction of a portion of the Meadowlands Railroad and Roadway Improvement Project. The 17-acre portion still owned by Honeywell has been re-developed and is leased to commercial businesses.

The UOP Site was placed on the National Priorities List (NPL) on September 8, 1983. The New Jersey Department of Environmental Protection (NJDEP) served as the lead oversight agency for the UOP Site from 1982 through July 2008 under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. EPA assumed the role of lead agency in 2008.

2.2. Enforcement Activities

Response actions at the UOP Site have been conducted by NJDEP and EPA since the early 1980s. In 1983, NJDEP issued an Administrative Consent Order (ACO) requiring UOP to conduct a RI and Feasibility Study (FS). UOP entered into an amended settlement agreement with NJDEP in 1986, which also included a requirement to implement the remedial action selected by NJDEP based on the FS. RIs were conducted at OU1 of the UOP Site in 1988 and 1990. NJDEP, with EPA concurrence, issued a ROD in 1993 selecting an interim remedial action for UOP OU1 upland soil and shallow groundwater. This ROD was modified through a 1998 ROD Amendment and was further modified by an Explanation of Significant Differences in April 1999. Allied-Signal, Inc. began construction in 1996. The amended remedy required excavation of contaminated soil followed by either off-site disposal or thermal treatment (based on the type of contamination) and placement of treated soil in an on-site containment area. The sanitary, sewer, and stormwater lines were also cleaned and excavated.

Partial remediation of OU1 was completed in 1999, with the balance of remediation completed in 2001. In November 2004, NJDEP and EPA confirmed that the OU1 upland soil remedial activities had been completed and the objectives of the 1993 ROD achieved. Five-year reviews were conducted for OU1 in 2001, 2006, 2011, and 2016.

A RI report focused on OU2 areas was prepared in 1990 using data collected during phased events conducted between 1983 and 1988 (Phase I) and 1989 and 1990 (Phase II). Honeywell performed RI activities in the waterway channels and marshes (located on both the east and west sides of

Murray Hill Parkway) beginning in 2005 with collection of sediment and surface water data to investigate the nature and extent of contamination and to develop a preliminary conceptual site model (CSM). In 2010, Honeywell signed an Administrative Order on Consent (AOC) with EPA to complete the RI/FS and to conduct a non-time critical removal action (NTCRA). The 2010 AOC incorporated the former lagoon area as well as the marshes and waterway channels into one operable unit (OU2). The Ackermans South Area was subsequently added to OU2 in an AOC amendment in 2019.

The following remedial actions were conducted in OU2 between 1990 and 2013:

- Allied-Signal performed an interim remedial measure under NJDEP oversight to remove PCB-contaminated sediment from the former lagoon system in 1990 (sediment was dredged and transported off-site for incineration).
- NJSEA performed removal actions under NJDEP's cleanup procedures and oversight in 2005 and 2007 to accommodate the construction and placement of the New Jersey Transit rail line and right-of-way (ROW) to connect the Pascack Valley rail line with the Meadowlands Sports Complex. Because the footprint of the Meadowlands rail line would no longer be accessible once construction was complete, the 2007 action generally addressed contamination through removal of four feet of sediments below the existing grade within the proposed railroad footprint, with portions of the lagoon and tidal ditches along the proposed rail line excavated to a depth of two feet below the proposed final grade. No further actions are planned for sediments beneath the railroad.
- Honeywell performed the NTCRA in the northwest corner of OU2 in 2012-2013 to excavate the former lagoon berms and sediment for off-site disposal, followed by placement of a 1-foot thick layer of sand backfill in the excavated area. The objective of the NTCRA was to remove highly-contaminated sediment from the former wastewater lagoons and adjacent areas of Ackermans Creek that had not been addressed during the 1990 removal action. As a result of the NTCRA, the configuration of the former lagoon area was substantially altered, and that area is now hydrologically connected with Ackermans Creek.

Due to the interconnection of UOP OU2 and the BCSA, the two sites are being managed using complementary, phased, and adaptive management approaches. The RI and FS Reports for UOP OU2 were approved by EPA in November and December 2018, respectively.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA is committed to maintaining a transparent, pro-active community interaction process during each remedial phase, and has provided the opportunity for community participation throughout the UOP Site RI/FS process. Since UOP is geographically located within BCSA, the community concerns for UOP and BCSA are similar. In 2008 and 2017, EPA conducted community interviews with various BCSA stakeholders to understand community concerns. A common concern expressed during these interviews and meetings related to the potential impacts of remedial action on flooding and mitigating future flooding issues.

EPA hosted a Public Meeting in 2012 at the East Rutherford Memorial Library to discuss UOP and the UOP OU2 NTCRA with the community. To ensure that the public had access to site documents, an information repository was established at the East Rutherford Memorial Library in East Rutherford, NJ.

The RI and FS Reports and the Proposed Plan for UOP OU2 were made available to the public during the public comment period which began on December 10, 2018. They can be found in the Administrative Record file and the information repositories maintained at the EPA Records Center, 290 Broadway – 18th Floor, New York, NY, the Wood-Ridge Memorial Library and the East Rutherford Memorial Library. Notice of commencement of the public comment period and availability of these documents was published in The Record on December 10, 2018. The comment period was initially to extend to January 23, 2019, but it was extended by means of a second notice, published in The Record on Tuesday February 26, 2019.

Public comment on the Proposed Plan for the proposed interim source control remedial action for OU2 was accepted during the public comment period from December 10, 2018 to March 22, 2019. EPA presented the details of the Proposed Plan during a public meeting on March 6, 2019 at the Hasbrouck Heights Free Public Library. This meeting was announced in the February 26, 2019 notice. Additional information on UOP was made available through the administrative record, announcements published in the local newspapers, and access to the USEPA website for UOP. These activities were intended to:

- Help the public to understand the alternatives presented in the Proposed Plan, including the Preferred Alternative, and EPA's evaluation criteria, so that the public could effectively provide input on the Proposed Plan.
- Make the public aware of the full range of opportunities to learn about the Proposed Plan and how to provide input.

Public comment received on the Proposed Plan for UOP OU2 and EPA's responses to the comments are provided in the Responsiveness Summary in Appendix 5.

Flooding is a major concern of residents that live and work in the Bergen County municipalities near the Hackensack River and Berry's Creek. The area is very low lying, and much of it is built on fill. Both rainfall and tidal events cause flooding in the area, and the frequency of flooding seems to be increasing. The selected remedy for OU2 was designed to not exacerbate flooding in the area by only placing backfill up to the pre-removal surface sediment elevation and by including provisions to retain the culvert under Murray Hill Parkway in the Northern Channel, if design evaluations show that it will help to mitigate flooding.

4. SCOPE AND ROLE OF OPERABLE UNIT

4.1. Phased Approach

UOP OU2 is being addressed using a phased approach which is complementary to the ROD for the interim action to address waterway sediment at the BCSA. The remedy presented in this ROD is considered an interim source control action – one or more future decision documents will be required to make further remedial decisions for the UOP Site as part of an adaptive management framework.

Contaminated soil and groundwater at UOP OU1 were addressed by an interim remedy selected in the OU1 ROD issued in 1993. EPA plans to conduct additional evaluation of the potential for vapor intrusion to OU1 buildings from groundwater before a remedy protectiveness evaluation can be completed. Future remedial decisions and actions at OU1, if needed, will be addressed separately from the interim source control remedy developed for OU2.

4.2. Adaptive Management

Given the complexity and uncertainty involved with remediating sediment sites, EPA supports the use of an adaptive management approach to addressing such sites. As discussed in the USEPA guidance titled "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites" (December 2005):

> "Project managers are encouraged to use an adaptive management approach, especially at complex sediment sites to provide additional certainty of information to support decisions. In general, this means testing of hypotheses and conclusions and re-evaluating site assumptions as new information is gathered. This is an important component of updating the conceptual site model. For example, an adaptive management approach might include gathering and evaluating multiple data sets or pilot testing to determine the effectiveness of various remedial technologies at a site. The extent to which adaptation is cost-effective is, of course, a site-specific decision."

EPA expects that information and experience gained during implementation of the OU2 interim remedy for the waterway sediment will inform and be integrated with subsequent remedies for the UOP Site as a whole. This will allow for appropriate adjustments or modifications to enable efficient and effective remedy implementation, providing a means to address uncertainties promptly and inform final remedy decisions. Any remedy modifications will be made and documented in accordance with the CERCLA process and USEPA's "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents" (July 1999), through a memorandum to the Site file, an Explanation of Significant Differences, or an Amendment to the ROD.

5. SITE CHARACTERISTICS

The RI Reports for UOP OU1 were published in 1988-1990. OU2 has been evaluated through multiple studies that began in 1990. The most recent of these studies, the OU2 RI/FS, was initiated in 2005 and its results are presented in the RI/FS Reports completed in 2018.

5.1. Hydrogeology

The UOP OU1 RI Report revealed that upland soils were contaminated with PCBs, polycyclic aromatic hydrocarbons (PAHs), volatile organic contaminants (VOCs), and lead. Depth to groundwater is approximately 6 feet or less in the OU1 upper zone, which consists of 1 to 8 feet of fill material. VOCs detected in the shallow OU1 groundwater included benzene, chlorobenzene, 1,2-dichloroethene, trichloroethene, and 1,1,2,2-tetrachloroethane. Groundwater flow within OU1 fill is toward the northern side of the former NTCRA area and the adjacent marsh system in OU2. Most groundwater flow entering OU2 from OU1 is associated with horizontal flow through the fill and meadow mat to the stream channels.

NJDEP, with EPA's concurrence, selected an interim remedial action for OU1 soil and shallow groundwater in a 1993 ROD. This ROD was modified through a 1998 ROD Amendment and was further modified by an Explanation of Significant Differences in April 1999. Allied Signal, Inc. began remedial construction in 1996. The amended remedy required excavation of contaminated soil followed by either off-site disposal or thermal treatment (based on the type of contamination) and placement of treated soil in an on-site containment area. The sanitary sewer and storm water lines were cleaned and excavated. Approximately 6.8 million gallons of shallow groundwater were pumped, treated, and discharged to Ackermans Creek under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit.

In 1997, NJDEP determined that the shallow OU1 groundwater was non-potable due primarily to its hydraulic connection to a saline water body and changed the shallow groundwater classification at UOP to a Class III-B aquifer. Factors responsible for this re-classification included:

- Elevated levels of ammonia, total dissolved solids (TDS), sodium, iron, manganese, and hardness;
- Likely elevated chloride levels due to monitoring well proximity to saline water and elevated sodium levels in the wells; and
- Tidal nature of the receptor water body.

In November 2004, NJDEP and EPA determined that the OU1 soil remedial activities had been completed and the objectives of the 1993 ROD achieved. EPA approved the remedial action report for OU1 soil in August 2013; however, further porewater analysis will be conducted during the OU2 interim remedy design to determine if contaminated groundwater discharging from OU1 could present an unacceptable risk to the benthic community. A portion of the OU1 property was re-developed in 2005 and is currently occupied by a shopping center.

5.2. Hydrodynamics, Sediment Characteristics, and Sediment Transport

The UOP Site is located within the New Jersey Meadowlands, which consist of approximately 8,400 acres of tidal marsh, including saltwater and freshwater tidal wetlands, freshwater non-tidal wetlands, uplands, and developed areas. The area associated with UOP OU2 is considered tidal fringe wetlands. Ackermans Creek is connected to Berry’s Creek. The area is generally flat, with surface elevations ranging from approximately 1 to 8 feet above mean sea level. Vegetation within OU2 consists of a monoculture of *Phragmites australis*. The National Wetlands Inventory Map identifies the UOP area as Estuarine and Marine Intertidal Emergent Wetlands (E2EM) and Estuarine Subtidal (E1UBL) areas.

The hydrodynamics of the waterways were characterized in the 2005 surface water and sediment characterization study (provided as Appendix Q to the Final RI Report). This study found that flow throughout the waterways is driven dominantly by semidiurnal (twice daily) tides that drain and fill most of OU2, including the marsh and channels in the Ackermans South Area. The Ackermans Creek main channel serves as the main conveyance of flows into and out of OU2. Surface water elevations and current velocities are influenced by daily tidal fluctuations and monthly lunar tidal cycles.

The tidal fluctuations ranged from 3.5 to 7 feet during the monitoring period for the 2005 study, and the average tidal range observed was 5.5 feet at monitoring stations on either side of Murray Hill Parkway. The water elevations were typically below the root mat; however, the marsh was flooded during the highest tides. Tide level data on either side of Murray Hill Parkway were similar, indicating that the flows are not greatly restricted by the culvert. During a typical tidal cycle, most of the surface water is drained from OU2 to Berry’s Creek and mixed with Berry’s

Creek flow; mixed waters from Berry's Creek are returned to OU2 during the subsequent flood tide. Culverts draining properties west and north of Ackermans Creek have been the only additional source of flow to OU2 (Figures 3 and 4).

The highest current velocities occur in the main channel of Ackermans Creek near Murray Hill Parkway, and are likely influenced by flow through the culvert system below Murray Hill Parkway that connects the waterbodies on the eastern and western sides of the Parkway (Figure 4). Current velocities in the tributaries were not measured directly; modeled velocities are much lower than those in Ackermans Creek. Precipitation amounts recorded at Teterboro Airport had little apparent effect on the observed velocities, indicating that storm-related flow has a relatively small contribution to OU2 hydrodynamics under normal weather conditions.

The channels in the Ackermans Creek system are relatively insensitive to storm surge conditions compared to Berry's Creek; this is because Ackermans Creek drains a relatively small portion of the tidal system, and the additional volume conveyed through Ackermans Creek during a surge is small relative to the Ackermans Creek cross section. The exception to this observation occurred during Superstorm Sandy in 2012, which caused tidal surge flooding from the south along the railroad tracks. Conversely, Berry's Creek drains large marsh areas and experiences significantly higher flows during storm surge conditions than it does during typical hydrodynamic conditions. These extreme hydrodynamic conditions do not cause dramatic differences in maximum observed velocities in the waterways of OU2.

The marsh sediments are dominated by root mat material surrounded by clays and silts. The surface sediments within the stream channels exhibited more variability and ranged from clays and silts to sandy gravels. The coarser surface sediments are located generally proximal to storm drain outfalls, in the central (deeper) part of Ackermans Creek main channel, and in the central channel of Berry's Creek. The soft sediments[2] in both the waterways and marsh are underlain by the relatively firm, gray clay, similar to what was encountered during the OU1 investigations. The surface and subsurface sediments in the OU2 waterways are primarily clays and silts. It should be noted that during the NTCRA, 1 foot of sand backfill was placed over the excavation surface. The two subsequent monitoring events have demonstrated that this area has begun to fill in with clay and silt-sized sediment.

The soft sediment thickness was typically greatest in the meander of the stream channel east of the former lagoon that was removed during the NTCRA and in the interior marsh sampling locations. Soft sediment thicknesses in these locations generally ranged from 5 to more than 7 feet. The soft sediment thickness in the former stream channel north of the lagoon area, near the historical storm water discharge point, was thinner, between 1 and 2.9 feet (sediments in this channel were removed during the 2012 NTCRA). The Ackermans Creek main channel and the two north–south channels connecting Ackermans Creek to the Northern Channel typically exhibited thicknesses of soft sediment between less than 1 and 2.9 feet. The Northern Channel west of Murray Hill Parkway had soft sediment thicknesses ranging from 1 to 6.9 feet.

Limited sampling locations were included in the remnant channel in Ackermans South, leading to uncertainty as to the soft sediment thickness in this area. Thicknesses of soft sediments were also

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[2] "Soft sediment" refers to recently-deposited (over the last 100 years) alluvial sediment in waterways that has not undergone longer term consolidation and related geochemical changes.

obtained from sediment probing activities in 2005 and are detailed in Appendix Q to the Final RI Report. Although there has been additional soft sediment deposition since the time of the probing study, the probing data generally showed greater thicknesses of soft sediments in areas outside the Ackermans Creek main channel, which is consistent with the overall understanding of sediment transport in the system.

While the main channel of Ackermans Creek is a high energy environment in regard to surface water flow, it is likely dynamically stable (neither consistently eroding nor gaining sediment), with fine particles that deposit during a tidal cycle being re-suspended and carried off during subsequent peak tidal flow periods. The lower-energy areas off the Ackermans Creek main channel experience lower peak velocities during the tide cycle than the main channel and tend to be more consistently depositional over time. Probing and coring in these lower-energy areas identified greater soft sediment thicknesses than those observed in the main channel. Associated geochronology data, along with a more dominant presence of finer-grained surface sediments, further indicate these areas are generally depositional and stable. The transitional areas are those channels connecting the main channel and the off-channel, lower-energy areas. These transitional areas experience intermediate peak velocities and show moderate levels of accumulation. The transitional areas are considered to be net depositional.

The NTCRA influenced sediment transport at OU2 by removing the former lagoon in the northwest corner of OU2, expanding the intertidal area in this portion of OU2, and placing berms along a portion of the adjacent marsh through development of an access road. The waterway adjacent to the former lagoon was hydraulically connected to Ackermans Creek and Berry's Creek prior to the removal action, but not to the lagoon itself. During the NTCRA, the former lagoon was removed in its entirety, resulting in a larger open-water area that is now hydraulically connected to Ackermans Creek and Berry's Creek. Expansion of the open water area at the northwestern corner of OU2 reduced current velocities near the northern storm water discharge due to an increased channel cross section. This expansion in open water area also increased the tidal prism (i.e., volume of water moved into the area with the tides) and the quantity of sediment transported to this region during flood tides.

5.2.1. Biologically Active Zone (BAZ)

The biologically active zone (BAZ) is the portion of the surface sediment where most macroinvertebrates come into contact with the sediment and any contaminants which may be present. A BAZ depth range of 15 cm was identified early in the RI planning process, resulting in the collection of samples defined as surface sediment from that interval. As a result, the UOP OU2 Baseline Ecological Risk Assessment (BERA) examined data from the upper 15 cm of the sediment bed to evaluate potential exposures in the BAZ.

Because EPA developed remedial action objectives for UOP OU2 to be consistent with those developed for the BCSA, they incorporate the BAZ depth established for the BCSA during the BCSA RI. This depth is defined as the upper 10 cm of the sediment bed in waterway areas other than Upper Berry's Creek. EPA concluded that this depth adequately defined the BAZ for the OU2 sediments.

5.3. Contaminant Nature and Extent in OU2

The human health and ecological risk assessments identified PCBs as the primary contaminants of concern (COCs) for UOP OU2. Mercury, methylmercury, and chromium were also detected in UOP OU2 and contribute to the unacceptable ecological risk (please refer to Section 7.2); however, these contaminants are co-located with the PCBs, so actions to address PCBs will also address other contaminants present in OU2. The distribution of COCs in OU2 media is characterized in the RI Report. The median surface sediment concentrations of COCs are summarized in Table 1.

PCBs are manmade chemicals that were banned in the late 1970s. PCBs consist of 209 congeners that can be subdivided into different sub-groups, based on the amount of chlorine in each congener. Each PCB congener has a unique structure that contributes to its characteristics and toxicity to various receptor populations (e.g., children, adults, etc.). Some of the congeners are referred to as dioxin-like PCBs, because they have chemical structures, physico-chemical properties and toxic responses similar to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Some commercial PCB mixtures are known in the United States by an industrial trade name "Aroclor." Because they do not burn easily and are good insulating materials, PCBs were widely used as coolants and oils, and in the manufacture of paints, caulking and building material.

PCBs stay in the environment for a long time and bioaccumulate in fish and crab. In birds and mammals, PCBs can cause adverse effects such as anemia and injuries to the liver, stomach, and thyroid gland. PCBs are classified as probable human carcinogens, and exposure can have different types of effects on the impacted individuals. Children exposed to PCBs may develop learning and behavioral problems later in life. Further, PCBs are known to impact the immune system and may cause cancer in people who have been exposed to them over a long period of time. PCBs also can cause problems with the immune system, behavioral problems, and impaired reproduction.

5.3.1. Sediment

The distribution of COCs in OU2 sediment reflects contributions from historical sources in the surrounding watershed, the hydrodynamic mechanisms that control water flow (both tidal and storm event-driven) and sediment transport within the OU2 waterways, the interactions of the OU2 waterways with Berry's Creek, and the chemical characteristics of the COCs, most notably their strong association with the suspended solids and particulate organic carbon (POC) in the system (the POC is derived primarily from the marshes). More simply put, the COCs are most likely to be bound to the high organic-content particulate material (such as marsh detritus and fine-grained sediment) and transported along with the suspended solids in the water column.

While the chemical characteristics of the COCs have not changed since their introduction into the waterways of OU2, the hydrodynamics which control their transport have been modified. The morphology of Ackermans Creek and the northwest corner of OU2 has been altered since industrial activities began at OU1 and the surrounding areas in the late 19th century. The Ackermans Creek main channel was straightened in 1960, and the NTCRA was conducted at the former lagoon area in 2012. Modeling of hydrodynamic conditions and sediment transport have focused on the period between 1960 and 2012, thereby establishing a baseline to facilitate understanding of hydrodynamic changes (and therefore contaminant distribution changes) observed in post-2012 studies.

Generally, once sources of contaminants affecting a waterbody have been controlled, various natural processes occur that may allow the waterbody to recover. As indicated in Section 2, multiple actions have been taken by the NJDEP and EPA to control or eliminate historical contaminant sources to the OU2 waterways. The most recent of these was the NTCRA, which was implemented in the former lagoon area. Prior to implementation of the NTCRA, COC concentrations were generally highest on the west side of OU2 and decreased across the Site to the east.

The surface sediment concentrations (top six inches) of Total PCBs[3] and mercury detected in the OU2 waterways were significantly greater than surface sediment concentrations in the Mill Creek (a reference area for OU2) data set. The detected concentrations in the surficial sediments within the OU2 marsh areas were consistently lower than in the waterways, but still greater than the corresponding reference area values.

Surface sediment COC concentrations measured in the waterways in 2013, immediately following implementation of the NTCRA, were significantly less than those detected prior to the action, since a significant volume of comparatively highly contaminated sediment was removed from OU2 and disposed of off-site. The post-NTCRA dataset showed a more gradual concentration trend from west to east (Figure 5). Conversely, COC concentrations measured in a subsequent sampling event in 2015 were higher than those measured in 2013, a sign that the former lagoon area had been re-contaminated. Evaluation of PCB congener composition and mercury-to-chromium ratios in the 2015 samples revealed that the recently-deposited material originated in Berry's Creek and East Ackermans Creek. Tidal transport of contaminated solids from Berry's Creek appears to have re-contaminated the surface sediment in the NTCRA area.

Plots of sediment concentration with depth for Total PCBs, mercury, and chromium in the waterways (Figures 6 through 8) illustrate that the greatest constituent concentrations are typically within the top two feet of sediment. Neither Total PCBs nor mercury were detected at concentrations above 1 milligram per kilogram (mg/kg) at depths greater than two feet, and chromium was not detected above 100 mg/kg at depths greater than two feet. Within the waterways, methylmercury was typically detected at the greatest concentrations in the top one foot of sediment. Below that depth, methylmercury was either not detected, or detected at notably lesser concentrations than those observed in the uppermost sampling intervals. The greatest individual concentrations of PCBs, mercury, and chromium are observed in samples collected from the waterways.

Marsh sediments within OU2 are characterized by the same general contaminant distributions as waterway sediments, with the greatest constituent concentrations typically observed in the top two feet of sediment (Figures 9 and 10).

Contamination near the sediment surface is a concern because it is within the BAZ and is therefore more available for uptake by biota than more deeply-buried contamination. The COC concentrations in the sediments near and at the surface of the waterways are the product of a variety of mechanisms, including ongoing deposition to the sediment bed and episodic redistribution of shallow sediment in localized areas from within the greater regional area during large storm events. COC concentrations in marsh near-surface sediment reflect movement of COCs that are bound to particles from the waterways into the marshes. Continuing deposition of COC-contaminated particles from the waterways results in slower recovery rates in the marshes than might otherwise be observed.

5.3.2. Surface Water

The majority of the COCs identified in OU2 strongly adsorb to the particulate matter suspended in surface water. Suspended particulates in surface water have high organic content resulting from *Phragmites* detritus originating in the surrounding marshes, as well as organic material present in the water column introduced through tidal exchange with Berry's Creek. The particulates routinely settle onto, interact with, and re-suspend from the surface of the waterway sediment bed because of fluctuations in tidal velocities. These processes support the presence of a thin (~0.2 inch) layer of unconsolidated, high organic content material on the surface of the sediment bed in the waterways. This easily re-suspended layer is commonly referred to as the "fluff layer." The presence of a fluff layer is typical in estuarine systems. Although the fluff layer contains substantially more solids particles than the water column above it, the fluff layer behaves more like the surface water than the surficial soft sediments. Interaction of the fluff layer with the surface of the waterway sediment bed is an important mechanism for COCs to be transported from waterway sediments to surface water and, in turn, for COCs to be taken up by organisms and transported elsewhere, where they can accumulate in the tissues of biota. The suspended particulate matter and associated COCs are transported into the marshes during high tides, where a portion of the particulates are deposited and retained on the marsh surface and contribute to marsh surface sediment COC concentrations.

5.4. Biological Uptake of COCs

PCBs, mercury, methylmercury, and chromium have been detected in biota collected from UOP OU2 waterways and marshes (Table 2).

The food web in OU2 is primarily detritus-based. This means that detritus, which predominantly originates from decaying *Phragmites* leaves and stems, serves as the primary source of energy to biota within the system. Because the detritus is composed almost entirely of organic matter, the COCs readily adsorb to it from the surface sediments.

Shrimp, blue crab, and other organisms feeding on detritus and other organic matter provide the dietary link between the detritus and fish and other consumers. Thus, COC concentrations in the detritus entering the food web are linked to the COC concentrations at the surface of the waterway sediment bed. In marshes, exposure to COCs is limited primarily to the detrital layer on the marsh surface, where most of the biological activity is concentrated. Marsh invertebrates and other organisms feeding on or in the detrital layer can be exposed to COCs, and COCs have been detected in invertebrates collected from OU2 marshes. Overall, the COC concentrations in marsh detritus and the waterway near-surface sediment are reflected in the COC concentrations in the fauna.

Bioavailability (i.e., how readily COCs can be taken up into the tissue of organisms) is controlled by many factors in the OU2 system. The bioavailability of primary COCs is largely controlled by partitioning to organic matter, complexation with sulfides, as well as the burial of COCs by cleaner sediment.

6. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

6.1. Land Use

UOP OU2 consists of waterways and marshes that are mostly inaccessible due to their physical nature. The wetland vegetation is very dense and cannot be easily traversed without the aid of brush-cutting tools. Additionally, OU2 cannot be accessed by boat from the eastern side of Murray Hill Parkway, and conditions are not conducive to recreational activities. Access to the center of the wetlands is also hindered by deep water and strong tidal currents in the main channel of Ackermans Creek at high tide and deep mud in the side channels at low tide. The water is only deep enough for swimming for a short time at high tide, and the mud is too deep for wading. Edible-size fish are occasionally present in the waterways west of Murray Hill Parkway, however, fishing has not been observed. Access to Ackermans South is difficult due to the adjacent active rail line and the dense vegetation present within the wetlands. Consistent with the rest of OU2, brush-cutting tools would be needed to enter and move through the wetlands. The stream that runs through the Ackermans South area is dry except at high tide; therefore, it does not provide a permanent habitat for fish.

UOP is located in an urban area, with the adjacent properties occupied by industrial and commercial/retail uses. The portion of UOP OU1 located directly west of OU2 is occupied by a commercial shopping center that is accessed via Route 17. UOP OU2 is isolated from the surrounding properties by an active rail line which is managed by New Jersey Transit, and various tidal ditches and wetlands. Route 17, bordering UOP to the west, provides a distinct separation between the predominantly industrial/commercial properties closer to OU2 and the Berry's Creek tidal areas farther to the east, and the predominantly residential properties of the communities of East Rutherford, Wood-Ridge, and Rutherford, New Jersey on the west side of Route 17. A ridge parallels Route 17 and, as a result, these residential areas are at a higher elevation than the adjacent industrial/commercial areas. Other notable current land uses in the vicinity of UOP and BCSA include:

- New Jersey Meadowlands: A major component of the history of the area is the New Jersey Meadowlands (the Meadowlands), also known as the Hackensack Meadowlands. The Meadowlands is comprised of approximately 13 square miles of open undeveloped land in addition to vast areas that have been developed but were once part of the wetlands. The Meadowlands was administered by the New Jersey Meadowlands Commission (NJMC), a state agency formed to protect the balance of nature, provide for orderly development, and manage solid waste activities in the Meadowlands until 2015, when the NJMC was merged into the NJSEA.
- NJSEA: The NJSEA is a state-authorized entity that, in addition to having assumed the NJMC's responsibilities, oversees the development and operation of numerous sports, convention, and entertainment venues. Some of these venues include MetLife Stadium, the Meadowlands Arena, and the Meadowlands Racetrack. Portions of the complex were redeveloped in 2009, including construction of a new rail crossing south of Paterson Plank Road at the north end of Walden Swamp and Ackermans Marsh, and construction of a new stadium and shopping/entertainment complex (currently known as American Dream Meadowlands).

6.2. Future Potential Land Use

Future potential land use in OU2 will likely be similar to current land use. In the upland area surrounding the tidal zone of the OU2 and Berry's Creek areas, most of the land is zoned non-residential, with residential development concentrated above the 100-year flood zone. The upland is currently more than 90 percent developed; however, further development of UOP OU1 east of the Pascack Valley Line could potentially take place. The most substantial ongoing development/redevelopment projects in the vicinity are the American Dream Meadowlands project and the Kingsland Redevelopment Plan to facilitate closure and redevelopment of former landfill areas.

6.3. Groundwater Use

UOP OU2 overlies the glacial Lake Passaic formation. This formation is over 100 feet thick in much of the area and has a low hydraulic conductivity ($\sim 10^{-7}$ cm/year). The relatively thin surface fill layer (0 to 20 feet) is not a potable water source due to its high salinity, being in contact with brackish water. The shallow groundwater above the Lake Passaic clay layer at the UOP Site has been reclassified by the NJDEP as a Class IIIB aquifer, which is not suitable for potable use due to salinity from the tidal exchange.

7. SUMMARY OF SITE RISKS

A Baseline Human Health Risk Assessment (BHHRA) and a Baseline Ecological Risk Assessment (BERA) were conducted for UOP OU2 to estimate current and future effects of contaminants on human and ecological health. Typically, a BHHRA and a BERA analyze the potential for adverse human and ecological health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate the hazardous substances under current and future land uses. They provide the basis for taking an action and identify the contaminants and exposure pathways that need to be addressed by the remedial action. The BHHRA and BERA summarized in the following sections incorporate new data collected since the NTCRA. The BHHRA is a revised BHHRA that updates the findings of a BHHRA completed in 2012, to reflect current site conditions.

The final revised Baseline Human Health Risk Assessment, Operable Unit 2, dated August 2018, and the final Baseline Ecological Risk Assessment, dated November 2018, are available in the Administrative Record for UOP OU2.

7.1. Summary of the Baseline Human Health Risk Assessment

The revised BHHRA addresses chemical concentrations remaining in the channels associated with the waterways west of Murray Hill Parkway and the Ackermans South Area. The waterways east of Murray Hill Parkway, initially included in OU2, were evaluated in the BCSA BHHRA and will be remediated under the interim action for BCSA; however, because they were previously included in UOP OU2, they were discussed in the revised BHHRA (but the conclusions of the UOP OU2 BHHRA were not affected). Consistent with Superfund policy and guidance, the revised BHHRA assumed no remediation had been undertaken to mitigate or remove hazardous substance releases and no institutional controls.

A four-step process is utilized for assessing site-related human health risks for actual and/or plausible exposure scenarios, as follows:

Hazard Identification (termed Data Evaluation in the BHHRA): uses analytical data collected at the site to identify contaminants of potential concern (COPCs) for each sampled medium (e.g., sediment, surface water, and fish tissue) based on such factors as toxicity, concentration, and other considerations noted below.

Exposure Assessment: estimates the magnitude of actual and/or plausible human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated sediment) by which humans are potentially exposed. Using these exposure considerations, reasonable maximum exposure (RME), which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated for each human receptor.

Toxicity Assessment: determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of effect (response).

Risk Characterization: summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. It also identifies contaminants with concentrations that exceed acceptable levels, defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as an excess lifetime cancer risk greater than 1×10^{-6} to 1×10^{-4} or a Hazard Index (HI) greater than 1; contaminants at these concentrations are considered COCs and are typically those that require remedial action at the site. Also included in this section is a discussion of the uncertainties associated with the estimated risks.

Key components of the BHHRA are presented in Appendix 2, Tables 3 to 8.

7.1.1. Hazard Identification

In this step, analytical data collected at OU2 between 2006 and 2015 (during the RI and the NTCRA) and selected analytical data collected by the BCSA Potentially Responsible Party Group between 2009 and 2013, were used to identify COPCs in sediment, surface water, and fish tissue. COPC selection was based on factors such as toxicity, concentration, frequency of occurrence, and fate and transport in the environment, including mobility, persistence, and bioaccumulation potential. The COPCs associated with sediment, surface water, fish tissue, and human health are summarized below.

Location	Media	COPC
Ackermans Creek Main Channel and tributaries	Sediment	Inorganic compounds Pesticides Semi-Volatile Organic Compounds Total PCBs[a]
	Surface Water	Inorganic compounds Pesticides Semi-Volatile Organic Compounds Total PCBs[b] Volatile Organic Compounds
Ackermans South	Sediment	Inorganic compounds Semi-Volatile Organic Compounds Total PCBs[a]
	White Perch	Total PCBs[a,c]

a. Based on PCB congeners
b. Based on PCB Aroclors
c. The TCDD Toxic Equivalency (TEQ; consists of PCBs that have dioxin-like toxicity) also poses unacceptable risk

The complete COPC selection and exposure point concentration (EPC) derivation processes can be found in the Risk Assessment Guidance for Superfund (RAGS) Part D Table 2 series and Table 3 series, respectively, in Appendix A of the August 2018 revised BHHRA.[3]

As discussed below, PCBs were found to pose the greatest hazard to human health and were determined to be COCs for UOP OU2. A summary of the analytical data for these COCs in each environmental medium of concern and the selected EPCs used to evaluate exposure to them are provided in Table 3.

7.1.2. Exposure Assessment

In this step, the different exposure scenarios and pathways through which people might be exposed to the COPCs identified in the previous step were evaluated.

Cancer risks and non-cancer HIs were calculated based on an estimate of the RME expected to occur under current and future conditions at the site for each human receptor. As noted previously, the RME is defined as the highest exposure that is reasonably expected to occur at a site.

The exposure assessment identified potential human receptors based on a review of current and reasonably foreseeable future land use at the Site. The UOP Site is located in an urban area with light industrial and commercial/retail operations on adjacent properties. It is isolated from the surrounding properties by an active rail line and various tidal ditches and wetlands. The area near the active rail line is patrolled by New Jersey Transit.

The OU2 waterways are mostly inaccessible due to their physical nature; wetland vegetation is very dense and cannot be traversed easily without the use of brush-cutting tools. There is limited exposure potential to sediment due to the thick detrital layer and root system of the vegetation.

[3] While discussed collectively as "PCBs", PCB congeners were analyzed in sediment and white perch tissue and PCB Aroclors were analyzed in surface water. Both are reflective of "Total" PCB concentrations and are referred to as such. PCB Congeners that exhibit dioxin-like toxicity were evaluated separately as TCDD TEQ in accordance with EPA guidance.

Access into the center of the wetlands is also hindered by deep water and strong tidal currents in the main channel of Ackermans Creek at high tide, and deep mud (approximately 2.5 to 3 feet) in the side channels at low tide. The water is only deep enough for swimming for a short time at high tide, and the mud is too deep for wading. Therefore, site conditions are not conducive to swimming or wading.

Edible-size fish are occasionally present in the OU2 waterways; however, fishing has not been observed and is not expected to occur onsite due to the difficulty in accessing the site. Additionally, the wetlands west of Murray Hill Parkway cannot be accessed by boat from the eastern side because Ackermans Creek passes through a culvert under Murray Hill Parkway. Based on field observations, the predominant nongame fish species in the area is mummichog, while the predominant game fish species present in the area is white perch.

Access to Ackermans South is difficult due to the adjacent active rail line and the dense vegetation present within the wetlands. As with the waterways, brush-cutting tools would likely be needed to enter and move through the wetlands. The stream that runs through the Ackermans South Area is dry except at high tide; therefore, it does not provide a permanent habitat for fish. Overall, the Ackermans South Area is unlikely to be an attractive destination for potential trespassers.

Based on current and future land uses the following potential human receptors and exposure scenarios were evaluated quantitatively in the revised BHHRA:

- Current/potential future trespassers, including an older child (6 to 18 years old) and adult trespassers potentially exposed to sediment (0-6 inches) via ingestion and dermal contact and to surface water via dermal contact in the OU2 waterways.
- Current/potential future fish consumers, including younger children (0 to 6 years old), older children, and adults assumed to consume white perch caught on-site. Consumption of crab was not evaluated because edible-size blue crabs were not observed at UOP OU2 during the long-term monitoring sampling events.
- Current/potential future trespassers, including an older child (6 to 18 years old) and adult trespassers potentially exposed to sediment (0 to 6 inches) in Ackermans South via ingestion and dermal contact.

Potential exposure routes varied by receptor and included incidental ingestion of and dermal contact with sediment, incidental ingestion of and dermal contact with surface water, and ingestion of fish (white perch). Table 4 presents the exposure pathways considered in the revised BHHRA, and the rationale for the selection or exclusion of each pathway.

The potential for exposure of kayakers to sediment and surface water in the eastern stream channels and consumers of blue crab were quantitatively evaluated in the 2012 BHHRA, however, these receptors were not evaluated in the revised BHHRA because the exposure pathways were deemed incomplete. For kayakers, access to the western stream channels by kayak is not possible because Murray Hill Parkway separates the eastern and western stream channels and it would be difficult to portage watercraft across Murray Hill Parkway due to the presence of soft sediments, dense vegetation, a guardrail, and vehicle traffic. For crab consumers, no edible-size blue crabs were observed during the long-term monitoring sampling events.

The conceptual site exposure model and the specific exposure parameter values for each receptor can be found in the RAGS Part D Table 1 and the Table 4 series, respectively, in Appendix A of the August 2018 revised BHHRA.

7.1.3. Toxicity Assessment

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

Under current EPA guidelines, the likelihood of carcinogenic risks and non-cancer hazards due to exposure to site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the site-related chemicals would be additive. Thus, cancer risks and non-cancer hazards associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Toxicity data for the revised BHHRA were provided by EPA's Integrated Risk Information System (IRIS) database, EPA's Provisional Peer Reviewed Toxicity Database (PPRTV), or other sources that are identified as an appropriate reference for toxicity values consistent with EPA's directive on toxicity values. Non-cancer and cancer toxicity information can be found in Tables 5 and 6, respectively. The complete toxicity value information set can be found in the RAGS Part D Tables 5 and 6, respectively, in Appendix A of the August 2018 revised BHHRA.

7.1.4. Risk Characterization

This step summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks and hazards. Exposures were evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risks for oral and dermal exposures are calculated from the following equation, while the equation for inhalation exposures uses the IUR[4], rather than the SF:

Risk = LADD x SF

Where: Risk = a unitless probability of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

The likelihood of an individual developing cancer is expressed as a probability that is usually expressed in scientific notation (such as 1 x 10^{-4}). For example, a 1 x 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk," or one additional cancer may be seen in a population of

[4] Note that the inhalation pathway was not of concern in this HHRA such that cancer risks and non-cancer hazards were not quantified.

10,000 people as a result of exposure to site contaminants under the conditions described in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk), with 10^{-6} being the point of departure.

For non-cancer health effects, a HI is calculated. The HI is determined based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (i.e., reference doses and inhalation reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the HQs for all COPCs within a particular medium that impacts a particular receptor population.

The HQ for oral and dermal exposures is calculated as shown below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

HQ = Intake/RfD

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD represent the same exposure period (*i.e.*, chronic, sub-chronic, or acute).

The key concept for a non-cancer HI is that a "threshold level" (measured as an HI of less than 1.0) exists below which non-cancer health effects are not expected to occur.

The HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific receptor population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1.0, separate HI values are then calculated for those chemicals which are known to act on the same target organ or system. These discrete HI values are then compared to the acceptable level of 1.0 to evaluate the potential for non-cancer health effects on a specific target organ or system. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

As shown in Table 8, there were no cancer risks above $1x10^{-4}$ identified as a result of exposure to site contamination; however, as shown in Table 7, the potential exists for non-cancer hazards from exposure to Total PCBs[5] for the following receptors and exposure pathways:

- Potential hazards to adults and older children from exposure to sediment in the OU2 (HIs = 2 for immune system, dermal, and ocular effects for both receptor groups);
- Potential hazards to young children, older children, and adults from the consumption of white perch (HIs = 9 to 18 for immune system, dermal, and ocular effects, 3 to 6 for

[5] Total PCBs based on the sum of all PCB Congeners detected during the RI/FS investigation.

reproductive, developmental, and endocrine effects, depending on the receptor group).

There were no cancer risks or non-cancer hazards above the EPA risk thresholds for exposure to sediment in the Ackermans South Area.

The complete set of RME exposure calculations and the associated risk/hazard estimates can be found in the RAGS Part D Table 7 and Table 9 series (which presents non-cancer hazards by target organs/systems), and a summary of the unacceptable non-cancer hazards can be found in the RAGS Part D Table 10 series, in Appendix A of the August 2018 revised BHHRA.[6]

7.1.4.1. Uncertainty in the Risk Assessment

The process of evaluating human health cancer risks and non-cancer health hazards involves multiple steps. Inherent in each step of the process are uncertainties that ultimately affect the final risks and hazards. Important site-specific sources of uncertainty are identified for each of the steps in the four-step risk assessment process below.

7.1.4.1.1. Uncertainties in Hazard Identification

Uncertainty is always involved in the estimation of chemical concentrations. Examples of such uncertainties include the following:

- Potential errors in the analytical data stemming from errors inherent in sampling and/or laboratory procedures.
- Environmental sample variability and the potential that the analytical datasets might not accurately represent reasonable maximum concentrations.
- The representativeness of the analytical data for white perch collected at the UOP Site, given their high mobility in the environment.
- The lack of surface water samples and the limited number of sediment samples from the Ackermans South Area. The channel that runs through the area is small and dry except at high tide; however, because only nine sediment samples were collected, the estimated risks and hazards may not represent potential exposures throughout the entire area.

7.1.4.1.2. Uncertainties in Exposure Assessment

There are two major areas of uncertainty associated with exposure parameter estimation. The first relates to the estimation of EPCs while the second relates to parameter values used to estimate chemical intake (*e.g.*, ingestion rate, exposure frequency). Examples of such uncertainties include the following:

- Some of the exposure factors, whether recommended by EPA or based on professional judgment, are upper-bound assumptions such that the resulting cancer risks and non-cancer hazards likely overestimate actual risks and hazards; however, RME risks and hazards were quantified consistent with EPA risk assessment guidance.
- While consumption of white perch collected at the UOP Site poses potential hazards to human health, few edible size fish of any species have been observed at the Site and the largest white perch caught at the site during the sampling event was only 10.2

[6] Note that RAGS Part D Table 8 was not required for this BHHRA.

centimeters (*i.e.*, about 4 inches).

7.1.4.1.3. Uncertainties in Toxicity Assessment

A potentially large source of uncertainty is inherent in the derivation of the EPA toxicity values (*i.e.*, RfDs and SFs). Examples of such uncertainties include:

- Site-specific risk-based screening levels were developed based on lowered target risk levels ($1x10^{-6}$ for cancer risk and HQ = 0.1 for non-cancer hazard). These more conservative screening levels may have resulted in more contaminants being identified as COPCs for evaluation in the revised BHHRA.
- Uncertainty factors ranging between 1 and 3,000 were applied by EPA in deriving RfDs by extrapolating doses from animal studies to humans. Therefore, while protective, the RfDs may overestimate overall toxicity.
- PCBs can be analyzed and evaluated as individual PCB congeners (and summed into Total PCBs) or as Aroclor mixtures (and summed into Total Aroclors). Analysis of Aroclor mixtures does not quantify all 209 PCB congeners and, thus, Total PCB exposure estimates based on Aroclors may underestimate cancer risks and non-cancer hazards. In the revised BHHRA, Total PCB congeners were analyzed in sediment and fish were evaluated and Total PCB Aroclors were analyzed in surface water such that risks/hazards may be only slightly underestimated.
- RfDs were not available for one pesticide, six carcinogenic PAHs, and thallium, which likely leads to an underestimation of non-cancer hazards, the extent of which cannot be determined.

7.1.4.1.4. Uncertainties in Risk Characterization

When all of the uncertainties from each of the previous three steps are added, uncertainties are compounded. While some of the uncertainties may result in an underestimation of risk, the overall risk assessment likely overestimates potential cancer risks and non-cancer hazards because access to sediment and surface water in the waterways is difficult and edible-size fish were not collected.

7.2. Summary of the Baseline Ecological Risk Assessment

The BERA evaluated the potential for adverse effects to ecological receptors from exposure to contaminants within OU2. The BERA was conducted in accordance with EPA's 1997 Ecological Risk Assessment Guidance for Superfund and its updates. The following summary is organized around the four principal components:

Problem Formulation: establishes the goals, scope and focus of the BERA and clarifies what is known about potential ecological resources and potential adverse effects to those resources at the site. This section summarizes the OU2 CSM, focusing on the nexus of contaminant exposure pathways and exposures by ecological receptors, and reviews available site-specific data relevant to estimating ecological exposures. Finally, assessment endpoints are established for all ecological receptor groups for which complete exposure pathways exist.

Exposure Assessment: results in exposure profiles that quantify the spatial and temporal patterns, as well as the magnitude of exposure, for contaminants of potential ecological concern (COPECs) as they relate to the assessment endpoints.

Effects Assessment: summarizes available toxicity and other effects information relevant to evaluating COPEC exposures and estimates the potential for ecological receptors to be adversely affected.

Risk Characterization: summarizes and combines outputs of the exposure and effects assessments to provide a quantitative assessment of site-related risks. Also included in this section is a discussion of the uncertainties associated with the estimated risks.

Key components of the BERA are presented in Appendix 2, Tables 9 to 14.

7.2.1. Problem Formulation

A conceptual ecological exposure model was developed that identified potential linkages between potential contaminant sources, transport pathways, exposure media (including sediment, surface water, and biological tissue), exposure routes, and ecological receptors. The principal exposure routes include direct contact with contaminated surface sediment and surface water, ingestion of prey that have accumulated contaminants, and incidental ingestion of sediment during feeding or preening activities.

Consistent with EPA guidance, the BERA identified ecological components that became the focus of the analysis and which were selected with consideration of ecological relevance, relative contaminant susceptibility, and relevance to management goals. For each endpoint, the potential effects of OU2 contaminant exposure on survival, growth, and reproduction effects were evaluated. Selected assessment endpoint components for waterways and marsh habitat are summarized in Tables 9 and 10, respectively. Along with the community level endpoints (e.g., fish and water column biota, benthic and marsh invertebrates), specific representative wildlife species included the following:

- Waterway receptors – fish-feeding bird (great blue heron), invertebrate-feeding bird (spotted sandpiper), omnivorous mammal (raccoon); and
- Marsh receptors – invertebrate-feeding bird (red-winged blackbird, marsh wren).

In addition, the muskrat was selected to evaluate plant-feeding mammal exposures in both waterways and marsh habitat.

7.2.2. Exposure Assessment

Direct exposure, or the exposure of lower-trophic-level organisms (such as benthic invertebrates) to COPECs in surface water and sediment by direct contact, and tissue-based exposures by organisms (*e.g.*, invertebrates, fish) which have bioaccumulated contaminants, were considered in the BERA. For wildlife receptor groups, the risk associated with exposure through the food web (along with the incidental ingestion of sediment during foraging activities) was evaluated.

RI surface sediment and surface water data were used to estimate EPCs to evaluate direct contact exposures for the community endpoints. Tissue-based exposures were estimated using COPEC concentrations measured in whole-body epibenthic invertebrates (blue crab and grass shrimp) and fish (mummichog and white perch) collected from OU2 waterways habitat and a reference site (Mill Creek).

Exposures to wildlife endpoints were estimated using dietary intake modeling used to estimate the total daily dose from both the consumption of contaminated prey and incidental sediment ingestion exposure pathways. Receptor-specific model parameters (including body weight, ingestion rate, and dietary composition) were estimated using literature information. Available site-specific biota data were used to estimate prey concentrations; however, this information was supplemented using bioaccumulation models where site tissue data were not available for specific COPECs or specific biota (prey) types. The BERA calculated risks for wildlife receptors with large foraging ranges (*i.e.*, great blue heron and raccoon) using two scenarios: (i) assuming that foraging is limited to OU2 and (ii) assuming that OU2 exposure is only a fraction of the receptor's typical foraging range.

7.2.3. Effects Assessment

Two categories of measurement endpoints were used in the BERA: literature-derived effects data and site-specific sediment toxicity tests. Tables 9 and 10 summarize the specific measures of effect for each assessment endpoint in waterway and marsh habitat, respectively.

Literature-derived effects data included media-based, tissue-based and dietary dose effect data. Media-based effect data included water quality criteria (WQC) and sediment quality guidelines (SQG) obtained preferentially from NJDEP and in the case of sediment, supplemented with other standard benchmarks compiled by the National Oceanic and Atmospheric Administration (NOAA). In addition, the molar ratios of acid volatile sulfide and simultaneously extracted divalent metal concentrations (AVS/SEM) were compared to the threshold level recommended by EPA.

Tissue-based effect data for epibenthic invertebrates were identified for mercury and PCBs and were obtained from the Environmental Residue Effects Database (ERED). In addition, the same literature-derived fish tissue residue effects data for methylmercury and total PCBs that were evaluated in the BCSA BERA, were compared to available fish tissue concentration data.

Dietary dose effect data for wildlife consisted of no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL) toxicity reference values (TRVs) derived from toxicity studies reported in the literature. In addition, a toxicological threshold for mercury in the eggs of fish-feeding birds (great blue heron) was established. Finally, available avian dose-response data were used to establish effective dose thresholds (ED10 and ED20; doses predicted to result in a 10 or 20 percent effect in exposed organisms) for mercury and Total PCBs.

Whole sediment laboratory bioassays (28-day exposures using the amphipod *Hyalella azteca*) were conducted to evaluate the potential for effects on survival and growth of benthic invertebrates exposed to OU2 sediment. Bioassay results were statistically compared to laboratory negative controls and to Mill Creek reference results, and scatterplots and correlation coefficients were developed for each COPEC and bioassay endpoint to explore potential concentration-response relationships. Bioassay results were also compared to BCSA bioassays.

7.2.4. Risk Characterization

Risk characterization consists of two primary components: risk estimation and risk description. Risk uncertainties are also discussed, and risk conclusions summarized. Risks for sediment, tissue, and surface water media are summarized in Tables 11 through 13, respectively; wildlife risk estimates are summarized and compared in Table 14.

Risk estimation consists of the integration of available data to define a final estimate of adverse effects for each line of evidence (LOE). For LOEs based on comparisons of calculated exposures to literature-based TRVs, a HQ approach was used. An HQ greater than 1 indicates that exposure is greater than the toxicological benchmark. An HQ greater than 1 calculated using a LOAEL-based TRV is typically interpreted as indicating a greater potential for risk than HQs that use a NOAEL-based TRV. Risk results were categorized based on type (NOAEL vs LOAEL, ED10 vs ED20) and magnitude of the HQs. Categories include "de minimis", "low", "moderate" and "high". For non-HQ LOEs, such as benthic laboratory toxicity, results were categorized based on the strength of the individual COPEC concentration response relationships and comparison to reference sites. Risk estimates were deemed to be "moderate or high" where the association between COPEC concentration and biological response was considered strong and site conditions were different from the reference sites. While a finding of de minimis risk is unlikely to be associated with significant population- or community-level impacts that would require remedial consideration, the other categories are presumed to potentially be associated with unacceptable effects on the particular receptor endpoint.

Risk conclusions for each ecological risk category are discussed in Section 7.2.6.

7.2.5. Uncertainties

Uncertainties are inherent in the ecological risk assessment process and an understanding of their potential effects on the conclusions is necessary to make informed remedial decisions. The following summarizes the key uncertainties associated with the BERA.

COPECs evaluated in the BERA were selected based on benchmark screening, evaluation of the results of previous wildlife modeling, and consideration of regional contaminant levels. As a result, the potential risks associated with ecological exposures to chemicals detected in OU2 sediments such as PAHs, bis-2-ethylhexyl phthalate, and dioxins/furans were not estimated and cumulative risks may have been underestimated. In addition, although surface water was not determined to be a medium of ecological concern in the BERA based on surface water grab sample analyses, the potential effects of VOC-contaminated OU1 groundwater discharge on the waterways benthic invertebrate community could not be entirely ruled out because sediment pore water chemistry data were not available. This data gap will be addressed during remedial design.

It was not possible to collect sufficient site-specific tissue data to evaluate wildlife exposure pathways for the OU2 marshes, so both data from outside OU2 (*e.g.*, east of Murray Hill Parkway) and modeling approaches were used to supplement the available site data. Although the representativeness of site-specific data needs to be considered, they are generally the most appropriate for use in the risk analysis because they reflect local conditions that influence chemical availability. As a result, use of other types of information to characterize exposures in the marsh habitat introduced uncertainties into the exposure assessment. The BERA did consider uncertainties attributable to contaminant bioavailability in the wildlife food web models and quantified scenarios assuming both 100 percent and lower bioavailability estimates derived from literature studies to bound the risks associated with this uncertainty source. The BERA also acknowledged that the various exposure parameters (*e.g.*, sediment ingestion rate, prey composition, body weight) used in the wildlife modeling were uncertain and concluded that they could have resulted in risk being either over- or under-estimated in the BERA. Finally, the time that wide-ranging wildlife spend foraging at UOP OU2 was another source of uncertainty in the exposure assessment. As with the bioavailability issue, the potential impacts of this uncertainty on the risk calculations was evaluated in the BERA by estimating exposures on the basis of either complete site fidelity (Table 14) or a more realistic assumption that only a fraction of the diet of wide-ranging wildlife was derived from OU2.

Limitations in available toxicity data required extrapolation of toxicity data between laboratory test organisms and the selected assessment receptors. In addition, the interactive effects of COPECs could not be assessed and the risks estimated were either under- or over-estimated, depending on the extent of synergistic and antagonistic effects between different chemicals.

7.2.6. Conclusions

The final risk conclusion for each receptor group was based on the collective weight of evidence, including consideration of the uncertainties discussed above. For receptors with multiple LOEs, the strength of the individual LOE to support the assessment was considered. LOEs with greater associated uncertainty and/or with a less direct link to the assessment endpoint were given less weight in deriving a final risk conclusion for that receptor. LOEs that showed a clear site-specific response to COPECs and elevated risk compared to reference sites were given higher weight in the final conclusions. The risk conclusions reflect the integrated best estimate of risk along with the plausible risk range, considering uncertainty.

For OU2 waterways, it was concluded that exposures to site-related contaminants would result in only de minimis risks to the following receptors: fish and water column biota community, piscivorous birds and omnivorous mammals. Invertivorous birds such as the spotted sandpiper that feed in OU2 waterways were determined to be at high risk due to exposure to PCBs in prey and sediment incidentally consumed during foraging activities; chromium, lead, and total mercury are additional risk contributors for invertivorous birds that forage in OU2 waterways habitat. Finally, risks to the benthic invertebrate community could range from de minimis to low due to a number of uncertainties described in the BERA. Although further resolution of these uncertainties was not attempted in the BERA based on the determination of an unacceptable risk to the spotted sandpiper, risk to benthic organisms will be addressed by the proposed actions taken to protect invertivorous bird species.

Herbivorous mammals were determined to be at moderate risk primarily due to exposure to manganese in sediment incidentally ingested during foraging activities in both OU2 waterways and marsh habitat. Invertivorous birds associated with OU2 marshes were determined to be at moderate risk attributable to dietary exposures to Total PCBs and mercury. Natural recovery characterization data suggest that risks to marsh receptors may be declining over time; however, there is a higher degree of uncertainty for risk conclusions about the marsh sediments than the waterway sediments.

7.3. BASIS FOR ACTION

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment, and actual or threatened releases of pollutants or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare.

8. REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) provide a general description of what the interim source control remedial action for OU2 is intended to accomplish. In developing the RAOs, EPA considered the need for control of sources of sediment contamination and the reduction of risks to human health and the environment. The two RAOs developed for the interim source control remedial action are listed below:

- Control the sources of COCs by replacing the current BAZ in waterway soft sediment, thereby reducing exposure of human and ecological receptors to COCs in the waterways.
- Control the sources of COCs by replacing the current BAZ in waterway soft sediment, thereby reducing resuspension of COCs into the water column and transport into adjacent marshes and downstream areas.

Waterway removal areas are shown on Figure 11.

While the remedial construction will be designed for 100 percent bank-to-bank sediment removal, EPA has identified a performance metric of 95 percent removal of the surface area that is targeted by the remedial action, to allow EPA to determine when the remedial action has been successfully completed. Greater percentages of success are anticipated in the main stem waterways as compared to the narrow, shallow tributaries where implementation will be more challenging. Post-construction performance monitoring will also be conducted to characterize any residual contamination. The specifics of the monitoring program will be detailed in the remedial design.

The percentage of targeted areas addressed will be calculated by use of a digital mapping comparison of targeted areas to the areas remediated.

9. SUMMARY OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. CERCLA § 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains applicable or relevant and appropriate requirements (ARARs) under federal and state laws, unless a waiver can be justified pursuant to CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4).

Interim actions must protect human health and the environment from the threats they are addressing, be cost effective, and consistent with the final remedy. The remedial alternatives evaluated in the FS Report and presented in the Proposed Plan, except for the statutorily-required No Action Alternative, were developed to mitigate risk to human health and the environment and comply with ARARs, and are cost-effective, thus satisfying the requirements of CERCLA. As discussed below, these active alternatives include the use of treatment technologies as part of excavated materials management.

The three active alternatives evaluated for the interim remedial action focus on source control through the removal of contaminated sediment to varying depths, followed by off-site disposal of the sediment. Brief descriptions of the remedial alternatives that were evaluated are provided in Section 9.1.2. Further information regarding the alternatives is provided in the FS Report.

Alternatives involving sediment removal are anticipated to require the addition of a stabilizing agent to improve handling properties of the excavated sediment prior to transporting it for off-site disposal, based on experience gained during the NTCRA. The stabilizing material would help solidify the material so that it would comply with transportation and disposal requirements. Stabilizing agents (e.g., Portland cement) also typically reduce the mobility of the contaminants and, therefore, serve as a form of treatment.

9.1. Common Elements of Active Alternatives

The active alternatives each include bank-to-bank excavation. The area considered for the interim source control remedial action is the same for all of the active alternatives (Figure 11), so the only significant difference between the alternatives is the depth of excavation, which affects the volume of material being removed and the corresponding volume of backfill. Fixed excavation depths were used to estimate removal volumes and construction costs for comparative evaluation purposes only. The remedial design process will include sediment investigation to define the thickness of accumulated sediment overlying the clay stratum to generate more accurate removal estimates. If the clay layer is encountered at a shallower depth than the design removal depth, only the soft sediment will be removed, resulting in less excavation. Conversely, areas of soft sediment that are only slightly deeper than the target removal depth may be selected for full removal during the design process. In addition, there is some uncertainty regarding contaminant concentrations in the Ackermans South Area, due to the limited number of samples collected in this location, so additional sampling during the design would occur.

Other common elements among the active alternatives include: groundwater monitoring to fill in data gaps, implementation of the BCSA interim action (including remediation of the waterway sediment on the east side of Murray Hill Parkway) according to the BCSA ROD issued on September 25, 2018, implementation of a post-construction performance monitoring program, continuation of the NJDEP fish consumption advisories, and maintenance of the backfill in the waterway, as needed. Since contamination will remain onsite and a final remedy (including the marshes) has not been selected, Five-Year Review reports will be prepared following implementation of the interim remedy.

Additional details for each alternative are presented in Table 18.

9.1.1. Site Preparation

Site preparation work for all active alternatives would be consistent. The removal area would be surveyed to establish the current conditions, including elevations, thickness of soft sediment, and channel boundaries. Pre-design sampling and testing would be performed to delineate material regulated by the Toxic Substances Control Act (TSCA) and perform waste classification in-situ.

Additional tasks within the remedial areas include removal of the blocked culvert at the intersection of the North Channel and Murray Hill Parkway (see Section 9.1.4 below for additional details) and dewatering the excavation areas.

The establishment of land-based elements would also take place, including preparation of erosion controls, installation of storm water diversion systems, identification and delineation of material laydown areas, dewatering areas, and storage areas, and construction of temporary site roads and a waste water treatment plant (WWTP). Any permits needed for work performed entirely off-site would be secured. For work performed on-Site, CERCLA Section 121(e)(1) provides that permits are not required; the exemption does not remove the requirement to meet the substantive provisions of permitting regulations identified as ARARs. EPA, in consultation with NJDEP, will identify the substantive requirements.

9.1.2. Removal, Dewatering, and Disposal

Soft sediment removal for all active alternatives would be conducted in dewatered excavation areas using long-reach excavators. The excavators would conduct sediment removal from temporary mat roads located next to the waterway. The depth of dredging will be to the depth specified in the alternative, plus an additional 6-inch over-excavation to ensure that the design removal depth is achieved.

It is anticipated that sediments would dry sufficiently during the process used to dewater the excavation areas to facilitate removal, loading, and transport to the slack-drying area. If this is not the case, Portland cement (or equivalent) could be mixed in during the excavation process to solidify the material for transport to the sediment dewatering area.

While the sequence for excavation will be developed during the remedial design, it is anticipated that sediment removal activities will progress in a fashion to better manage re-contamination potential for excavated and backfilled areas. Specifically, sediment removal in the main waterways of Ackermans Creek, Ackermans South, and the Northern Channel would be excavated from upstream to downstream, and sediment removal in side and spur channels to the main waterways will be excavated prior to the adjacent main waterway. EPA does not anticipate that temporary marsh bank stabilization would be required, but this element will be further evaluated during design.

A removal rate of 10 to 20 cubic yards per hour (cy/hr) was assumed for cost estimating purposes. This rate corresponds to 120 cubic yards per day (cy/day) and is based on assumptions presented in the BCSA FS for removal and backfill activities in the Upper Peach Island Creek marsh and waterways. It is anticipated that removal activities would be conducted five days per week until completion without a shutdown. The remedial design will address the need to accommodate fish windows and seasonal events, if necessary. It is also anticipated that the project may need to comply with the substantive requirements of NJ Division of Fish and Wildlife regulation N.J.A.C. 7:25-6.5, which governs the lowering of water in surface water features and will govern the timing of dewatering conducted in each excavation area.

The FS assumed that sediment excavation work would be performed in the dry, and that an onsite WWTP with a capacity of approximately 300 gallons per minute (gpm) would be constructed to treat contact water and supernatant from OU2 and perform sediment dewatering activities prior to discharge to Ackermans Creek or to Berrys Creek. The anticipated components of the WWTP were informed by the system used during the NTCRA. The discharge point for the WWTP will be determined during the remedial design and will account for potential work in the BCSA.

The cost estimate presented in this ROD assumes the addition of approximately ten percent (by weight) Portland cement would be required to dewater and solidify the sediment so that it can be transported off-site; this assumption is based on previous work at the site. For disposal costs, it was assumed 65 percent of sediment removed will be characterized as TSCA-regulated and Resource Conservation and Recovery Act (RCRA) non-hazardous, with the balance classified as non-TSCA regulated and RCRA non-hazardous. The determination of waste categories was based on available site characterization data presented in the RI Report, and may be further refined during the remedial design. Waste characterization samples of the removed sediment will be collected at a frequency of one per 500 cy of material.

9.1.3. Backfill

The backfill of excavated areas is a common component of all active alternatives, with backfill placed to an elevation consistent with the existing sediment grades to minimize changes to the existing site hydrology. The specific nature of the backfill utilized will be based on current velocities. In areas of lower velocity, a layer of sand will be used as backfill. Lower velocity areas include approximately 80 percent of the NTCRA area and the tributaries. In areas where current velocities could potentially be greater, a combination of sand and armoring material (gravel-sized or larger) will be utilized. Six inches of armoring material will be placed on top of the sand layer, the thickness of which will vary based on the existing sediment elevation. More specifically, the combined thickness of the sand and armoring layers will return the sediment surface of the excavated area to an elevation consistent with the elevation of the surrounding unexcavated areas. Potential higher velocity areas include the main stem of Ackermans Creek, the approximately 20 percent of the western NTCRA area located near the twin 48-inch outfalls, and the Ackermans South main channel.

During the remedial design, the need for armoring in the main channel of Ackermans Creek and the need for additional armoring to be placed near the storm drain outfalls will be further assessed. For areas where the native clay is currently exposed and no soft sediment removal occurs, no backfill will be placed. The specifications for the backfill material with respect to grain size, composition, and other parameters (e.g., use of NJ-certified clean fill) will be determined during the remedial design. Backfill placement methodologies will also be determined during the remedial design.

9.1.4. Removal of Northern Channel Culvert beneath Murray Hill Parkway

Removal activities for each active remedial alternative would include the removal and disposal of the Northern Channel's culvert under Murray Hill Parkway and associated sediment and debris. Sediment would be treated with Portland cement prior to disposal in a properly permitted landfill. Removed sediment is expected to consist of both TSCA-regulated waste and non-TSCA/RCRA regulated waste. Road base and excavated material above the culvert would be recycled or disposed of as non-hazardous material. Once removal is complete, the road would be replaced; however, the culvert would not be replaced unless evaluations conducted during the remedial design phase indicate a flood mitigation benefit associated with leaving the culvert open. Temporary coffer dams may be required to keep the work area from flooding during high tide.

9.1.5. Groundwater Discharge Monitoring

Monitoring will be conducted during the remedial design to determine if contamination remaining in the shallow groundwater in OU1 areas is negatively impacting the surface water and sediment in OU2. If contaminants in porewater associated with discharging groundwater from OU1 areas are found to pose an unacceptable risk to the benthic invertebrate community, further investigations and an appropriate response action will be determined in the future.

9.1.6. Confirmation Sampling and Surveys

Confirmation sampling and surveys are a common component of all active alternatives. High-resolution topographic surveys and construction quality control checks, e.g., cores advanced through the backfill to measure thickness, will confirm that backfill was placed to the proper elevation and will maintain pre-removal hydrology.

Confirmation sampling of the post-construction surface will be conducted to characterize sediments left in place. The extent, magnitude, and details of the confirmation sampling will be defined during the remedial design.

9.1.7. Institutional Controls

All active remedial alternatives would include Institutional Controls (ICs) to limit activities within the remedial area. ICs for OU2 could include:

- Continuing the existing New Jersey fish and crab consumption advisories;
- Maintaining signage around the Site periphery to prevent exposure of local residents;
- Restricting certain construction activities to preserve the post-remediation backfill surface, if necessary, including by establishing a deed notice, or for areas for which no deed exists, an equivalent notice, pursuant to NJDEP requirements.

Specific ICs will be presented in the remedial design, if necessary.

Since the remedial action described in this ROD is an interim remedial action, ICs would need to be maintained until such time that human health risks are deemed to be at or below acceptable levels. Considering the urbanized area and regional background conditions associated with the Hackensack River and Newark Bay Complex, fish consumption ICs are anticipated to be a long-term feature of the UOP remedial actions.

9.1.8. Post-Remediation Monitoring and Maintenance

All active remedial alternatives would be monitored and maintained. Monitoring of the remedial alternatives would start during construction, with the requirements for monitoring developed during the remedial design. Because this remedial action is an interim action, monitoring would continue after remedy implementation until a final decision is made. It is assumed that the monitoring associated with the interim action will include three sampling events over a five-year period.

A key goal of the monitoring program would be to evaluate whether the source control measures have effectively reduced/eliminated COC migration into the surrounding marshes and downstream waterways. Remedy performance monitoring would be conducted post-remediation, starting after remedial construction is complete. The scope of this monitoring would be described in a Performance Measures Monitoring Plan (PMMP) that would be developed as part of the remedial design.

In addition to post-remediation monitoring, maintenance would be conducted as necessary to ensure the effectiveness of the remedy. Maintenance could include, for example, replenishment of backfill in an area should an unanticipated significant disturbance occur, or the addition of supplemental cover materials if necessary based on the performance monitoring results.

9.2. Remedial Alternatives

In the description of alternatives that follow, all removal and backfill volumes contain, as applicable, allowances for over-dredging and over-excavation, material loss, and volume uncertainty contingency. All reported cost estimates include direct and indirect capital costs, direct and indirect operations and maintenance (O&M) costs (including performance monitoring), and contingency. The costs are presented as present value, discounted by the 7% discount factor specified in EPA guidance. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

The following sections describe four waterway alternatives, including the “No Action” alternative as required by law.

9.2.1. Alternative 1: No Action

The “No Action” alternative is statutorily required for analysis of alternatives. Pursuant to NCP requirements, this alternative must be carried through the entire FS process as a baseline condition against which other alternatives are compared. The no action alternative would consist of taking no specific remedial action. This alternative would not change or add to the current fish consumption advisories already in place at the Site, nor would it include monitoring of the progress of natural recovery. Thus, the “No Action” alternative would not achieve the threshold criterion of protectiveness.

Cost Summary: Alternative 1	
Capital Cost	$0
Annual O&M Cost	$0
Contingency (20%)	$0
Total Estimated Costs	$0
Construction Time	0 years

9.2.2. Alternative 2: Removal of 1-foot of Waterway Sediment + Backfill + ICs

Alternative 2 would be comprised of waterway sediment removal and management, backfill placement, groundwater monitoring during the remedial design, post-remediation performance monitoring and maintenance and ICs. This alternative would provide source control and achieve RAOs through the removal of 1 foot of contaminated waterway sediments, plus an over-excavation of approximately 6 inches. The approximate removal volumes under Alternative 2 (including over-excavation) would be:

- 9,900 cy west of Murray Hill Parkway

- 2,300 cy in Ackermans South

Material removal would be followed by placement of backfill to the existing surface sediment elevation to separate the new post-remediation BAZ from underlying sediments. Where armoring is needed, the backfill composition would be adjusted accordingly (refer to Section 9.1.3). The composition of the armoring layer would be designed to ensure sediment bed stability during a major storm event. It is estimated that approximately 10,500 cy of sand backfill and 1,540 cy of gravel armor would be needed under Alternative 2.

This source control remedial action is designed to achieve the RAOs through reduction of human and ecological exposure to COCs, while simultaneously mitigating the potential for contaminated surface sediment resuspension and transport to the surrounding marshes and downstream waterways.

Cost Summary: Alternative 2	
Capital Cost	$10,844,000
Annual O&M Cost	$1,585,000
Contingency (20%)	$2,486,000
Total Estimated Costs	$14,915,000
Construction Time	8.5 months

9.2.3. Alternative 3: Removal of 2 feet of Waterway Sediment + Backfill + ICs

Alternative 3 is characterized by the same approach and objectives as Alternative 2. Like Alternative 2, it would provide source control and achieve RAOs via removal of contaminated sediments and placement of backfill, except that Alternative 3 includes the removal of 2 feet of contaminated waterway sediment plus an over-excavation of 6 inches, which is where most of the contaminated sediment is located (based on contaminant concentration depth profiles). The approximate removal volumes under Alternative 3 (including over-excavation) would be:

- 12,500 cy west of Murray Hill Parkway
- 3,800 cy in Ackermans South

In addition, the thicker backfill layer placed in Alternative 3 would result in a greater separation distance between underlying, residual contaminated material and the BAZ. Where armoring is needed, the backfill composition would be adjusted accordingly (refer to Section 9.1.3). It is estimated that approximately 14,730 cy of sand backfill and 1,555 cy of gravel armor would be needed under Alternative 3.

Cost Summary: Alternative 3	
Capital Cost	$13,791,000
Annual O&M Cost	$1,656,000
Contingency (20%)	$3,089,000
Total Estimated Costs	$18,536,000
Construction Time	11.5 months

9.2.4. Alternative 4: Removal of All Soft Sediment + Backfill + ICs

Alternative 4 is characterized by the same approach and objectives and would provide a source control remedial action similar to Alternatives 2 and 3. Alternative 4 includes removal of all waterway sediment to the native clay layer. While the depth of this layer is approximately 3 feet on average throughout OU2, specific areas are characterized by thicker columns of soft sediment. The stream channel meander east of the NTCRA removal area and interior marsh in Ackermans West have soft sediment thicknesses which generally range from 5 to more than 7 feet, and the Northern Channel west of Murray Hill Parkway is characterized by soft sediment thicknesses ranging from 1 to 6.9 feet. The approximate removal volumes under Alternative 4 would be:

- 14,200 cy west of Murray Hill Parkway
- 4,500 cy in Ackermans South

All soft sediments would be removed under Alternative 4. It should be noted that the range in soft sediment depths results in substantial uncertainty with regard to how much sediment is actually present in these deep deposits; the removal volumes could be significantly higher than expected. In areas where the soft sediments extend to these depths, the potential need to stabilize the banks during remediation increases significantly, which would increase costs.

Backfill would be placed; however, since all contaminated sediments would be removed, no costs are included for long-term maintenance or replacement of backfill. It is estimated that approximately 14,210 cy of sand backfill and 1,865 cy of gravel armor would be needed under Alternative 4.

Alternative 4 would address the RAOs by eliminating the source of contamination to the marshes, as well as removing the human and ecological exposure pathways.

Cost Summary: Alternative 4	
Capital Cost	$16,572,000
Annual O&M Cost	$1,787,000
Contingency (20%)	$3,672,000
Total Estimated Costs	$22,031,000
Construction Time	14 months

10. COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

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

The UOP OU2 interim source control alternatives were evaluated using these nine criteria.

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

- Overall protection of human health and the environment: addresses whether or not an alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.
- Compliance with ARARs: addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

Primary Balancing Criteria: The next five criteria are known as "primary balancing criteria." These criteria are factors by which tradeoffs between response measures are assessed so that the best options will be chosen, given site-specific data and conditions.

- Long-term effectiveness and permanence: considers the ability of an alternative to maintain reliable protection of human health and the environment over time.
- Reduction of toxicity, mobility, or volume 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: addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and implementation.
- Implementability: the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost: includes the estimated capital and operation and maintenance costs, and net present worth costs.

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

- State acceptance: State agency acceptance considers whether the State agrees with EPA's analyses and recommendations.
- Community acceptance: considers whether the local community agrees with EPA's analyses and preferred alternative. Comments on the Proposed Plan received during the public comment period are an important indicator of community acceptance.

The results of the comparative analyses follow. In the evaluation of balancing criteria, EPA has assigned each alternative a relative rating between low and high based on the analysis results. A low rating shows that the alternative has a low level of achievement of some or all the factors considered for the criterion compared to other alternatives, while a high rating indicates a high relative level of achievement. Intermediate levels of achievement are rated as low to moderate, moderate, and moderate to high.

10.1. Comparative Analysis of Alternatives

10.1.1. Threshold Criteria

Protection of Human Health and the Environment: This criterion addresses whether the alternatives provide adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through implementation of the remedy.

Alternative 1 (No Action) would not be protective of human health and the environment because it would not reduce the exposure of human and ecological receptors to COCs in the waterway sediment, or reduce the resuspension or transport of sediment-bound COCs into the water column within a reasonable timeframe. As it would not meet this threshold criterion, Alternative 1 was not evaluated against the NCP balancing criteria.

The active alternatives (Alternatives 2 through 4) would be protective of human health and the environment through reduction of site risks, thereby meeting the threshold criterion. All of the active alternatives were evaluated against the NCP balancing criteria.

The three active alternatives utilize contaminated sediment removal and backfill placement to reduce both human and ecological exposure to COCs and the potential resuspension and transport of contaminated material to the surrounding marshes and downstream areas. The primary difference between Alternatives 2, 3, and 4 is the amount of sediment removed: Alternative 2 requires the removal of 1 foot of contaminated material prior to backfill placement, Alternative 3 requires the removal of 2 feet of material prior to backfill placement and Alternative 4 calls for the removal of all contaminated sediment down to the native clay, a depth of approximately 3 feet on average, prior to backfill placement.

Alternative 2 would mitigate the exposure to and potential resuspension and transport of COCs through removal of a portion of the contaminated material and subsequent sequestration of the remaining contaminated material through backfill placement. Alternatives 3 and 4 are considered more protective of human health and ecological receptors due to the deeper excavation depths. The RI results indicate that the majority of the contaminated waterway sediment, *i.e.*, material with the highest COC concentrations, was detected between the sediment surface and a depth of 2 feet below the surface, below which contaminant concentrations declined. This 2-foot thick layer of sediment would be removed by both Alternatives 3 and 4. These factors yield a further reduction in human and ecological exposure risks and contaminated sediment resuspension and transport potential.

Compliance with ARARs: This criterion requires that remedial actions at CERCLA sites meet legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations, unless an identified ARAR is waived. Non-promulgated advisories or guidance issued by federal or state entities that are not legally binding can be identified as “to be considered” (TBC) material. ARARs can be divided into three categories: chemical-specific, location-specific, and action-specific. These categories are described fully in the FS prepared for OU2. Of these categories, action-specific (Table 15) and location-specific (Table 16) ARARs are applicable to the interim source control remedial action; there are no chemical-specific ARARs for sediment.

Alternative 1 would not trigger action- or location-specific ARARs because no action would be conducted within OU2.

The active alternatives (Alternatives 2 through 4) share an approach to and implementation of the interim source control remedial action: the excavation, management, treatment, transport, and disposal of contaminated sediment, and the placement of backfill for habitat restoration. As a result, they have common action- and location-specific ARARs. Examples of these include:

- The requirements of the Clean Water Act that apply to dredging (33 U.S.C. §404[b][1] and 40 C.F.R Part 230) which require that disturbance to aquatic habitat be minimized to the extent possible,
- The New Jersey Flood Hazard Control Act Rules, and
- Federal floodplain management requirements.

The active alternatives can be designed to comply with the substantive requirements of the action- and location-specific ARARs. It should be noted that the alternatives are not intended to achieve a risk-based preliminary remedial goal; rather the alternatives are intended to achieve targeted excavation depths (bank-to-bank) in the waterways.

Complete lists of action- and location-specific ARARs are included in Tables 15 and 16, respectively.

10.1.2. Balancing Criteria

Long-Term Effectiveness and Permanence*:* This criterion is evaluated in terms of the magnitude of residual risk and the adequacy and reliability of controls associated with each alternative.

Alternatives 2 through 4 provide varying degrees of long-term protection, with risk reduction and adequacy/reliability of controls proportional to:

- The volume of contaminated sediment removed, and
- Thickness of the backfill layer.

Therefore, the ratings for this criterion improve as the sediment removal volumes and backfill thickness increase.

The active alternatives would remove the sediment that serves as the current source for potential human and ecological exposures and COC transport. Alternative 2 (1 foot of removal and backfill) is rated as “moderate” with respect to this criterion, while Alternatives 3 (2 feet of removal and backfill) and 4 (removal of all sediment and backfill), are rated as “high”.

Alternatives 3 and 4, which require removal of most or all of the contaminated material, would result in more long-term effectiveness and permanence than Alternative 2, which leaves a significant amount of the contamination in place below the backfill. Alternatives 3 and 4 also result in thicker backfill layers, further contributing to long-term effectiveness and permanence through additional protection and control of post-construction risk.

Alternatives 2 through 4 prescribe that post-excavation backfill be placed to an elevation equal to the existing sediment surface, which would result in post-construction hydrodynamics, bathymetry, and potential upland flooding risk which are consistent with current conditions.

It should be noted that the contribution of contamination through groundwater/surface water interaction is still unresolved. This uncertainty will be addressed in the pre-design period. If the results of this monitoring indicate potential risks to receptors, it will be addressed in a future remedial action.

Reduction of Toxicity, Mobility, or Volume through Treatment: This criterion evaluates the anticipated reduction of toxicity, mobility, or volume resulting from application of treatment technologies which may be included as part of a remedy.

CERCLA expresses a preference for remedial alternatives that employ treatment technologies that permanently or significantly reduce the toxicity or mobility of hazardous substances. Alternatives 2 through 4 satisfy the statutory preference for treatment as a principal element of the remedy. Although the dredged/excavated sediment will be transported off-site for disposal, an amendment (e.g., Portland cement) will be added as needed to meet transportation and disposal requirements. The addition of an amendment will reduce the toxicity and the mobility of contaminants contained within the sediment, compared to untreated sediment. While treatment could be considered a secondary benefit of amendment addition for transportation and disposal requirements, the sediment will nonetheless undergo treatment, and the statutory preference will be met. The details of the treatment design and specifications will be established during the remedial design and may include, for example, required minimum dosages of treatment reagent, maximum allowable moisture content of treated sediment, and/or maximum-acceptable levels of liquids released from treated sediment under unconfined (*e.g.*, paint filter test) and/or confined (*e.g.*, compression test) conditions.

Short-Term Effectiveness: This criterion evaluates adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternatives 2 through 4 would all be fully effective in achieving the established RAOs upon the completion of construction; however, there would be short-term impacts to the local community, construction workers, and the environment during construction which would require mitigation. Short-term impacts to the local community may include increased local traffic, exhaust emissions, dust, noise, and possible odors. Construction workers may face short-term impacts related to increased potential accident risk, and the environment would be subject to short-term impacts to water quality and temporary loss of benthic organisms and ecological habitat.

Because the active alternatives all require the same type of action (*i.e.*, excavation, disposal and backfill), the same technology and procedures would be used during implementation of all three. Thereby, short-term impacts would also be the same, and differentiated only by duration of work and amount of material requiring transport to or from the work site. These factors are driven by the estimated removal volume of contaminated sediment:

- Alternative 2: 12,200 cy in 8.5 months,
- Alternative 3: 16,300 cy in 11.5 months, and
- Alternative 4: 20,000 cy in 14 months

The three active alternatives have been assigned a rank based on the construction duration, with Alternative 2 ranked as “high” because it has the shortest construction duration, Alternative 3 ranked as “moderate” based on a construction duration which is longer than that of Alternative 2, and Alternative 4 ranked as “low” because it has the longest construction duration.

Short-term impacts would be addressed through community outreach, implementation of appropriate engineering controls and best management practices, and compliance with the approved health and safety plans and site management plans, including the use of the required personal protective equipment and health and safety monitoring programs. Environmental impacts such as water quality degradation and habitat loss will be resolved once construction is complete. Cleaner fine-grained material would deposit over the coarser backfill and replace the previous habitat with improved conditions. Because the remedial action will replace and improve the existing habitat, the Clean Water Act would not require implementation of additional mitigation measures.

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

All of the active alternatives can be implemented with readily available materials and methods.

Based on site-specific experience gained during the NTCRA, excavation under dry conditions (*i.e.*, in the dry) and backfill are feasible. Because the channels and tributaries of Ackermans Creek are shallower than those that characterize Berry’s Creek, there would be less water to manage and control. Further, the NTCRA demonstrated that excavation in the dry would better handle the challenges associated with working in the waterways area. Based on experience gained during the NTCRA, bank stability is not anticipated to be a concern for excavations of a relatively shallow depth, but this factor will be evaluated further during the remedial design.

The FS Report indicates that the average depth of soft sediment in the UOP OU2 waterways is 3 feet; however, there are areas where soft sediments may extend to a depth of 5-7 feet, including the Northern Channel and the Ackermans South Area. The stability of the banks during the complete excavation of the soft sediments to this depth would need to be evaluated to assess if the banks required sheet piling during the remedy implementation.

Alternatives 2 and 3 are therefore ranked as “moderate to high” for implementability, while Alternative 4 is ranked as “low to moderate”.

Cost: The total estimated cost for each alternative is presented below:

Alternative	Estimated Cost
1	$0
2	$14,915,000
3	$18,536,000
4	$22,031,000

The cost estimates have been developed based on assumptions and are presented for comparing the alternatives. The cost of the selected remedy will depend on the actual labor and material costs, market conditions, final project scope, the implementation schedule, and other variables. Consistent with EPA guidance, the cost estimates are order of magnitude estimates with an intended accuracy range of plus 50 to minus 30 percent.

The least expensive active remediation option is Alternative 2. Costs for the active alternatives increase with the depth of sediment removal, as the increased amount of excavation and disposal is more resource-intensive. Alternative 3 is about 24 percent more costly than Alternative 2. Alternative 4 is about 48 percent more costly than Alternative 2, and about 19 percent more costly than Alternative 3 (Table 18). It should be noted that Alternative 4 is particularly sensitive to uncertainties regarding sediment thickness and resulting removal volumes due to limited spatial data on sediment deposits greater than 3 feet thick, compounded by the limited number of sediment core samples collected during the RI, as well as the need for additional bank stability measures.

10.1.3. Modifying Criteria

State Acceptance: The New Jersey Department of Environmental Protection has concurred with this ROD.

Community Acceptance: The community was given the opportunity to provide comment at the public meeting on March 6, 2019, and during the public comment period from December 10, 2018 through March 22, 2019. Three comments were received at the public meeting and via email to EPA, and are included in the Responsiveness Summary along with responses to each comment (Appendix 5).

11. PRINCIPAL THREAT WASTES

Identifying principal threat wastes (PTW) combines concepts of both hazard and risk. In general, EPA identifies PTW as 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 (with a potential cancer risk of 10^{-3} or greater) should exposure occur. The NCP specifies that EPA will employ treatment to address principal threats posed by a site wherever practicable (40 CFR §300.430[a][1][iii][A]).

Based on this definition, the waterway sediments which will be addressed in the interim source control remedial action are not considered PTW. The rationale for this conclusion is as follows:

- All sediment addressed by the interim source control remedial action is secondary source material consisting of environmental media (*i.e.*, sediment) previously impacted by COCs from legacy primary sources that formerly existed at the UOP Site, specifically OU1, as well as other upgradient industrial facilities.
- The revised BHHRA did not identify cancer risks above the NCP lifetime excess cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ as a result of exposure to contamination in OU2. The calculated RME excess cancer risk, 5×10^{-7} to 1×10^{-5}, is within or below the NCP risk range.
- While the revised BHHRA did identify potential non-cancer risks to adults and older children from Total PCBs in sediment and surface water west of Murray Hill Parkway (HIs = 2 for immune system, dermal, and ocular effects for both receptor groups), the potential hazards do not meet the PTW threshold.

- While the BERA did identify risks to ecological receptors in the OU2 waterways and marshes, including high risks to invertivorous birds from Total PCBs, chromium, and total mercury in the waterways and moderate risks from Total PCBs and mercury, in the marshes; and potential de minimis to low risks to benthic invertebrates, the estimated risks do not meet the PTW threshold.
- COCs within OU2 are not highly mobile, most fundamentally due to the level of sediment stability in the marsh system and the net depositional conditions throughout much of the waterways in the system, as discussed in the FS Report. Sediment resuspension is generally limited to the thin unconsolidated fluff layer during typical, tidally-dominated flow conditions, and is substantially limited even during rare, very large storm events such as Hurricane Irene.

Unlike PTW, which generally cannot be reliably contained, OU2 waterway sediment can be reliably removed and/or contained using proven technologies such as excavation and backfilling. EPA has incorporated treatment as a component of excavated material management, to the extent necessary to meet transportation and disposal requirements, and does not believe that additional treatment for excavated material is necessary.

12. SELECTED REMEDY

The selected remedy presented in this ROD is an interim action for source control in OU2 and will address contaminated sediment in the waterways on the west side of Murray Hill Parkway (including the Ackermans South Area). The selected remedy will remove the most contaminated layer of sediment and lead to a reduction in contaminant levels in the surface water and biota within OU2, preventing the resuspension and transport of contamination to the surrounding marshes and downstream areas. Alternative 3 provides the best balance of the NCP evaluation criteria, achievement of the RAOs, and cost of implementation. Alternative 3 is also consistent with the selected remedy for the BCSA, which includes the area east of Murray Hill Parkway, maximizing opportunity for cooperative remedial efforts within the watershed.

Alternative 3: Removal of 2 feet of Waterway Sediment + Backfill + ICs

- Bank-to-bank removal of the uppermost 2 feet of soft sediment within the remediation footprint (plus 6 inches of over-excavation). Where less than 2 feet of soft sediment is present, all of the soft sediment will be removed. The selected remedy is expected to remove approximately 16,300 cy of sediment from OU2.
- Backfill of the areas where sediment is removed. The backfill thickness will be equal to the thickness of sediment removed. In areas where contaminated soft sediment remains below the excavation depth, the backfill will serve to physically isolate this material. The work will include mitigation of the habitat disturbance caused by the remedial action.
- Removal activities will include removal and disposal of the Northern Channel culvert beneath Murray Hill Parkway, as well as 214 cy of debris and sediment located within the culvert. The remedial design will consider whether there could be a flood mitigation benefit from leaving the culvert in place.
- The excavated sediment will be dewatered, stabilized as necessary, and transported off-site for disposal at a permitted facility. It is expected that an on-site WWTP will be

constructed to treat contact water and supernatant from the excavation areas and to treat the dewatering effluent from the removed sediment.

- Monitoring will be conducted during the design to determine if contamination remaining in the shallow groundwater in OU1 areas is negatively impacting the sediment in OU2. If an unacceptable risk to the benthic invertebrate community is established, an appropriate response action will be determined in the future.
- A post-construction performance monitoring and maintenance program will be implemented to monitor the success of the interim source control remedial action in the surrounding ecosystem and in the adjacent marshes and waterways that are hydrologically connected to the OU2 and provide any necessary maintenance to preserve the backfill surface.
- Institutional Controls, such as the existing New Jersey fish and crab consumption advisories, will remain in place. Additional restrictions will be established if necessary, including restrictions limiting certain construction activities to preserve the backfill surface, such as a deed notice, or for areas for which no deed exists, an equivalent notice, pursuant to NJDEP requirements.

13. STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed; complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus supports that statutory mandate. Subsequent actions will address fully the threats posed by conditions at the UOP Site.

Because this is an interim action ROD, review of this remedy will be ongoing as EPA continues to develop final remedial alternatives for the UOP Site.

13.1. Protection of Human Health and the Environment

As an interim remedy, the selected remedy should provide adequate protection until a final ROD is signed. The selected remedy is expected to be protective of human health and the environment in the short term. EPA expects to evaluate cleanup levels in the final remedy decision for the UOP Site.

13.2. Compliance with ARARs

The selected remedy will comply with action- and location-specific ARARs and other criteria, advisories, or guidance presented in Tables 15 and 16, respectively. There are no chemical-specific ARARs for this interim remedy.

13.3. Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP at 40 CFR Section 300.430[f][1][ii][D]). Overall effectiveness is based on the evaluation of the following: long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost, to determine cost-effectiveness. Costs for each alternative were evaluated in detail. Capital and annual O&M costs were estimated. Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective. The assumptions upon which the cost estimate is based are presented in Table 18. The estimated capital cost of the selected remedy is $13,791,000. The annual O&M cost is $1,656,000. The total present value cost is $18,600,000.

13.4. Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in the NCP at 40 CFR Section 300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU2. While the selected remedy will leave contamination below the backfill in some areas, the majority of the detected contamination was encountered in the upper 2 feet of the soft sediment layer. Some ICs, such as fish consumption advisories, are based on area-wide concerns and will remain in place despite the implementation of the selected remedy.

13.5. Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for treatment as a principal element of the remedy. Although the excavated sediment will be transported off-site for disposal, an amendment (e.g., Portland cement) may be added as needed to meet transportation and disposal requirements. The addition of an amendment would reduce the toxicity and the mobility of contaminants contained within the sediment, compared to untreated sediment. While treatment could be considered a secondary benefit of amendment addition for transportation and disposal requirements, the sediment is expected to nonetheless undergo treatment, and in that case the statutory preference will be met.

13.6. Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, five-year reviews will be required to ensure that the remedy is, or will be, protective of human health and the environment. The schedule for the five-year review was set at the start of remediation of the UOP Site (OU1). Five-year reviews for OU1 were issued on September 28, 2001, September 29, 2006, September 26, 2011, September 27, 2016.

Because this is an interim action ROD, review of this remedy will be ongoing as EPA continues to develop final remedial alternatives for the UOP Site.

14. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA has determined that no significant changes to the selected remedy, as it was presented in the Proposed Plan, are warranted.

APPENDIX I

FIGURES

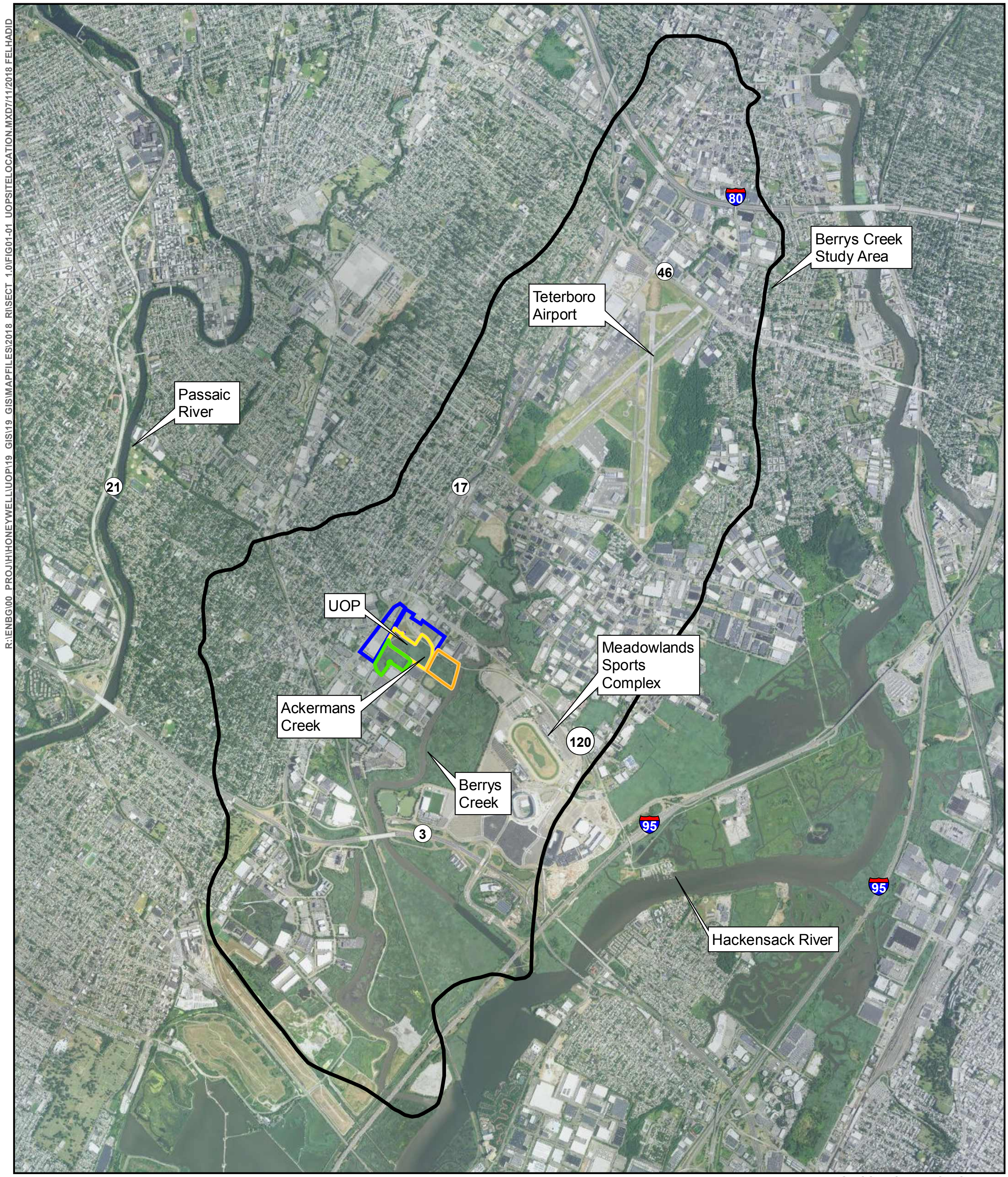


IMAGE SOURCE: APFO, FSA 2015.

Legend

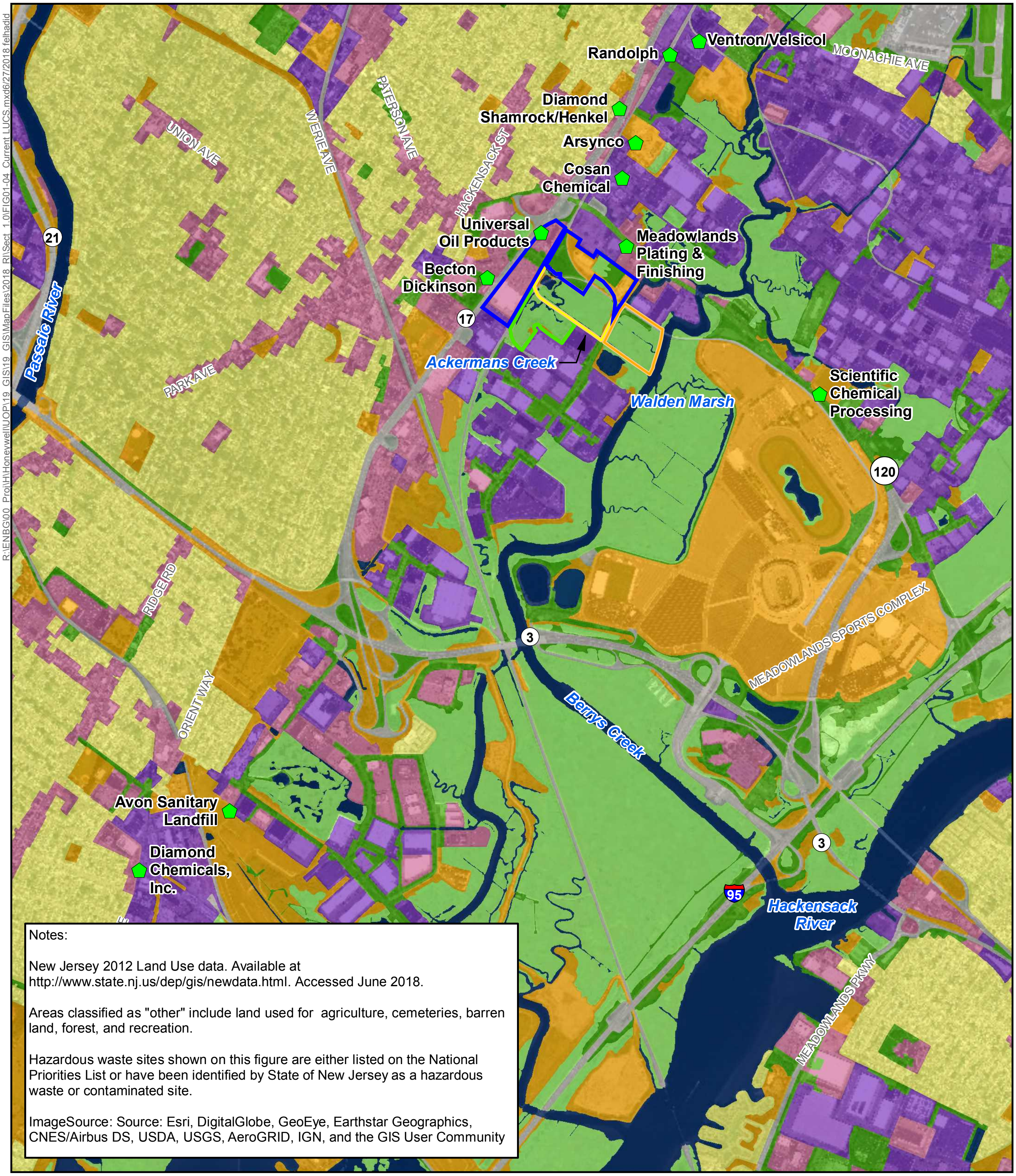
- OU1 Uplands
- OU2 Streamlands Area West of Murray Hill Parkway
- OU2 Streamlands Area East of Murray Hill Parkway
- Ackermans Area South
- Berrys Creek Study Area
- Interstate
- Highway

0 4,500 9,000
Feet

N

Figure 1
Universal Oil Products (UOP) and
Berrys Creek Study Area (BCSA)
Remedial Investigation Report
Universal Oil Products (UOP), OU2
East Rutherford, NJ

JACOBS



Notes:

New Jersey 2012 Land Use data. Available at http://www.state.nj.us/dep/gis/newdata.html. Accessed June 2018.

Areas classified as "other" include land used for agriculture, cemeteries, barren land, forest, and recreation.

Hazardous waste sites shown on this figure are either listed on the National Priorities List or have been identified by State of New Jersey as a hazardous waste or contaminated site.

ImageSource: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Legend

- Hazardous Waste or Contaminated Site
- OU1 Uplands
- OU2 Streamlands Area West of Murray Hill Parkway
- OU2 Streamlands Area East of Murray Hill Parkway
- Ackermans Area South

2012 Land Use Data

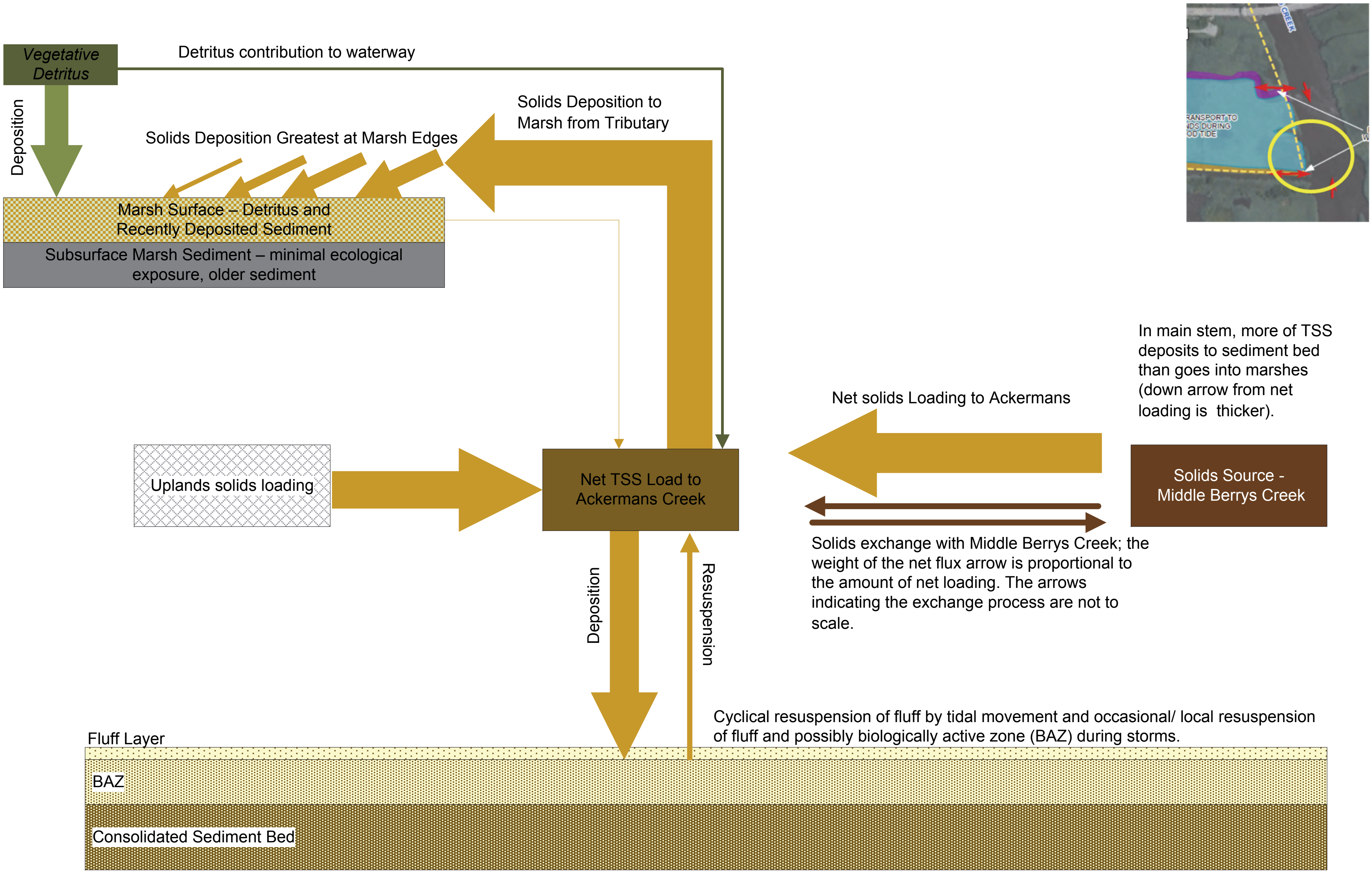
- Water
- Wetlands
- Other
- Commercial
- Industrial
- Mixed Urban
- Residential
- Transportation

N

0 2,500 5,000
Feet

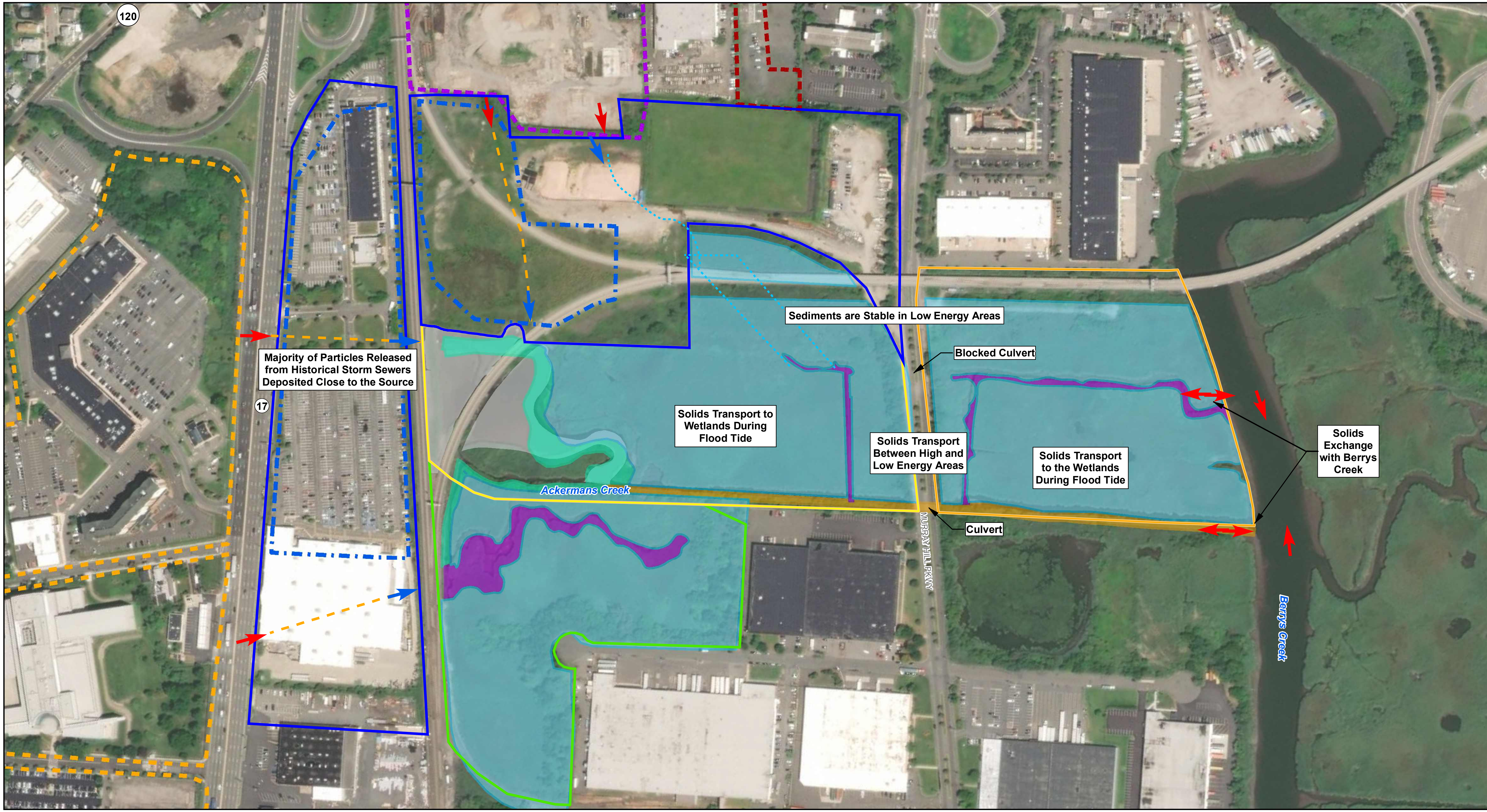
Figure 2
Current Land Use and Cover
Surrounding the UOP Site
Remedial Investigation Report
Universal Oil Products (UOP), OU2
East Rutherford, NJ

JACOBS



Notes:
Not to scale; HRE = Hackensack River Estuary
Relative sizes of particulate transport pathways are informed by sediment transport modeling

Figure 3. Conceptual Site Model—Particle Fate and Transport
Remedial Investigation Report, Universal Oil Products (UOP), OU2
East Rutherford, NJ



Legend

- Historical Surface Drainage
- Storm Drain
- OU1 Uplands
- OU2 Streamlands Area West of Murray Hill Parkway
- OU2 Streamlands Area East of Murray Hill Parkway
- Ackermans Area South
- Historical footprint of buildings and storage areas on the UOP site
- Approximate Former Meadowlands Plating and Finishing Property
- Approximate Former Matheson Gas Products Property
- Former Becton Dickinson Property
- High Energy Area - Dynamic, Non-depositional
- Low Energy - Depositional
- Low Energy - Historical Storm Water Inflow - Net Depositional
- Very Low Energy - Marsh Area - Depositional
- NTCRA Remediation Area
- Low Energy, Depositional Under Current Conditions
- Historical Site-Related Flow (Particle Sources)
- Non-Site Related Flow

0 300 600
Feet

N

Note:

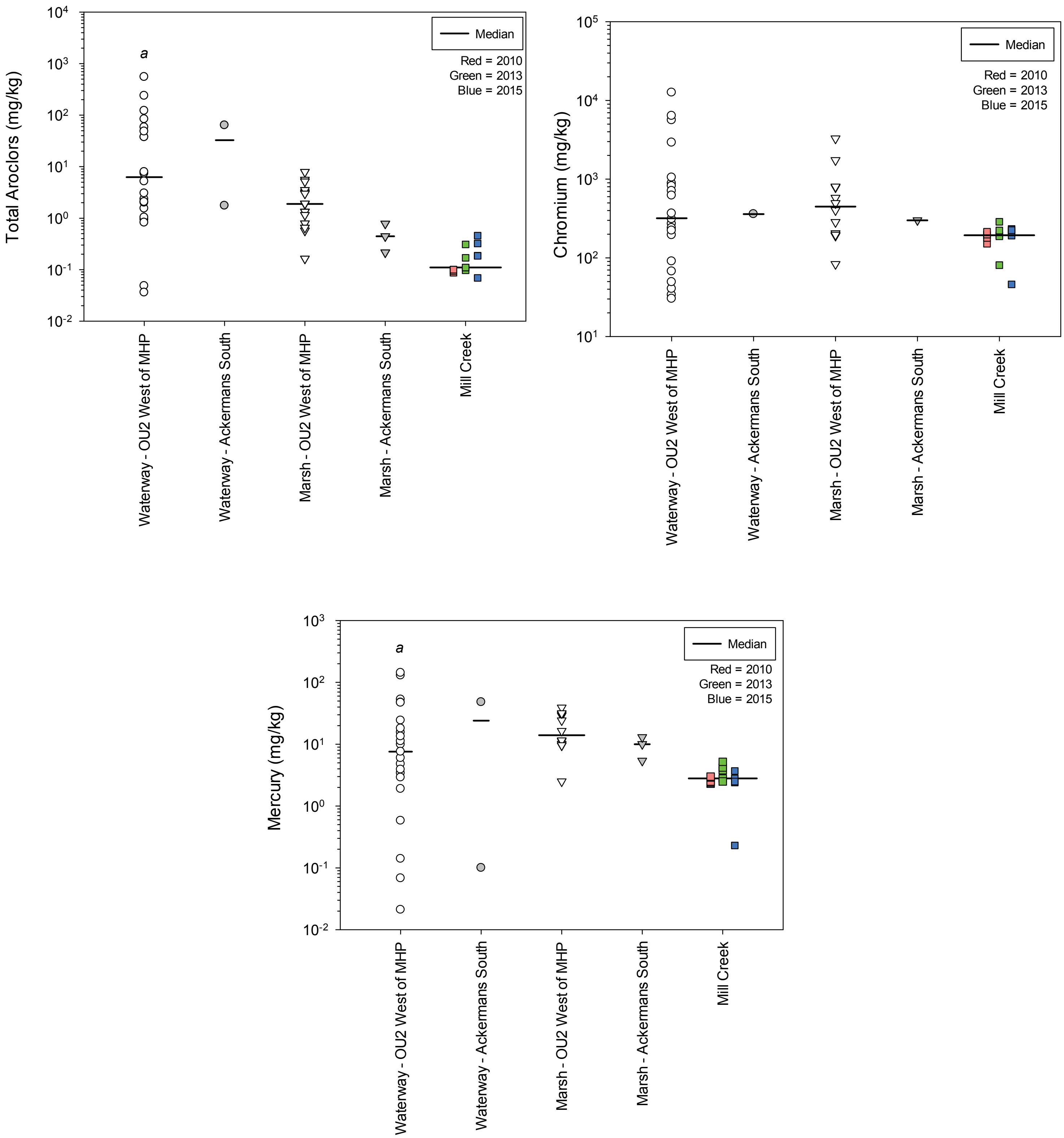
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Blocked Culvert = Northern Channel Culvert

Figure 4
Hydrodynamic and Sediment Transport Conceptual Site Model
Remedial Investigation Report
Universal Oil Products (UOP)
East Rutherford, NJ

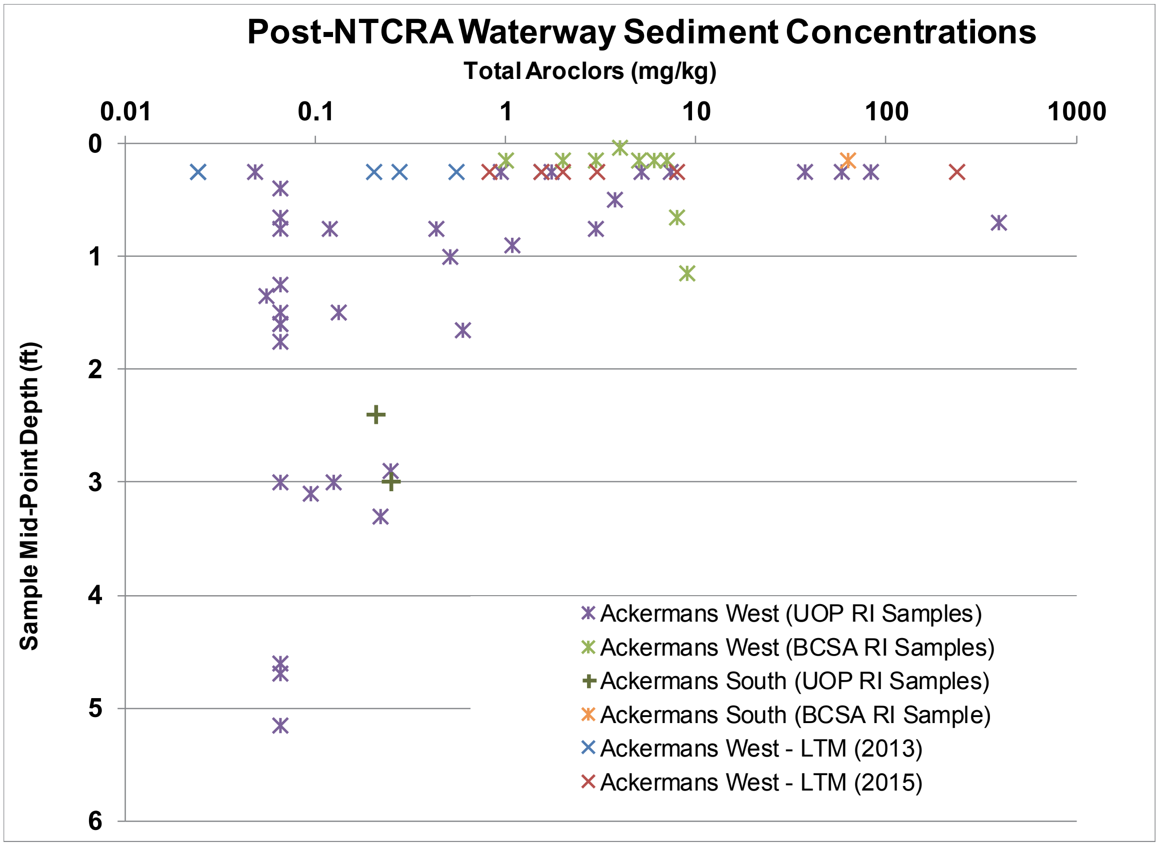
JACOBS

R:\ENBG\00_Proj\H\Honeywell\UOP\19_GIS\19_GIS\MapFiles\2018_RI\Sect_3.0\FIG03-05_PhysChemSite.mxd9/25/2018 felhadid



[a] Median value is significantly different from the median value for the Mill Creek dataset. Statistical analysis was only performed on the Waterway for OU2 West; comparison was against the Mill Creek data for all three sampling years. Statistical comparison of Ackermans South not performed due number of data points. *Non-detects shown at the maximum individual PCB Aroclor reporting limit and at half the reporting limit for metals.*

Figure 5
Nature and Extent Sediment Concentration Summary: Total PCB Aroclors, Mercury, and Chromium
Remedial Investigation Report
Universal Oil Products(UOP), OU2
East Rutherford, NJ



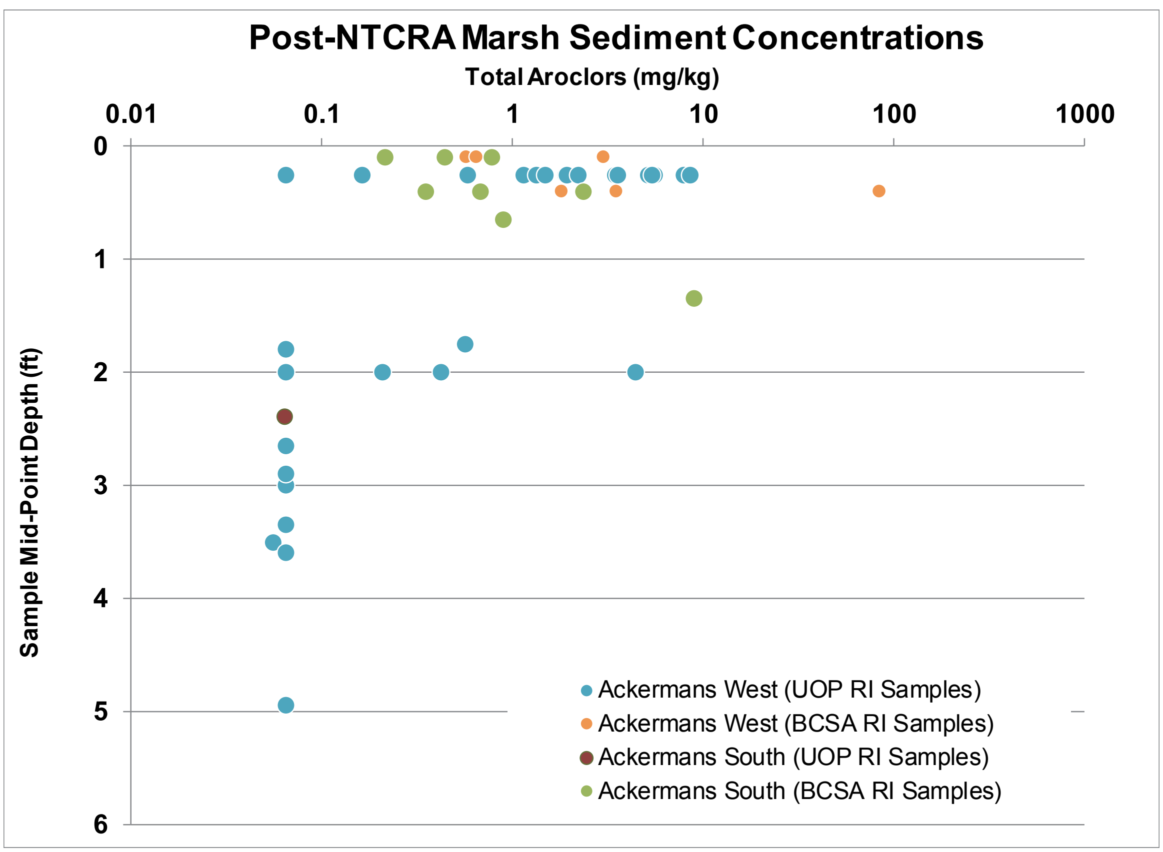
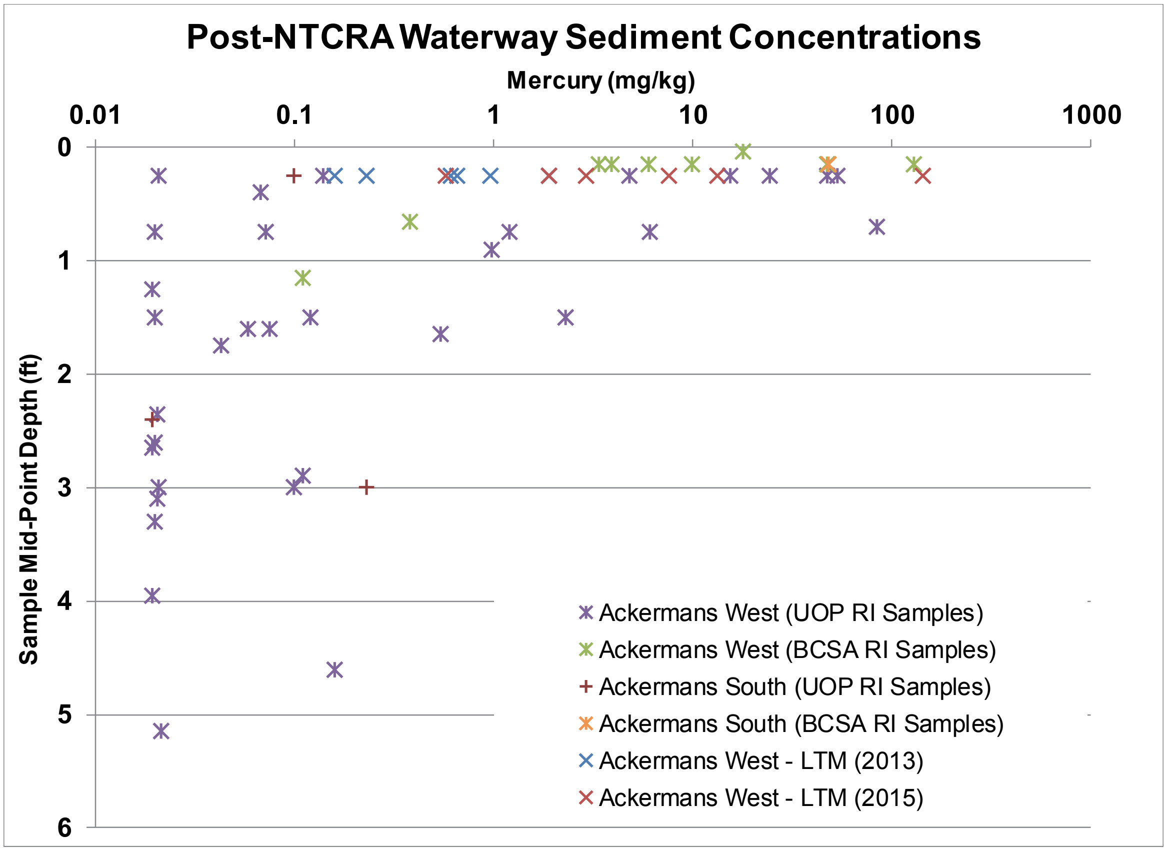


Figure 6
Total PCB Aroclor Concentrations with Depth
Remedial Investigation Report, Universal Oil Products (UOP), OU2
East Rutherford, NJ



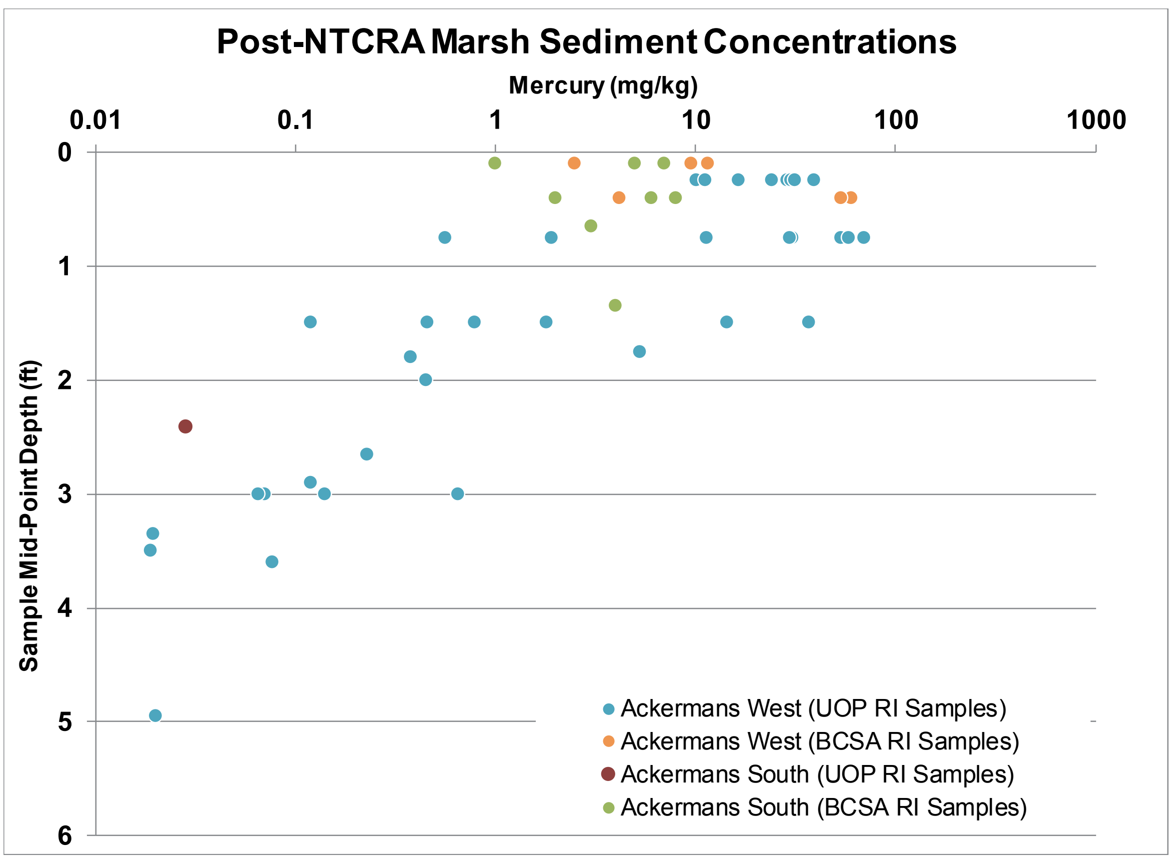
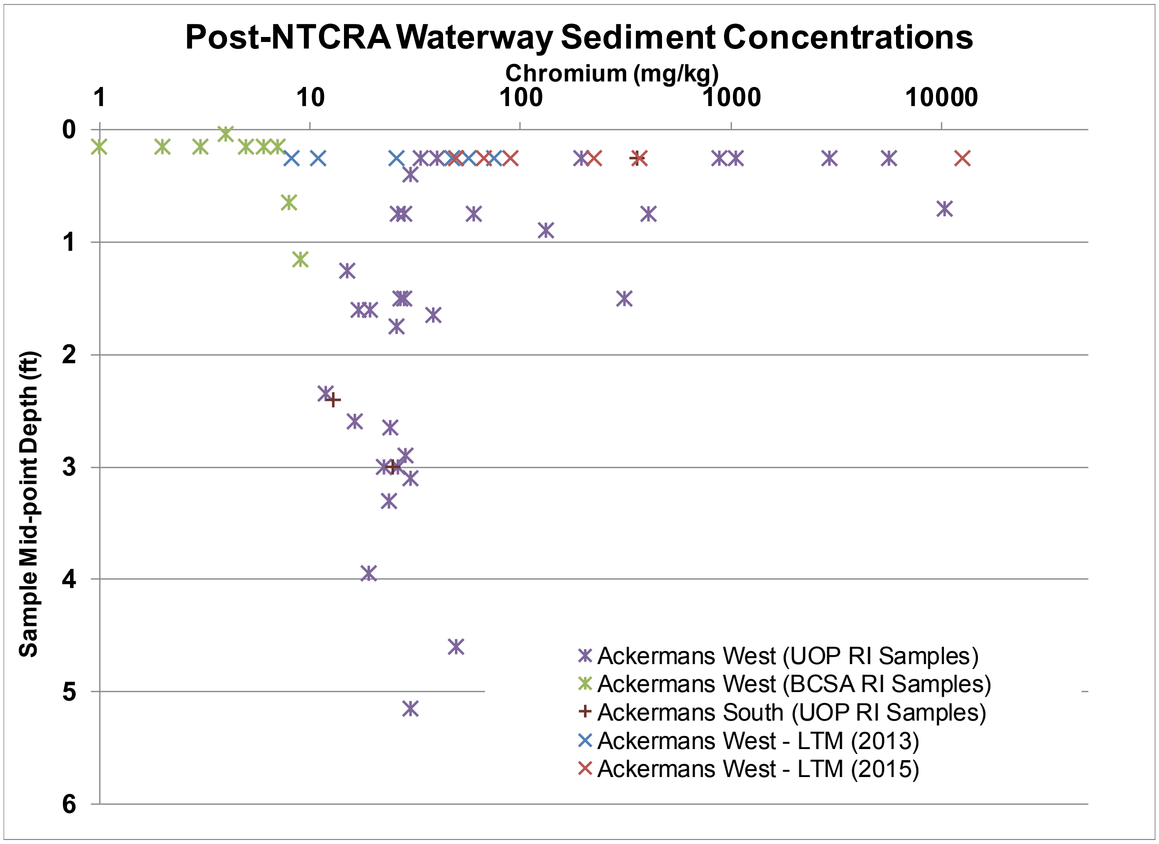


Figure 7
Total Mercury Concentrations with Depth
Remedial Investigation Report, Universal Oil Products (UOP), OU2
East Rutherford, NJ

JACOBS



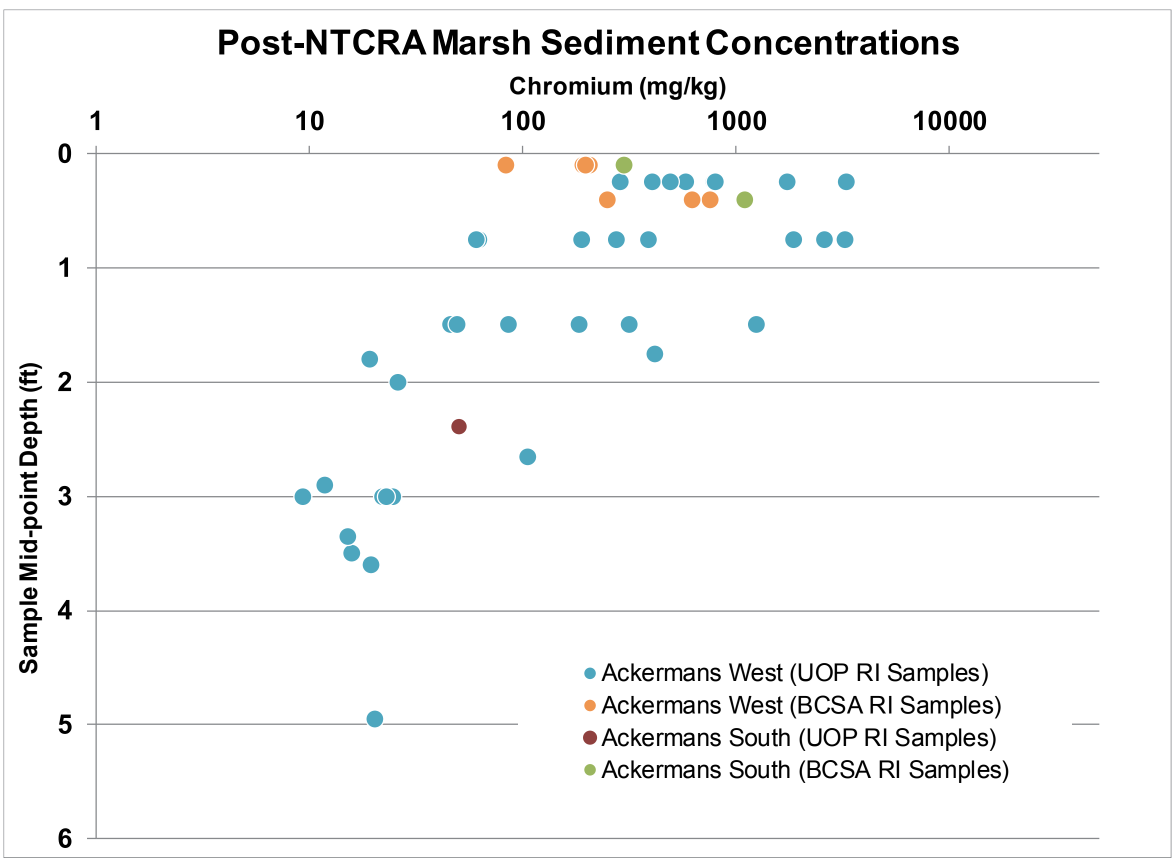
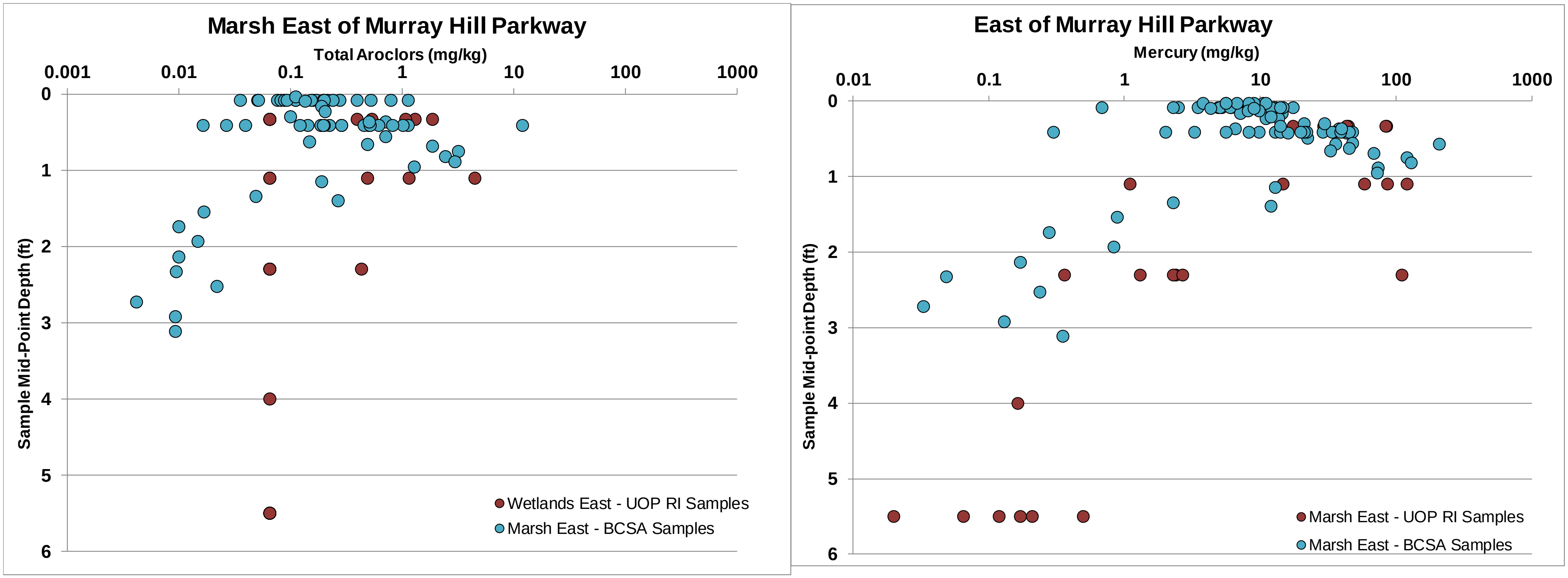


Figure 8
Total Chromium Concentrations with Depth
Remedial Investigation Report, Universal Oil Products (UOP), OU2
East Rutherford, NJ

JACOBS

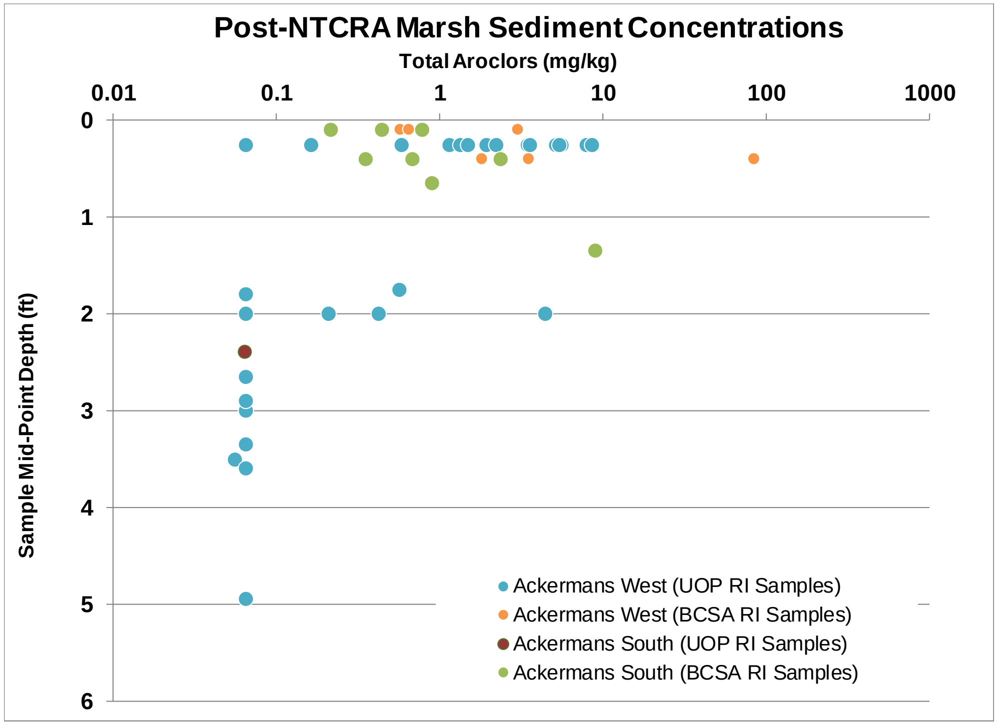


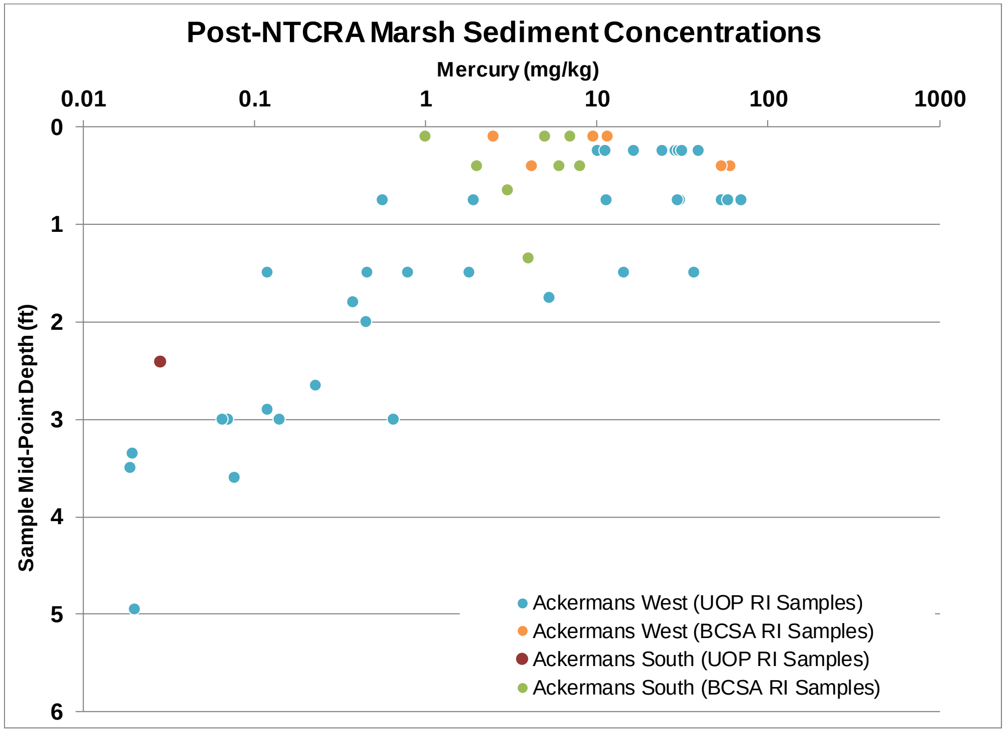
Notes:
Logarithmic scale used on both plots.
Total PCBs are the sum of detected Aroclors.
See Figure 2-1 for UOP RI sampling locations.
BCSA data includes locations MMC-213; MMDB-313 and -315; MRH-233, -234, -3001, -3002, -3003, -3004, -3005, -3006, -3007, -3008, -3009, -3014, -3015, -316, -318, -320, -324, -325, -369, -392; MRHV-392. These data are presented in the BCSA RI (BCSA Group 2018a).

Title revised to read "COC" instead of "COPC" for inclusion in the ROD.

Prepared by LimnoTech

Figure 9. Profiles of Marsh Sediment from Ackermans Marsh East Showing Subsurface COC Peaks
Remedial Investigation Report – Universal Oil Products (UOP), OU2
East Rutherford, NJ



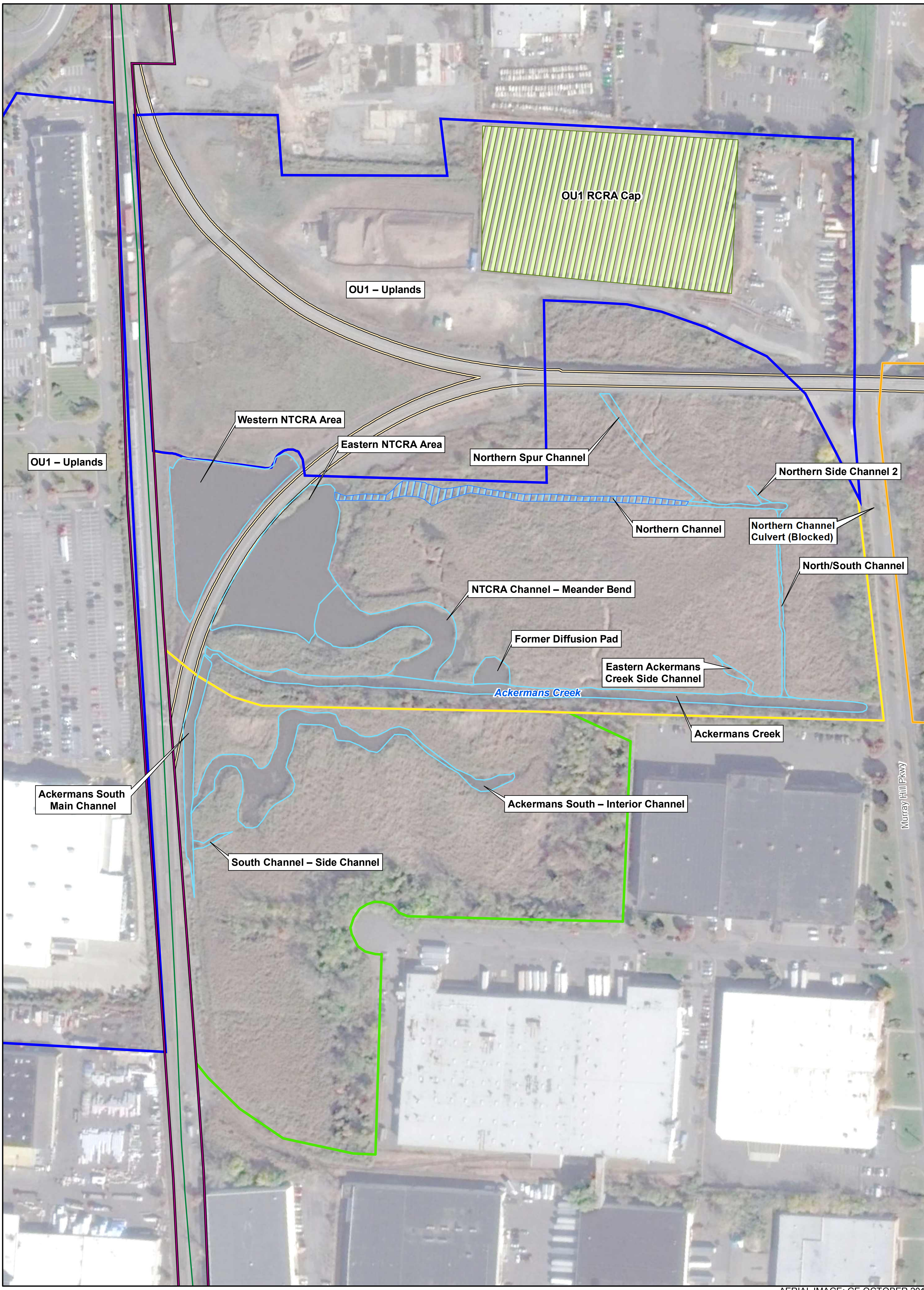


Notes:
Logarithmic scale used on both plots.
Total PCBs are the sum of detected Aroclors.
See Figures 2-1 and 2-9 for sampling locations.

Title revised to read "COC" instead of "COPC" for inclusion in the ROD.

Figure 10. Profiles of Marsh Sediment from Ackermans Marsh West Showing Subsurface COC Peaks
Remedial Investigation Report – Universal Oil Products (UOP), OU2
East Rutherford, NJ

Prepared by LimnoTech



AERIAL IMAGE: GE OCTOBER 2015.

Legend

- OU1 RCRA Cap
- Channel Footprint to be Reviewed and Potentially Modified During Remedial Design (With EPA Approval)
- Waterway
- Railroad Right-of-Way
- Approximate Extent of NJSEA Rail Spur
- OU1 Uplands
- OU2 Streamlands Area West of Murray Hill Parkway
- OU2 Streamlands Area East of Murray Hill Parkway
- Ackermans Area South

Note:

The extent of the waterway in the area of MNR-5 will be determined during remedial design.

0 200 400 Feet

N

Figure 11
Remediation Target Area
Feasibility Study
Universal Oil Products (UOP), OU2
East Rutherford, NJ

R:\ENBG\00_PROJ\H\HONEYWELL\UOP\19_GIS\19_GIS\MAPFILES\2018_FS\SECT_2.0\FIG02-01_REMEDIATIONTARGETAREA.MXD FELHADID 10/24/2018 4:06:33 PM

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APPENDIX II

TABLES

Table 1. Median Surface Sediment Concentrations (mg/kg)

Remedial Investigation Report

Universal Oil Products (UOP), OU2

East Rutherford, NJ

Contaminant of Concern	UOP OU2	UOP Reference	BCSA Reference
PCB Aroclors	6.26	0.11	0.2
Mercury	7.6	2.8	1.3
Chromium	360	190	43

Table 2. Summary of Tissue Concentration Data
Remedial Investigation Report
Universal Oil Products (UOP), OU2
East Rutherford, NJ

					Not Lipid Normalized								Lipid Normalized	
					Total Aroclors	Total Aroclors (NDs = RL)	Sum of 12 Congeners	Chromium	Mercury	Methyl mercury	% Lipids	Lipid	Total Aroclors (NDs = RL)	Sum of 12 Congeners
Sample ID	Location	Date	Tissue Type	Sample Type	ug/kg	ug/kg	pg/g	mg/kg	mg/kg	ng/g	%	g/g	ug tPCB/ g lipid	ug tPCB/ g lipid
NTCRA Area - Pre-removal Tissue Results														
061010-BT-SL01	SL01	6/10/2010	bentic invert	Regular Sample	ND	*93*	327,183	0.99 U	0.11	90 J	0.8	0.008	11.6	40.9
061010-BT-SL02	SL02	6/10/2010	bentic invert	Regular Sample	414	414	353,881	17.6	0.11	144 J	0.65	0.0065	63.7	54.4
061110-BT-SL03	SL03	6/11/2010	bentic invert	Regular Sample	ND	*100*	348,193	0.99 U	0.075	148 J	0.85	0.0085	*11.8*	41.0
060710-FT-SL01	SL01	6/7/2010	mummichog	Regular Sample	388	388	178,149	0.99 U	0.13	112 J	0.47	0.0047	82.6	37.9
060710-FT-SL02	SL02	6/7/2010	mummichog	Regular Sample	535	535	471,759	1 U	0.2	135 J	0.23	0.0023	232.6	205.1
061110-FT-SL03	SL03	6/11/2010	mummichog	Regular Sample	1116	1116	214,438	0.96 U	0.18	198 J	0.62	0.0062	180.0	34.6
061110-FT-SL03-D	SL03	6/11/2010	mummichog	Field Duplicate	1805	1805	279,212	1 U	0.098	194 J	0.88	0.0088	205.1	31.7
NTCRA Area - Post-removal Tissue Results														
082013-ST-LTM03-01	LTM03	8/20/2013	bentic invert	Regular Sample	ND	*190*	122,865	2	0.14	173	0.485	0.00485	*39.2*	25.3
081913-ST-LTM04-01	LTM04	8/19/2013	bentic invert	Regular Sample	ND	*100*	92,188	10.2	0.41	293	1.17	0.0117	*8.5*	7.9
082013-ST-LTM05-01	LTM05	8/20/2013	bentic invert	Regular Sample	ND	*96*	220,603	9.2	0.37	131	0.13	0.0013	73.8	169.7
082213-ST-LTM06-01	LTM06	8/22/2013	bentic invert	Regular Sample	--	--	99,023	--	--	--	0.983	0.00983	0.0	10.1
091415-BT-LTM03	LTM03	9/14/2015	bentic invert	Regular Sample	ND	*190*	70,732	1 U	0.11	89.6	1.8	0.018	*10.6*	3.9
091415-BT-LTM03-D	LTM03	9/14/2015	bentic invert	Field Duplicate	ND	*250*	73,090	1 U	0.11	124	1.4	0.014	*17.9*	5.2
091815-BT-LTM04	LTM04	9/18/2015	bentic invert	Regular Sample	ND	*240*	94,379	1 U	0.14	110	2	0.02	*12.0*	4.7
091815-BT-LTM05	LTM05	9/18/2015	bentic invert	Regular Sample	ND	*250*	142,188	1.8	0.39	98.3	1.6	0.016	*15.6*	8.9
091415-BT-LTM06	LTM06	9/14/2015	bentic invert	Regular Sample	ND	*230*	62,058	1.2	0.12	105	1.5	0.015	*15.3*	4.1
081413-FT-LTM01-01	LTM01	8/14/2013	mummichog	Regular Sample	2090	2090	340,693	1.6	0.21	126	0.44	0.0044	475.0	77.4
081413-FT-LTM02-01	LTM02	8/14/2013	mummichog	Regular Sample	2170	2170	386,400	1.2	0.16	180	0.69	0.0069	314.5	56.0
081413-FT-LTM02-01-D	LTM02	8/14/2013	mummichog	Field Duplicate	1700	1700	340,691	3.2	0.2	133	0.79	0.0079	215.2	43.1
081613-FT-LTM03-01	LTM03	8/16/2013	mummichog	Regular Sample	1410	1410	581,182	1 U	0.16	177	1.1	0.011	128.2	52.8
081413-FT-LTM04-01	LTM04	8/14/2013	mummichog	Regular Sample	1960	1960	556,452	0.98 U	0.21	172	0.61	0.0061	321.3	91.2
081413-FT-LTM05-01	LTM05	8/14/2013	mummichog	Regular Sample	1730	1730	623,081	0.96 U	0.28	286	0.56	0.0056	308.9	111.3
081913-FT-LTM06-01	LTM06	8/19/2013	mummichog	Regular Sample	472	472	441,386	1.8	0.24	196	0.92	0.0092	51.3	48.0
090915-FT-LTM01	LTM01	9/9/2015	mummichog	Regular Sample	4870	4870	149,206	1 U	0.2	168	1.8	0.018	270.6	8.3
091015-FT-LTM02	LTM02	9/10/2015	mummichog	Regular Sample	5030	5030	207,730	1.4	0.12	87	2.8	0.028	179.6	7.4
091015-FT-LTM03	LTM03	9/10/2015	mummichog	Regular Sample	3550	3550	179,576	1 U	0.26	205	2.8	0.028	126.8	6.4
090915-FT-LTM04	LTM04	9/9/2015	mummichog	Regular Sample	4660	4660	243,143	0.95 U	0.16	164	2.1	0.021	221.9	11.6
091015-FT-LTM05	LTM05	9/10/2015	mummichog	Regular Sample	5820	5820	373,374	0.96 U	0.33	287	2.7	0.027	215.6	13.8
090815-FT-LTM06	LTM06	9/8/2015	mummichog	Regular Sample	6070	6070	275,841	2.9	0.17	85.3	3.1	0.031	195.8	8.9
090815-FT-LTM06-D	LTM06	9/8/2015	mummichog	Field Duplicate	5210	5210	305,243	3.5	0.18	86.7	3.3	0.033	157.9	9.2
Mill Creek Reference Area Tissue Results														
080410-BT-MC01	MC01	8/4/2010	bentic invert	Regular Sample	ND	*100*	36,586	0.95 U	0.12	169	0.93	0.0093	*10.8*	3.9
080610-ST-MC01	MC01	8/6/2010	bentic invert	Regular Sample	--	--	38,731	--	--	73.4	--	0.0049	--	7.9
080610-BT-MC02	MC02	8/6/2010	bentic invert	Regular Sample	ND	*100*	17,324	0.98 U	0.066	91.1	0.23	0.0023	*43.5*	7.5
080410-BT-MC03	MC03	8/4/2010	bentic invert	Regular Sample	ND	*100*	32,888	0.97 U	0.16	77.5	0.42	0.0042	*23.8*	7.8
080410-BT-MC03-D	MC03	8/4/2010	bentic invert	Field Duplicate	ND	*100*	30,276	0.95 U	0.13	76.5	0.58	0.0058	*17.2*	5.2
080610-BT-MC04	MC04	8/6/2010	bentic invert	Regular Sample	ND	*100*	50,747	0.95 U	0.077	56.3	0.24	0.0024	*41.7*	21.1
080310-BT-MC05	MC05	8/3/2010	bentic invert	Regular Sample	ND	*100*	17,143	0.97 U	0.11	72.7	0.55	0.0055	*18.2*	3.1
082213-ST-MC01-01	MC01	8/22/2013	bentic invert	Regular Sample	ND	*94*	31,565	0.95 U	0.11	85.7	0.43	0.0043	*21.9*	7.3
082213-ST-MC02-01	MC02	8/22/2013	bentic invert	Regular Sample	ND	*100*	34,713	2.4	0.1	167	1.58	0.0158	*6.3*	2.2
082213-ST-MC03-01	MC03	8/22/2013	bentic invert	Regular Sample	ND	*89*	27,400	1 U	0.15	96.4	0.34	0.0034	*26.2*	8.1
082113-ST-MC04-01	MC04	8/21/2013	bentic invert	Regular Sample	ND	*500*	22,875	1.4	0.099	231	1.7	0.017	*29.4*	1.3
082213-ST-MC05-01	MC05	8/22/2013	bentic invert	Regular Sample	--	--	18,540	--	--	--	1.84	0.0184	--	1.0
092315-BT-MC01	MC01	9/23/2015	bentic invert	Regular Sample	ND	*190*	12,809	0.99 U	0.055	55.2	1.4	0.014	*13.6*	0.9
092315-BT-MC02	MC02	9/23/2015	bentic invert	Regular Sample	ND	*240*	18,290	1 U	0.049	74.9	0.84	0.0084	*28.6*	2.2
092215-BT-MC03	MC03	9/22/2015	bentic invert	Regular Sample	ND	*250*	7,744	0.98 U	0.057	29.2 J	0.98	0.0098	*25.5*	0.8
092215-BT-MC03-D	MC03	9/22/2015	bentic invert	Field Duplicate	ND	*230*	8,214	1 U	0.061	55 J	1.1	0.011	*20.9*	0.7
092215-BT-MC04	MC04	9/22/2015	bentic invert	Regular Sample	ND	*210*	7,340	0.99 U	0.071	52.5	0.92	0.0092	*22.8*	0.8
092215-BT-MC05	MC05	9/22/2015	bentic invert	Regular Sample	ND	*240*	7,563	1 U	0.071	46.2	1.2	0.012	*20.0*	0.6

Table 2. Summary of Tissue Concentration Data
Remedial Investigation Report
Universal Oil Products (UOP), OU2
East Rutherford, NJ

					Not Lipid Normalized								Lipid Normalized	
Sample ID	Location	Date	Tissue Type	Sample Type	Total Aroclors	Total Aroclors (NDs = RL)	Sum of 12 Congeners	Chromium	Mercury	Methyl mercury	% Lipids	Lipid	Total Aroclors (NDs = RL)	Sum of 12 Congeners
					ug/kg	ug/kg	pg/g	mg/kg	mg/kg	ng/g	%	g/g	ug tPCB/ g lipid	ug tPCB/ g lipid
080510-FT-MC01	MC01	8/5/2010	mummichog	Regular Sample	ND	*100*	37,998	2.5	0.11	45.8	1.2	0.012	*8.3*	3.2
080510-FT-MC02	MC02	8/5/2010	mummichog	Regular Sample	322	322	57,036	2	0.14	179	1.1	0.011	29.3	5.2
080610-FT-MC03	MC03	8/6/2010	mummichog	Regular Sample	ND	*100*	64,999	0.96 U	0.15	38.6 J	1.3	0.013	*7.7*	5.0
080610-FT-MC03-D	MC03	8/6/2010	mummichog	Field Duplicate	140	140	58,407	0.98 U	0.11	110 J	1.2	0.012	11.7	4.9
080510-FT-MC04	MC04	8/5/2010	mummichog	Regular Sample	ND	*100*	52,404	0.97 U	0.064	102	1.1	0.011	*9.1*	4.8
080310-FT-MC05	MC05	8/3/2010	mummichog	Regular Sample	156	156	56,892	1 U	0.089	97.6	1.6	0.016	9.8	3.6
081913-FT-MC01-01	MC01	8/19/2013	mummichog	Regular Sample	ND	*94*	46,654	2	0.082	50.6	0.86	0.0086	*10.9*	5.4
081313-FT-MC02-01	MC02	8/13/2013	mummichog	Regular Sample	ND	*91*	66,176	1.1	0.1	83	0.56	0.0056	*16.3*	11.8
081613-FT-MC03-01	MC03	8/16/2013	mummichog	Regular Sample	ND	*96*	65,071	1 U	0.083	62	0.52	0.0052	*18.5*	12.5
081313-FT-MC04-01	MC04	8/13/2013	mummichog	Regular Sample	ND	*96*	56,637	1.3	0.074	52.1	0.59	0.0059	*16.3*	9.6
081313-FT-MC04-01-D	MC04	8/13/2013	mummichog	Field Duplicate	ND	*93*	52,280	0.97 U	0.073	48.9	0.48	0.0048	*19.4*	10.9
081313-FT-MC05-01	MC05	8/13/2013	mummichog	Regular Sample	ND	*98*	53,660	0.99 U	0.077	51.5	0.79	0.0079	*12.4*	6.8
091515-FT-MC01	MC01	9/15/2015	mummichog	Regular Sample	1013	1013	77,133	1 U	0.17	133	3.5	0.035	28.9	2.2
092315-FT-MC02	MC02	9/23/2015	mummichog	Regular Sample	398	398	65,014	1 U	0.13	117	4	0.04	10.0	1.6
091615-FT-MC03	MC03	9/16/2015	mummichog	Regular Sample	801	801	71,284	0.97 U	0.11	125	4.2	0.042	19.1	1.7
091615-FT-MC04	MC04	9/16/2015	mummichog	Regular Sample	ND	*250*	58,825	1 U	0.08	106	4.4	0.044	5.7	1.3
091515-FT-MC05	MC05	9/15/2015	mummichog	Regular Sample	1176	1176	60,266	1.1 U	0.095	136	3.8	0.038	30.9	1.6
091515-FT-MC05-D	MC05	9/15/2015	mummichog	Field Duplicate	ND	*220*	69,347	0.99 U	0.096	93.6	3.1	0.031	7.1	2.2
Site - Post-NTCRA White Perch														
082113-FT-WP01-01	WP01	8/21/2013	white perch	Regular Sample	--	--	209,897	--	--	--	1.52		--	--
082113-FT-WP04-01	WP04	8/21/2013	white perch	Regular Sample	--	--	454,263	--	--	--	1.54		--	--
082113-FT-WP04-02	WP04	8/21/2013	white perch	Regular Sample	--	--	389,251	--	--	--	1.77		--	--
082113-FT-WP04-03	WP04	8/21/2013	white perch	Regular Sample	--	--	337,836	--	--	--	1.67		--	--
082213-FT-WP02-01	WP02	8/22/2013	white perch	Regular Sample	--	--	371,478	--	--	--	1.64		--	--
082213-FT-WP02-02	WP02	8/22/2013	white perch	Regular Sample	--	--	394,286	--	--	--	1.28		--	--
082213-FT-WP02-03	WP02	8/22/2013	white perch	Regular Sample	--	--	238,105	--	--	--	1.15		--	--
082213-FT-WP03-01	WP03	8/22/2013	white perch	Regular Sample	--	--	411,800	--	--	--	1.86		--	--
091715-FT-WP01	WP01	9/17/2015	white perch	Regular Sample	--	--	165,541	--	--	--	--		--	--
091815-FT-WP03	WP03	9/18/2015	white perch	Regular Sample	--	--	262,900	--	--	--	--		--	--
091815-FT-WP04	WP04	9/18/2015	white perch	Regular Sample	--	--	264,229	--	--	--	--		--	--
092315-FT-WP02	WP02	9/23/2015	white perch	Regular Sample	--	--	282,802	--	--	--	--		--	--

Notes:
J - estimated value
RL - reporting limit
U - parameter not detected above reporting limit shown
Italized values in Total Aroclor results indicate a non-detected result
-- not sampled/analyzed

Table 3. HHRA - Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Scenario Timeframe: Current/future
Medium: Streamlands Wetlands Sediment and Surface Water (Onsite)
Exposure Medium: Sediment (0-6 inches)

Exposure Point	Chemical of Concern	Concentration Detected [1]		Concentration Units	Frequency of Detection [1]	Exposure Point Concentration [2]	Exposure Point Concentration Units	Statistical Measure [2]
		Min	Max					
Sediment	2,3,7,8-TCDD TEQ	2.19E-06	2.71E-03	mg/kg	15/15	2.04E-03	mg/kg	99% Chebyshev (Mean, Sd) UCL
	Total PCBs	1.61E-01	3.54E+02	mg/kg	15/15	2.61E+02	mg/kg	99% Chebyshev (Mean, Sd) UCL

Scenario Timeframe: Current/future
Medium: Streamlands Wetlands Sediment and Surface Water (Onsite)
Exposure Medium: Surface water

Exposure Point	Chemical of Concern	Concentration Detected [1]		Concentration Units	Frequency of Detection [1]	Exposure Point Concentration [2]	Exposure Point Concentration Units	Statistical Measure [2]
		Min	Max					
Surface water	Total Aroclors	6.10E-02	2.67E-01	ug/L	2/12	2.67E-01	ug/L	Max

Scenario Timeframe: Current/future
Medium: Streamlands Wetlands Sediment and Surface Water (Onsite)
Exposure Medium: Fish

Exposure Point	Chemical of Concern	Concentration Detected [1]		Concentration Units	Frequency of Detection [1]	Exposure Point Concentration [2]	Exposure Point Concentration Units	Statistical Measure [2]
		Min	Max					
White perch	2,3,7,8-TCDD TEQ	4.58E-05	1.19E-04	mg/kg	10/10	9.93E-05	mg/kg	95% Student's-t UCL
	Total PCBs	4.89E+00	9.03E+00	mg/kg	7/7	9.03E+00	mg/kg	Max

Key
1: See Tables 2.1 RME to 2.3 RME, Attachment A RAGS Part D Tables, August 2018 Human Health Risk Assessment, Operable Unit 2.
2: See Tables 3.1 RME to 3.3 RME, Attachment A RAGS Part D Tables, August 2018 Human Health Risk Assessment, Operable Unit 2.
2,3,7,8-TCDD TEQ: 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
Min: minimum detected concentration
Max: maximum detected concentration

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

This table presents the primary chemicals of concern (COC) and their exposure point concentrations in sediment, surface water, and white perch (i.e., the concentrations that were used to estimate the exposure and risk/hazard from these COCs. The table includes the range of concentrations detected for 2,3,7,8-TCDD TEQ and PCBs, as well as the frequency of detection (i.e., the number of times the COC was detected in the samples collected at the site), the EPCs and how they were derived.

Table 4. HHRA - Selection of Exposure Pathways
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age [1]	Exposure Route	Type of Analysis	Rationale for Selection or Elimination of Exposure Pathway
Current/Future	Sediment	Sediment	Wetland Sediment (0 to 6 inches) (On-site)	On-Site Trespasser [2]	Adult & Older Child	Ingestion	Quant	Trespassers may contact sediment if they access the site. The site conditions are not conducive for wading or swimming due to heavy vegetation, strong tidal currents at high tide, and soft sediments at low tide. A thick vegetation mat is present above the sediments, hindering access to sediments. Elemental mercury has not been observed on-site.
						Dermal	Quant	
	Surface Water	Surface Water	Wetland Surface Water	On-Site Trespasser [2]	Adult & Older Child	Dermal	Quant	Trespassers may contact surface water if they access the site. The site conditions are not conducive for wading or swimming due to heavy vegetation, shallow water depth, and deep sediments. Elemental mercury has not been observed on-site.
	Sediment/ Surface Water	Fish	Fish (White perch)	Fish Consumer [3]	Adult, Older Child & Younger Child	Ingestion	Quant	It is highly unlikely that trespassers will access the site for fishing. However, if fishing occurs, fish consumers could be exposed to site contaminants in fish caught on-site.
	Sediment (Ackermans South)	Sediment	Wetland Sediment (0 to 6 inches) (Off-site)	Off-Site Trespasser [2]	Adult & Older Child	Ingestion	Quant	Trespassers may contact sediment if they access the Ackermans South area. There is heavy vegetation present at Ackermans South and trespassers would likely need brush-cutting tools to enter the area. The stream that runs through the area is dry except for at high tide and, therefore, does not provide a habitat for fish. Due to the physical characteristics of the Ackermans South area, it is unlikely to be an attractive destination for trespassers.
						Dermal	Quant	

Key

1: The age groups include: younger child (0-6 years old); older child (6-18 years old); and adult (18-16 years old).

2: Trespassing is expected to be an infrequent activity since active rail lines are present along and across the site, the land is patrolled by NJ Transit, and very dense vegetation is present on-site. 3: Fish consumers are assumed to be adult or older child trespassers on-site, or a younger child who eats fish caught on-site.

Quant: quantitative risk analysis performed

Table 5. HHRA - Non-Cancer Toxicity Data Summary
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Pathways: Ingestion of sediment, dermal contact with sediment and surface water, and consumption of fish										
Chemicals of Concern	**Chronic/ Subchronic**	**Oral RfD Value**	**Oral RfD Units**	**Absorption Efficiency (Dermal)**	**Adjusted RfD (Dermal)**	**Adjusted Dermal RfD Units**	**Primary Target Organ**	**Combined Uncertainty / Modifying Factors**	**Sources of RfD Target Organs**	**Dates of RfD**
2,3,7,8-TCDD TEQ [1]	Chronic	7.0E-10	mg/kg-day	50-83%	7.0E-10	mg/kg-day	Developmental, Endocrine System, and Reproductive	30	IRIS	6/10/2018
Total Aroclors [2]	Chronic	2.0E-05	mg/kg-day	80-96%	2.0E-05	mg/kg-day	Dermal, Immune System, and Ocular	300 / 1	IRIS	6/10/2018
Total PCBs [2]	Chronic	2.0E-05	mg/kg-day	80-96%	2.0E-05	mg/kg-day	Dermal, Immune System, and Ocular	300 / 1	IRIS	6/10/2018

Key

1: 2,3,7,8-tetrachlorodibenzo-p-dioxin was used to represent 2,3,7,8-TCDD TEQ

2: Aroclor 1254 was used to represent Total Aroclors and Total PCBs due to the availability of a noncancer toxicity value for this Aroclor

IRIS: Integrated Risk Information System

mg/kg-day: milligrams per kilogram-day

RfD: Oral reference dose

Table 6. HHRA - Cancer Toxicity Data Summary
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Pathways: Ingestion of sediment, dermal contact with sediment and surface water, and consumption of fish							
Chemicals of Concern	Oral Cancer Slope Factor	Cancer Slope Factor Units	Adjusted Cancer Slope Factor (for Dermal)	Adjusted Cancer Slope Factor Units	Weight of Evidence/ Cancer Guideline	Sources	Date
2,3,7,8-TCDD TEQ	1.3E+05	per mg/kg-day	1.3E+05	per mg/kg-day	NA	Cal/EPA	6/10/2018
Total Aroclors	2.0E+00	per mg/kg-day	2.0E+00	per mg/kg-day	B2	IRIS	6/10/2018
Total PCBs	2.0E+00	per mg/kg-day	2.0E+00	per mg/kg-day	B2	IRIS	6/10/2018

Key

Cal/EPA: California Environmental Protection Agency

IRIS: Integrated Risk Information System

mg/kg-day: milligrams per kilogram-day

2,3,7,8-TCDD TEQ: 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

Weight of Evidence definitions:

A: Human carcinogen

B1: Probable human carcinogen - Indicates that limited human data are available

B2: Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans

C: Possible human carcinogen

D: Not classifiable as a human carcinogen

E: Evidence of noncarcinogenicity

HHRA - Cancer Toxicity Data Summary

While 2,3,7,8-TCDD TEQ and PCBs may be carcinogenic, they did not pose an unacceptable carcinogenic risk via any of the exposure pathways evaluated at the site.

Table 7. HHRA - Risk Characterization Summary - Non-Carcinogens
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Wetland Surface Water	Total Aroclors	Dermal, Immune System, and Ocular	--	--	1.20E-01	1.2E-01
Sediment	Sediment	Wetland Sediment (0 to 6 inches)	2,3,7,8-TCDD TEQ	Developmental, Endocrine System, and Reproductive	1.3E-01	--	5.6E-02	1.9E-01
			Total PCBs	Dermal, Immune System, and Ocular	5.8E-01	--	1.2E+00	1.8E+00

Scenario Timeframe: Current/future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Wetland Surface Water	Total Aroclors	Dermal, Immune System, and Ocular	--	--	1.3E-01	1.3E-01
Sediment	Sediment	Wetland Sediment (0 to 6 inches)	2,3,7,8-TCDD TEQ	Developmental, Endocrine System, and Reproductive	2.1E-01	--	4.0E-02	2.5E-01
			Total PCBs	Dermal, Immune System, and Ocular	9.5E-01	--	8.3E-01	1.8E+00

Scenario Timeframe: Current/Future
Receptor Population: Fish Consumer
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface Water	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	Developmental, Endocrine System, and Reproductive	2.9E+00	--	--	2.9E+00
			Total PCBs	Dermal, Immune System, and Ocular	9.2E+00	--	--	9.2E+00

Scenario Timeframe: Current/future
Receptor Population: Fish Consumer
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface Water	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	Developmental, Endocrine System, and Reproductive	3.1E+00	--	--	3.1E+00
			Total PCBs	Dermal, Immune System, and Ocular	1.0E+01	--	--	1.0E+01

Scenario Timeframe: Current/future
Receptor Population: Fish Consumer
Receptor Age: Younger Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface Water	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	Developmental, Endocrine System, and Reproductive	5.1E+00	--	--	5.1E+00
			Total PCBs	Dermal, Immune System, and Ocular	1.6E+01	--	--	1.6E+01

Key
1: See Tables 7.1 RME to 7.5 RME, Attachment A RAGS Part D Tables, August 2018 Human Health Risk Assessment, Operable Unit 2.
2,3,7,8-TCDD TEQ: 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

HHRA - Risk Characterization Summary - Non-Carcinogens

PCB (as either total PCBs or PCB Aroclors) in OU2 wetlands sediment (0 to 6 inches) and 2,3,7,8-TCDD TEQ and total PCBs in white perch posed unacceptable non-cancer hazards at the site. Hazard indices for sediment in the Ackermans South area were below 1.0 and, therefore, not included here.

Table 8. HHRA - Risk Characterization Summary - Carcinogens
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Wetland Surface Water	Total Aroclors	--	--	5E-07	5E-07
Sediment	Sediment	Wetland Sediment (0 to 6 inches)	2,3,7,8-TCDD TEQ	1E-06	--	6E-07	2E-06
			Total Aroclors	2E-06	--	4E-06	6E-06
			Total PCBs	3E-06	--	5E-06	8E-06

Scenario Timeframe: Current/future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Wetland Surface Water	Total Aroclors	--	--	9E-07	9E-07
Sediment	Sediment	Wetland Sediment (0 to 6 inches)	2,3,7,8-TCDD TEQ	3E-06	--	6E-07	4E-06
			Total Aroclors	4E-06	--	4E-06	8E-06
			Total PCBs	6E-06	--	6E-06	1E-05

Scenario Timeframe: Current/Future
Receptor Population: Fish Consumer
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	3E-05	--	--	3E-05
			Total PCBs	4E-05	--	--	4E-05

Scenario Timeframe: Current/future
Receptor Population: Fish Consumer
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	5E-05	--	--	5E-05
			Total PCBs	7E-05	--	--	7E-05

Scenario Timeframe: Current/future
Receptor Population: Fish Consumer
Receptor Age: Younger Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment/ Surface	Fish	Fish (White perch)	2,3,7,8-TCDD TEQ	4E-05	--	--	4E-05
			Total PCBs	6E-05	--	--	6E-05

Key
1: See Tables 7.1 RME to 7.5 RME, Attachment A RAGS Part D Tables, August 2018 Human Health Risk Assessment, Operable Unit
2,3,7,8-TCDD TEQ: 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

HHRA - Risk Characterization Summary

While 2,3,7,8-TCDD TEQ and PCBs may be carcinogenic, they did not pose unacceptable carcinogenic risks via any of the exposure routes evaluated at the site.

Table 9. Receptor Groups, Representative Taxa and Measurement Endpoints for Waterways Habitat in the Ecological Risk Assessment
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Endpoint Receptor Group	Representative Taxa	Measurement Endpoints	
		Exposure	Effect
Fish and water column biota community	Fish: mummichog, white perch; invertebrates: rotifers, copepods	• Surface water EPCs • Tissue EPCs	• Surface WQC • Tissue TRVs
Benthic invertebrate community	Polychaetes, amphipods, grass shrimp, blue crab	• Sediment EPCs • Divalent metal bioavailability (AVS/SEM) • Tissue EPCs	• NJDEP SQGs • ERED Tissue TRVs • 28-day Laboratory Bioassays
Piscivorous and invertivorous bird populations	Great blue heron; spotted sandpiper	• Deterministic exposure models • Diet-to-egg models (mercury)	• NOAEL and LOAEL TRVs • ED_{10} and ED_{20} TRVs
Omnivorous mammal populations	Raccoon	• Deterministic exposure models	• NOAEL and LOAEL TRVs • ED_{10} and ED_{20} TRVs
Herbivorous mammal populations	Muskrat	• Deterministic exposure models	• NOAEL and LOAEL TRVs • ED_{10} and ED_{20} TRVs

Notes:
AVS/SEM - acid volatile sulfides/simultaneously extracted metals
ED10 – 10 percent effect dose
ED20 – 20 percent effect dose
EPC - exposure point concentration
ERED – Environmental Residue Effects Database
LOAEL – Lowest-observed-adverse-effect level
NJDEP – New Jersey Department of Environmental Protection
NOAEL – no observed adverse effect level
SQG - sediment quality guideline
TRV – toxicity reference value
WQC – water quality criteria

Table 10. Receptor Groups, Representative Taxa and Measurement Endpoints for Marsh Habitat in the Ecological Risk Assessment
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Assessment Endpoints (Survival, Growth, and Reproduction)	Representative Taxa	Measurement Endpoints	
		Exposure	Effect
Marsh invertebrate community	Fiddler crab, emerging insects, spiders	• Sediment EPCs • Tissue EPCs	• Surface WQC • Tissue TRVs
Invertivorous bird populations	Marsh wren; red-winged blackbird	• Deterministic exposure models • Diet-to-egg models (mercury)	• NOAEL and LOAEL TRVs • ED_{10} and ED_{20} TRVs
Herbivorous mammal populations	Muskrat	• Deterministic exposure models	• NOAEL and LOAEL TRVs • ED_{10} and ED_{20} TRVs

Notes:
ED_{10} – 10 percent effect dose
ED_{20} – 20 percent effect dose
EPC - exposure point concentration
ERED – Environmental Residue Effects Database
LOAEL – Lowest-observed-adverse-effect level
NJDEP – New Jersey Department of Environmental Protection
NOAEL – no observed adverse effect level
TRV – toxicity reference value
WQC – water quality criteria

Table 11. Summary Hazard Quotients for OU2 Sediment
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Sample Type	Contaminants	Sediment Quality Guideline	Frequency of Exceedance	Hazard Quotient (HQ)		
				Maximum	Mean	UCL
Waterway (mg/kg)						
Grab Samples	Chromium	110	8 / 20	114.5	11.1	49.2
	Mercury	0.71	17 / 26	201.4	25.4	70.4
	Methyl Mercury	0.71	0 / 24	0.2	0.01	0.1
	Total PCBs (Aroclors)	5.3	8 / 25	106.4	8.8	54.2
	Total PCBs (Homologs)	5.3	3 / 13	68.6	6.0	58.1
Sediment Trap Samples	Chromium	110	26 / 27	14.6	4.7	6.0
	Mercury	0.71	27 / 27	42.0	17.4	20.5
	Total PCBs (Aroclors)	5.3	11 / 24	65.3	6.0	18.6
	Total PCBs (Homologs)	5.3	3 / 3	4.2	3.5	-
Marsh (mg/kg) – recently deposited sediment						
Turf Mat Samples	Chromium	110	32 / 35	6.9	2.3	2.7
	Mercury	0.71	34 / 34	21.5	12.3	13.7
	Total PCBs (Homologs)	5.3	2 / 39	3.3	0.4	0.5
Sediment Trap Samples	Chromium	110	3 / 3	8.8	5.0	-
	Mercury	0.71	3 / 3	48.7	30.6	-
	Total PCBs (Aroclors)	5.3	3 / 3	11.8	5.5	-
	Total PCBs (Homologs)	5.3	0 / 1	0.6	0.4	-

Notes:
Shaded HQs are >1.0
"-" indicates that no 95% upper confidence limits were calculated due to low sample size and/or too few detections; ½ the method detection limit (MDL) used to estimate results reported as non-detects

Table 12. Summary Hazard Quotients for OU2 Tissue
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Contaminants	Effect Level	Frequency of Exceedance	Hazard Quotient (HQ)		
			Maximum	Mean	UCL
Benthic macroinvertebrates – Grass shrimp (mg/kg wet weight)					
Mercury	1.64	0 / 8	0.3	0.1	0.2
Total PCBs (Aroclors)	1.1	1 / 8	1.6	0.2	-
Fish – Mummichog (mg/kg wet weight)					
Mercury	1.31	0 / 12	0.3	0.2	0.2
Methyl mercury)	0.71	0 / 13	0.6	0.3	0.3
Total PCBs (Aroclors)	7.55	1 / 13	1.0	0.5	0.7

Notes:

Shaded HQs are >1.0

"-" indicates that no 95% upper confidence limits were calculated due to low sample size and/or too few detections; ½ the method detection limit (MDL) used to estimate results reported as non-detects

Table 13. Summary Hazard Quotients for OU2 Surface Water
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Contaminants	Standard or Criterion	Frequency of Exceedance	Hazard Quotient (HQ)	
			Maximum	Mean
Chromium	10	0 / 12	0.11	0.2
Mercury	0.77	0 / 12	0.0	0.1
Total PCBs (Aroclors)	0.014	0 / 8	0.1	0.04

Notes:
Shaded HQs are >1.0
½ the method detection limit (MDL) used to estimate results reported as non-detects

Table 14. Summary of Deterministic Risk Estimates for Wildlife Receptors
Record of Decision
Universal Oil Products (UOP), OU2
East Rutherford, NJ

Contaminant	Receptor	Hazard Quotient (HQ)[1]			
		Lower Range[2]		Upper Range[2]	
		NOAEL	LOAEL	NOAEL	LOAEL
Waterways					
Chromium	Muskrat	5.53	1.38	33.05	8.24
	Raccoon	6.20	1.55	31.34	7.82
	Great blue heron	3.67	0.62	25.87	4.40
	Spotted sandpiper	67.04	11.41	318.56	54.21
Mercury	Muskrat	0.02	0.00	0.07	0.01
	Raccoon	0.02	0.00	0.06	0.01
	Great blue heron	0.43	0.22	1.58	0.79
	Spotted sandpiper	6.23	3.12	17.80	8.90
Methyl mercury	Muskrat	0.00	0.00	0.13	0.03
	Raccoon	0.66	0.13	4.06	0.81
	Great blue heron	1.04	0.21	7.47	1.49
	Spotted sandpiper	3.11	0.62	19.09	3.82
TEQ (PCBs)	Muskrat	0.57	0.13	23.44	5.27
	Raccoon	1.38	0.31	65.1	14.65
	Great blue heron	15.08	1.51	465.92	46.59
	Spotted sandpiper	85.07	8.51	3283.13	328.31
Total PCBs (Aroclors)	Muskrat	0.46	0.08	4.9	0.79
	Raccoon	0.59	0.09	38.01	6.15
	Great blue heron	5.25	0.52	144.64	14.46
	Spotted sandpiper	28.06	2.81	1195.37	119.54
Total PCBs (Homologs)	Muskrat	0.32	0.05	9.68	1.57
	Raccoon	1.21	0.2	28.72	4.65
	Great blue heron	8.12	0.81	675.69	67.57
	Spotted sandpiper	18.53	1.85	713.26	71.33
Marsh					
Chromium	Muskrat	5.17	1.29	14.65	3.65
	Marsh wren	7.47	1.27	57.66	9.81
	Red-winged blackbird	7.31	1.24	40.63	6.91
Mercury	Muskrat	0.03	0.00	0.05	0.00
	Marsh wren	1.0	0.50	18.42	9.21
	Red-winged blackbird	0.98	0.49	11.31	5.65
Methyl mercury	Muskrat	0.01	0.00	0.07	0.01
	Marsh wren	0.28	0.06	0.78	0.16
	Red-winged blackbird	0.14	0.03	0.46	0.09
TEQ (PCBs)	Muskrat	0.48	0.11	8.71	1.96
	Marsh wren	4.76	0.48	458.34	45.83
	Red-winged blackbird	4.65	0.47	274.98	27.50

Contaminant	Receptor	Hazard Quotient (HQ)[1]			
		Lower Range[2]		Upper Range[2]	
		NOAEL	LOAEL	NOAEL	LOAEL
Total PCBs (Aroclors)	Muskrat	0.08	0.01	0.52	0.08
	Marsh wren	0.3	0.03	11.79	1.18
	Red-winged blackbird	0.25	0.02	7.99	0.80
Total PCBs (Homologs)	Muskrat	0.10	0.02	1.82	0.29
	Marsh wren	0.24	0.02	6.90	0.69
	Red-winged blackbird	0.25	0.02	4.66	0.47

Notes:

Shaded HQs are =>1.0

½ the method detection limit (MDL) used to estimate results reported as non-detects

NOAEL– no-observed adverse effect level

LOAEL – lowest-observed adverse effect level

Ratio of selected exposure point concentration (EPC) divided by either a NOAEL- or LOAEL-based toxicity reference value (TRV); all results based on assumption that receptor forages entirely at OU2 (i.e., area use factor [AUF] = 1.0.)

Range of HQs presented based on either modeled or measured results and statistical metric (i.e., mean or UCL)

Table 15. Action-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
State of New Jersey Statutes and Rules	Technical Requirements for Site Remediation	N.J.A.C. 7:26E	Establishes minimum regulatory requirements for investigation and remediation of contaminated sites in New Jersey under New Jersey cleanup programs.	ARAR. Substantive provisions potentially relevant and appropriate.
Federal Resource Conservation and Recovery Act	Identification and Listing of Hazardous Waste	40 CFR 261	Identifies solid wastes subject to regulation as hazardous wastes.	Potential ARAR. Applicable if any hazardous waste will be generated as part of remedy, possibly including spent carbon or contaminated soil. Hazardous waste must be handled and disposed of in accordance with RCRA. Chemical testing and characterization of waste required.
Federal Resource Conservation and Recovery Act	Standards Applicable to Generators of Hazardous Waste	40 CFR 262	Establishes requirements (*e.g.,* EPA ID numbers and manifests) for generators of hazardous waste.	Potential ARAR. Dredged material will be characterized for disposal and to the extent material is characterized as hazardous, it would be managed as hazardous waste.
Federal Resource Conservation and Recovery Act	Standards Applicable to Owners and Operators of Treatment, Storage and Disposal Facilities	40 CFR 264	Establishes the minimum national standards that define acceptable management of hazardous waste.	Potential ARAR. Applicable to the management of dredged material that is characterized as hazardous, if any.
Federal Resource Conservation and Recovery Act	Standards Applicable to Transporters of Hazardous Waste	40 CFR 263	Establishes standards that apply to persons transporting manifested hazardous waste within the U.S.	Potential ARAR. Applicable for the transport of dredged material characterized as hazardous, if any.
Department of Transportation	Requirements for Packaging, Labeling and Marking Hazardous Waste for Transport	49 CFR 172, 173, 178 and 179	Transportation of hazardous materials on public roadways must comply with these requirements.	Potential ARAR. Applicable to the extent that dredged material is characterized as hazardous, if any.
Federal Clean Water Act	Guidelines for Specification of Disposal Sites for Dredged or Fill Material	CWA §404, 40 CFR Part 230	Regulates the discharge of dredged or fill material into the waters of the United States, including wetlands.	ARAR. Applicable.
Federal Clean Water Act	Compensatory Mitigation for Losses of Aquatic Resources	40 CFR §§ 230.91-98	In the event of wetland removal or filling, compensatory mitigation needed to offset unavoidable adverse impacts to wetlands, streams, and other aquatic resources is required.	ARAR. Applicable.

Table 15. Action-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
Toxic Substances Control Act	Regulates toxic substances; PCB Wastes	15 U.S.C. §§ 2601et seq., 40 CFR Part 761 Subpart D; 40CFR Part 761.60	Regulates handling, storage and disposal of PCB remediation waste.	Potential ARAR. Applicable to the extent that dredged material contains PCBs in excess of 50 mg/kg.
Mercury Export Ban Act	Mercury Regulations	Public Law 110-414, (122 STAT. 4341–4348)	Establishes export and resale ban of elemental mercury-containing materials. Remediation waste may be exported for treatment or disposal but not for sale or reuse of any recovered mercury.	Potential ARAR. Applicable if the remedy generates dredged material for disposal containing elemental mercury.
New Jersey Solid Waste Management Act (N.J.S.A. 13:1E-1 et seq.)	State Waste Management Program	N.J.S.A. 13:1E-1 et seq. N.J.A.C. 7:26-16 N.J.A.C. 7:26-16A	Establishes standards for the landfilling of solid waste in New Jersey.	Potential ARAR. Applicable to the collection, transportation, treatment, storage, transfer, or disposal of solid waste or hazardous waste in New Jersey.
Federal Clean Water Act	Water Quality Certification	CWA § 401	Requires any applicant for a federal license or permit that may result in a discharge into navigable waters to obtain certification of compliance with state effluent discharge standards.	Potential ARAR. Applicable if remedy involves discharges to navigable waters. Dredging and capping must comply with substantive standards.
Water Pollution Control Act	Protection of Water	33 U.S.C. 1251	Protects and maintains the chemical, physical, and biological integrity of the nation's water.	Potential ARAR. Applicable if the remedy may affect water quality.
Effluent Limitations	Discharge Requirements	33 U.S.C. 1251 Section 301	Technology-based discharge limitations for point sources of conventional, nonconventional, and toxic pollutants.	Potential ARAR. Applicable if the remedy includes discharge of wastewater containing regulated pollutants.
Disposal of Dredged and Fill Material	Requires Permitting of Discharges of Dredged and Fill Material to Navigable Waters	33 U.S.C. 1251 Section 404	Requires permitting of discharges of dredged and fill material to navigable waters.	Potential ARAR. Applicable if remedy requires discharge of dredged and fill material to navigable waters. Dredging and capping must comply with substantive standards.

Table 15. Action-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
New Jersey Pollutant Discharge Elimination System and Surface Water Criteria	Surface Water Discharge Criteria; New Jersey Criteria for Surface Water Quality	N.J.A.C. 7:14A; N.J.A.C. 7:9B	Describes the procedures associated with permitting operations that treat and discharge wastewater. N.J.A.C. 7:9B lists Surface Water Quality Standards.	ARAR. N.J.A.C.7:14A is applicable for the discharge of treated water to surface water. N.J.A.C 7:9B is a potential ARAR if treated water is discharged to surface waters.
Treatment Works Approval	Wastewater Treatment and Sludge Dewatering	N.J.A.C. 7:14A-22	Describes the applicability of the Treatment Works Approval regulations.	ARAR. Technical requirements are applicable to remedy if it includes the treatment of more than 8,000 gallons per day of wastewater and the construction of a facility that will dewater and store sludge.
Sludge Quality Assurance	Operating Requirements for Sludge Generation Processes	N.J.A.C. 7:14C	Describes the operating, sampling, and reporting requirements for the various types of treatment categories (also described in this subchapter).	Potential ARAR. Technical requirements for remedy associated with operating a wastewater treatment system that generates sludge residuals.
Water Pollution Control	Notification of Spills	N.J.A.C. 7:1E(5.3)	Requires immediate notification of any spill of hazardous substances.	Potential ARAR if remedy results in a spill of a hazardous substance. Spill notification requirements.
Disposition of Material Generated During Site Investigations (NJDEP)	Investigation-Derived Waste Management	NJDEP's Guidance Document	Provides guidance on the disposition of investigation-derived waste.	TBC.
Noise Pollution	Restrictions of Noise	N.J.A.C. 7:29-1	Sets maximum limits of sound from any industrial, commercial, public service, or community service facility.	Potential ARAR. Relevant and appropriate for establishing noise levels.
New Jersey Soil Erosion and Sediment Control Act	Soil Erosion and Sediment Control	N.J.S.A. 4:24-42; N.J.A.C. 2:90-1.1 et seq.)	Regulates construction that will potentially result in erosion of soils.	Potential ARAR. Applicable if remedy results in total land disturbance greater than or equal to 5,000 ft^2.
Stormwater Management Rules	Stormwater Management	N.J.A.C. 7:8	Design and performance standards for stormwater management measures, including those to be implemented during construction to minimize a construction site's impact on surface water.	Potential ARAR. Applicable if remedy includes total land disturbance of greater than or equal to 1 acre.

Table 15. Action-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
New Jersey Division of Fish and Wildlife	Water Lowering; Protection of Biological Resources	N.J.A.C. 7:25-6.25	Describes requirements for lowering water levels for purposes other than water supply (authorized by N.J.A.C. 7:19) or agricultural, aquacultural, or horticultural (authorized by N.J.A.C. 7:20).	ARAR. N.J.A.C. 7:25-6.25 is applicable to dewatering to facilitate removal of sediment 'in the dry.'
Federal Clean Water Act; Quality Criteria for Water	NPDES; Toxic Pollutant Effluent Standards; Water Quality Criteria	40 CFR 122 and 125; 40 CFR 129; 40 CFR 131 Quality Criteria for Water, 1976, 1980, and 1986	Regulates discharge into navigable waters. Establishes criteria and standards for imposing treatment requirements on permits. Establishes effluent standards or prohibitions for certain toxic pollutants (*i.e.,* aldrin and dieldrin, DDT, DDD, DDE, endrin, toxaphene, benzideine, and PCBs).	State ARAR takes precedence for discharge permit-equivalent. NPDES permit not required, since New Jersey has an approved SPDES permit program (NJDPES). New Jersey-specific standards are listed in N.J.A.C. 7:9B for discharges to surface water and N.J.A.C. 7:9C for discharges to groundwater. As water is discharged to surface water, these are used in setting effluent discharge limits.

Table 15. Action-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
Notes: ARAR = Applicable or Relevant and Appropriate Requirement CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980 CFR = Code of Federal Regulations CWA = Clean Water Act EPA = U.S. Environmental Protection Agency ft^2 = square foot (feet) ID = identification N.J.A.C. = New Jersey Administrative Code N.J.S.A. = New Jersey Statutes Annotated NAAQS = National Ambient Air Quality Standards N.J.S.A. = New Jersey Statutes Annotated NAAQS = National Ambient Air Quality Standards			NJDEP = New Jersey Department of Environmental Protection NJPDES = New Jersey Pollutant Discharge Elimination System NPDES = National Pollutant Discharge Elimination System OSHA = Occupational Safety and Health Act OSRTI = Office of Superfund Remediation and Technology Innovation OSWER = Office of Solid Waste and Emergency Response PCB = polychlorinated biphenyl PRP = potentially responsible party RCRA = Resources Conservation and Recovery Act of 1976 RI/FS = Remedial Investigation/Feasibility Study SARA = Superfund Amendments and Reauthorization Act of 1986 SPDES = State Pollutant Discharge Elimination System TSCA = Toxic Substances Control Act of 1976 TSDF = treatment, storage, and disposal facility U.S. = United States U.S.C. = United States Code USACE = U.S. Army Corps of Engineers	

Table 16. Location-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
Clean Water Act	Regulates discharge of dredged or fill material into wetlands	33 U.S.C. 1251 Section 404, 40 CFR 230, 231	Regulates discharge of dredged or fill material into waters of the United States, including wetlands and return flows from such activity. Implemented through regulations in 404(b)(1) guidelines, 40 CFR Part 230	ARAR. Applicable.
Policy Floodplains and Wetlands Assessment	Floodplain assessment	EPA 1985 Statement	Provides federal policy for the assessment of floodplains and wetlands.	TBC.
Executive Order Protecting Wetlands	Protects wetlands	Executive Order No. 11990; 40 CFR, Appendix A, §3c	Directs federal agencies to minimize the destruction, loss, or degradation of all wetlands affected by federal activities.	TBC.
Fish and Wildlife Coordination Act	Requires approval for modification of water body	16 U.S.C. 661 40 CFR 2 6:302(g)	Requires consultation with the USFWS when a federal department or agency proposes or authorizes any modification of any stream or other water body, and adequate provision for protection of fish and wildlife resources.	ARAR. Consultation will occur during remedial design.
Freshwater Wetlands Protection Act	Establishes freshwater wetlands regulated activities.	N.J.S.A. :13:9B-1, N.J.A.C 7:7A	Regulates construction or other activities that will have an impact.	ARAR. Best management practices will be used during implementation of remedy to avoid or minimize adverse impact on aquatic habitat.
New Jersey Waterfront Development Law (N.J.S.A. 12:5-3) and Coastal Permit Programs (N.J.S.A. 13:19-1 et seq.; 12:3-1 et seq., 12:5-3; 13:9A-1 et seq.)	Provides Waterfront development and coastal zone management	Coastal Zone Management Program N.J.A.C. 7:7	Regulates waterfront development, including sediment removal and fill, at or below mean high water and up to 500 ft from mean high water in the coastal zone and tidal waters of the State, in all areas containing tidal wetlands, and in the Hackensack Meadowlands District. The rules are used in the review of water quality certificates subject to Section 401 of the Federal Clean Water Act, and Federal consistency determinations under Section 307 of the Federal Coastal Zone Management Act, 16 U.S.C. § 1456.	Potential ARAR. Applicable to any construction, sediment removal, or filling activities within tidal wetlands and the Hackensack Meadowlands.

Table 16. Location-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
Magnuson-Stevens Fishery Conservation and Management Act, as amended and authorized by the Sustainable Fisheries Act	Protects fish habitat	Public Law 94-265	Requires that federal agencies consult with National Marine Fisheries Services on actions that may adversely affect essential fish habitats to evaluate the potential impacts.	Potential ARAR. Applicable if the relevant fishery council has designated any area where remedial work will occur as essential fish habitat.
New Jersey Tidelands Act (Riparian Lands Licenses, Leases, Grants and Conveyances [N.J.S.A. 12:3-1 et seq.])	Protects tidelands	N.J.S.A. 12:3-1 et seq.	Requires a tidelands license, lease, grant, or conveyance for the use of state-owned riparian lands, including sediment removal from rivers. Substantive requirements include preparation of plans by professional engineer depicting the limits of the tidelands instrument, notice to upland property owners.	Potential ARAR. Applicable to dredging and capping in State riparian lands inundated by the mean high tide of a natural waterway, except for those lands where it has already conveyed its interest in the form of a riparian grant. Permission must be obtained to disturb tideland areas.
Migratory Bird Treaty Act	Protects migratory birds	16 U.S.C. § 703-712	Requires that federal agencies consult with USFWS during the RD and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	ARAR. Applicable. Consultation with USFWS will occur during RD.
New Jersey Meadowlands Commission	Protects Hackensack Meadowlands District	N.J.A.C. 19:3-4	Regulates all activities in the Hackensack Meadowlands District. Contains performance standards regarding wastewater, hazardous substances, noise, and vibrations.	ARAR. Applicable. Performance standards will be addressed during RD.
Rivers and Harbors Act of 1899	Dredging and fill work in navigable waterways	33 U.S.C. §§ 401–403. Dredging in Navigable Waters of the United States 33 CFR Part 322	Governs coordination of activities occurring in navigable waters of the United States. Activities that could impede navigation and commerce are prohibited.	Potential ARAR. Consultation with USACE will occur.

Table 16. Location-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
National Historic Preservation Act	Protects National Register of Historic Places	16 U.S.C. § 470 et seq., 36 CFR 800	Establishes procedures to provide for preservation of scientific, historical, and archaeological data that might be destroyed through alteration of terrain because of a federal construction project or a federally licensed activity or program. If scientific, historical, or archaeological artifacts are discovered at the site, work affected by such discovery will be halted pending the completion of any data recovery and preservation activities required pursuant to the Act and its implementing regulations. New Jersey administers this program within the state and has integrated the New Jersey Register of Historic Places program with the National Register Program.	Potential ARAR. Applicable if any part of the remedy impacts areas listed or eligible for listing in the National Register of Historic Places, or if scientific, historic, or archaeological artifacts are identified during implementation of the remedy.
New Jersey Register of Historic Places Act	Protects New Jersey Register of Historic Places	N.J.A.C. 7:4 N.J.S.A 13:1B-15.128 et seq.	The New Jersey Register of Historic Places Act requires that actions by state, county, or local governments, which may impact a property listed in the New Jersey Register of Historic Places, be reviewed and authorized through the HPO.	Potential ARAR. Applicable if any part of the remedy impacts areas listed in the New Jersey Register of Historic Places or if scientific, historic, or archaeological artifacts are identified during implementation of the remedy.
New Jersey Threatened Plant Species	Lists threatened plant species	New Jersey's Threatened Plant Species	Lists threatened plant species.	ARAR if remedial actions will be completed in an area where threatened plant species are present. Consultations to be completed prior to initiating activities.
New Jersey Endangered Species Act	Lists threatened habitats where endangered species occur	N.J.S.A 23:21 and N.J.A.C. 7:5C	Lists threatened habitats where endangered species occur.	Potential ARAR. Consultations to be completed prior to initiating activities to determine if remedial actions will be completed in an area where listed species are present.
Federal Endangered Species Act	Protects threatened and endangered species	16 U.S.C. §§1530-1544.	Standards for the protection of threatened and endangered species.	Potential ARAR if endangered or threatened species are present in OU2 area.

Table 16. Location-Specific Applicable or Relevant and Appropriate Requirements

Act or Authority	Criteria and Issues	Citation	Brief Description	Applicability
New Jersey Flood Hazard Control Act; Flood Hazard Area Regulations	Protects floodplains; delineates flood hazard areas	N.J.S.A. 58:16A; N.J.A.C. 7:13	Protects floodplains through permitting requirements for construction and development activities; delineates flood hazard areas and regulates use.	ARAR. Evaluate site conditions to determine if remedial activities are in or near a 100- or 500-year floodplain. Proceed according to the regulatory requirements associated with floodplains.

Notes:

ARAR = Applicable or Relevant and Appropriate Requirement

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980

CFR = Code of Federal Regulations

CWA = Clean Water Act

EPA = U.S. Environmental Protection Agency

ft = foot (or feet)

HPO = Historic Preservation Office

N.J.A.C. = New Jersey Administrative Code

N.J.S.A. = New Jersey Statutes Annotated

NWP = Nationwide Permit

OSWER = Office of Solid Waste and Emergency Response

RD = remedial design

RCRA = Resource Conservation and Recovery Act of 1976

TBC = to be considered

U.S.C. = United States Code

USACE = U.S. Army Corps of Engineers

USFWS = U.S. Fish and Wildlife Services

Table 17. Summary of Alternatives Costs

Cost Type	Alternative 2: Removal of 1 ft of Waterway Sediment and Backfill ($)	Alternative 3: Removal of 2 ft of Waterway Sediment and Backfill ($)	Alternative 4: Removal of All Waterway Sediment and Backfill ($)
Total Estimated Present Worth Costs			
Direct Capital Cost	9,937,367	12,905,719	15,529,181
Indirect Capital Cost	906,364	885,718	1,043,126
Recurring Cost	1,585,040	1,655,786	1,786,959
Contingency (20%)	2,485,754	3,089,445	3,671,853
Total Estimated Costs	**14,914,525**	**18,536,668**	**22,031,119**
Net Present Value	**14,571,357**	**18,178,328**	**21,644,648**
Estimated Range of Costs (Class 4)			
-30%	10,440,000	12,976,000	15,422,000
+50%	22,372,000	27,805,000	33,047,000
Summary of Direct Costs by Area (specifically, excavation, backfill, sediment management, transport, and disposal). Note, these costs are already included in the Total Estimated Costs.			
OU2 West	4,098,087	4,694,542	5,096,538
Ackermans South	1,098,633	1,455,623	1,837,613

Notes:

Costs included in this table reflect the costs for the OU2 remedy. Additional costs for the groundwater monitoring to address remaining OU1 concerns are estimated to be approximately $234,000 (net present value of $211,000).

% = percent

OU = operable unit

ft = foot (feet)

Table 18. Alternative Components and Cost Estimating Assumptions

Cost Component	Alternative 1: No Action	Alternative 2: Removal of 1 Foot of Waterway Sediment and Backfill	Alternative 3: Removal of 2 Feet of Waterway Sediment and Backfill	Alternative 4: Removal of All Waterway Sediment and Backfill
Construction Duration (does not include any shutdowns)	—	8.5 months	11.5 months.	14 months.
Remedial Design	—	Assume 8% of total construction cost plus permitting and predesign testing. Percentage based on EPA *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000), hereafter referred to as EPA FS Cost Guidance.	Same as Alternative 2.	Same as Alternative 2.
Predesign Sampling and Testing	—	Assume survey is needed to establish sediment elevations, confirm soft sediment thicknesses in channels, and establish channel boundaries. Due to shallow water depths, survey will likely need to be done using traditional land surveying techniques rather than a bathymetry survey. Also, assume in situ sampling required to delineate TSCA from non-TSCA regulated dredge material and waste classification. Estimate assumes: • 75 samples collected for total PCB Aroclors ($45 per sample). Sample unit rates based on 2015-2016 Honeywell MSA laboratory rate averages. • A 5-day sampling event with three staff; sampling event would require specialty subcontractor (vibracore with shallow-depth work platform). Subcontractor costs approximately $10,000 for mobilization and demobilization and $5,000/day rate.	Same as Alternative 2.	Same as Alternative 2.
Permitting	—	Allowance included for permitting and permitting equivalency package preparation and agency coordination. Allowance assumes approximately $35,000 for drafting NJDEP permit equivalency package and initial stakeholder coordination. Based on the NTCRA, the following permit equivalency packages are assumed to be required: • NJPDES (BGR and 5G3) Groundwater Remediation Cleanup and Construction Activity Stormwater General Permit (issued by NJDEP Division of Water Quality, Bureau of Surface Water Permitting) • Treatment Works Approval for the construction of the WWTP (issued by the NJDEP Division of Water Quality) • Water Lowering permit equivalent (issued by the NJDEP Division of Fish and Wildlife, Bureau of Freshwater Fisheries) • Permit equivalent for the Waterfront Development Act, Flood Hazard Area Control Act, and freshwater wetlands (issued by the NJDEP Land Use Regulation Program) • New Jersey Administrative Code 7:27, Subchapter 8, Air Permit equivalency package (issued by the NJDEP Bureau of Air Compliance and Enforcement)	Same as Alternative 2.	Same as Alternative 2.
Performance Bond	—	Assume 2% of total construction cost.	Same as Alternative 2.	Same as Alternative 2.
Mobilization	—	Allowance included for mobilization.	Same as Alternative 2.	Same as Alternative 2.
Preremediation Site Work and General Conditions	—	Due to the limited amount of land area in the Meadowlands, the FS assumes the currently NJSEA-owned parcels that comprises UOP Uplands site east of the Pascack Valley Line would be available for use as a support area. This assumption will need to be revisited during design if this property is sold by NJSEA. Allowance included for: • Preparing Uplands administration area (site trailer and offices, parking, sanitary facilities). The FS assumes: – Dimensions will be 175 ft x 250 ft. – Area proofrolled and 6-inch DGA stone installed. – Temporary facilities included administration area, shower and break room, storage trailers, and light plants. Assume power to be provided by generators. • Preparing erosion controls. • Installing temporary stormwater diversion systems to control stormwater and cofferdams to contain stormwater for treatment; these will be constructed so intake and effluent piping can be moved as project needs dictate. The FS is informed by the bypass system used for the NTCRA, which was: – Designed per NJDEP BMPs and had capacity sufficient to handle flow from a 1.25-inch, 2-hour storm event with a return frequency of approximately 1 year. – System consisted of 36-inch HDPE piping and energy dissipation apron comprised of stone-filled gabion baskets. FS assumes approximately 1,800 LF of piping may be needed for remedy completion. – Two upstream stormwater retention pools are expected – one near the twin-48-inch-ID drains, and a second adjacent to the southern storm drain outfall. The retention basins will be constructed using either temporary cofferdams or earthen berms, and will be lined with heavy duty polyethylene sheeting to prevent contact with sediment and sediment resuspension. • Establishing material laydown areas, temporary onsite storage bins, sediment dewatering areas, or some combination of these. Slack-drying area for NTCRA included: – 10 bins were constructed; total area was approximately 2 acres	Same as Alternative 2.	Same as Alternative 2.

Table 18. Alternative Components and Cost Estimating Assumptions

Cost Component	Alternative 1: No Action	Alternative 2: Removal of 1 Foot of Waterway Sediment and Backfill	Alternative 3: Removal of 2 Feet of Waterway Sediment and Backfill	Alternative 4: Removal of All Waterway Sediment and Backfill
		– Slack drying area excavated and graded from existing to approximately 2 ft below existing grade at one end to facilitate water capture; soil from excavation used to create perimeter berms – Jersey barriers used to separate the individual bins – Subsurface pumps included at low end of each bin – Pad for slack-drying area consisted of (surface to depth): ▪ 4-inch asphalt pavement ▪ 4-inch compacted DGA ▪ Geotextile fabric ▪ SPCC liner ▪ Geotextile fabric ▪ Compacted soil • Performing temporary road construction or improvements to existing roads in the Uplands area and placement of mat roads in marsh, as follows: – Uplands haul roads are anticipated to be 16 ft wide on average; width of mat roads to be dictated by product availability and specifications, but assumed to be about 16 ft wide (e.g., EcoMats come in 8 ft × 16 ft sections). – Mat roads used in marsh will be moved around as needed during project progression. FS assumes approximately 1,500 LF of mat road will be used. – Approximately 3,000 LF of upland access roads will require improvement or construction. Assume road constructed of geotextile fabric and a layer of DGA. • Establishing survey control points for remedy implementation. • Performing utility locate. • Installing tide gate at Murray Hill Parkway (Honeywell has retained the tide gate used during the NTCRA). • Removing, processing, and disposing of vegetative matter in work areas (where marsh may need to be disrupted for access). • Adding additional fencing and traffic control in the staging area • Constructing the 300 gpm WWTP. • Laying out the silt fence. • Installing the truck scale and associated scaffolding. • Laying out the concrete barriers adjacent to active rail line (approximately 760 LF). • Dewatering remediation areas within the project area, and sending water to the WWTP after tide gate installation. FS assumes that up to five temporary cofferdams will be installed and moved around within the remediation footprint to create subareas for active work. FS assumes a NJ Transit flagperson will be onsite for the duration of the remedial action (including mobilization and demobilization).		
Removal of Blocked Culvert at Northern Channel and Murray Hill Parkway	—	The blocked culvert is assumed to be 84-inch ID and approximately 150 ft in length (based on the culvert that is present below Murray Hill Parkway at Ackermans Creek). FS assumes there are two segments of road, each approximately 24 ft wide, that will need to be replaced upon completion. Quantities assume opening will be 3 ft beyond outside diameter of pipe and that excavated road base, soil, and asphalt will be disposed as nonhazardous material. The culvert and sediment, and debris contained within it, will be disposed as TSCA-regulated waste. Estimate assumes that entire area is filled back in with appropriate DGA or road base (i.e., a new culvert is not installed). Estimated quantities are as follows: • 214 yd^3 (284 tons) debris and sediment from within culvert, treated with 28 tons portland cement prior to TSCA regulated disposal (313 tons) • Approximately 170 tons of cement from culvert for disposal as TSCA-regulated debris • Approximately 24 tons asphalt and 40 tons road base for recycling or nonhazardous disposal • Approximately 662 tons of excavated soil for disposal as nonhazardous waste or recycling • 729 yd^3 (1,167 tons) of replacement soil and drainage or road base needed to fill excavation • Repair or replace 672 ft^2 of road	Same as Alternative 2.	Same as Alternative 2.
WWTP	—	WWTP specifications from the NTCRA were: • 300 gpm system to treat water from dewatered excavation areas, equipment and personnel decontamination, and slack drying area	Assumptions same as Alternative 2. Costs are based 9-month operation.	Assumptions same as Alternative 2. Costs are based on 12-month operation.

Table 18. Alternative Components and Cost Estimating Assumptions

Cost Component	Alternative 1: No Action	Alternative 2: Removal of 1 Foot of Waterway Sediment and Backfill	Alternative 3: Removal of 2 Feet of Waterway Sediment and Backfill	Alternative 4: Removal of All Waterway Sediment and Backfill
		• 24-hour operation • System components: 4 influent and equalization tanks (20,000 gal per tank), chemical feed system, Del V-bottom tank (12,500 gal), 3 weir tanks (18,000 gal), bag filters, dual media filters, organoclay contactors, carbon contactors, and backwash and effluent storage tank. Assume weekly sampling for duration of dewatering activities (which will include initial site dewatering, the duration of remedial action, and stormwater treatment until tide gate is removed). Estimated per sample cost is $380 for all analyses (SVOC, VOC, pesticides and PCBs, metals, pH, TSS, and cyanide). WWTP is assumed to be in operation through remedial action and into the demobilization period to address residual supernatant water from excavated sediments and stormwater runoff. It is possible that after major excavation is complete, a smaller, modular unit could be set up to allow for WWTP demobilization, but FS includes simplifying assumption that larger plant used for duration of construction. Costs are based on duration of operation of 6 months.		
Sediment Removal, Dewatering, Stabilization, Transport, and Disposal	—	Key components of the sediment removal include the following and are based on the approaches and equipment used during the NTCRA: • Sediment will be removed from dewatered excavation areas using long-reach excavators positioned on temporary mat roads next to the waterways. It is anticipated sediments will dry enough to facilitate excavation, loading, and transport to the slack-drying area; however, dewatering agents (i.e., portland cement) could be mixed in during the excavation process, if required. • Sediment will be transported to the slack drying area in 7 yd³ off-road Hydrema trucks or comparable equipment. • A removal production rate of 10–20 yd³ per hour (120 yd³ per day, on average) is assumed for the FS based on the assumptions presented in the BCSA FS for removal and backfilling in UPIC marsh and UPIC waterways. The FS also assumes work will be performed 5 days per week. • Cleanup passes were not included in the estimate because this work is anticipated to be done in the dry, and cleanup passes are more appropriate for a dredging scenario when there may be less control over residuals. • Assume 10% portland cement will be used as drying agent. The portland cement will be mechanically mixed into excavated sediment at the slack drying area using conventional earthwork equipment. • TSCA disposal cost from NTCRA included transport by truck from site to NYSW rail loading facility, then rail to Michigan, offloaded and transported by truck to final facility. Estimates provided to Honeywell (R. Galloway) in July 2017 by Heritage Environmental Services indicated total T&D costs for TSCA-regulated materials would be $255 per ton using a reference city of Newark and disposal in Roachdale, Indiana. The latter costs are incorporated into the cost estimate. Non-TSCA, non-RCRA regulated disposal costs are assumed as follows, based on a quote from Waste Management in January 2018: • Disposal - $40 per ton (GROWS North Landfill) • Transportation via tri-axle dumps $29.50 per ton (22 ton/load minimum assumed). Demurrage and manifest costs not included in estimate. The actual reagent and dosage will be determined during the remedial design. Consideration will be needed to be given to the weights of reagents required, reagent costs, and associated effects on disposal costs. It is possible additional costs for additives, such as polymers or bentonite, may be justified by lower total disposal costs associated with needing to add less dewatering agent to the sediments (thus, resulting in lower quantities for T&D). Based on the removal areas and the volume calculations presented in Section 2 (Table 2-1, Figure 2-1), the quantity assumptions are as follows (quantities conservatively include a 6-inch over-excavation allowance). OU2 west of Murray Hill Parkway: • Estimated removal volume is 9,902 yd³ (9,916 tons, bulk density value of 1.33 used for previously unremediated areas and overdredge allowance based on RI data; bulk density of 0.6 used for recently deposited sediment in 2012 NTCRA footprint). • 992 tons portland cement used for stabilization. • Estimate assumes that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (7,090 tons, amended), balance is non-TSCA and non-RCRA (3,818 tons, amended). This assumption is different from that used by BCSA Group based on site-specific sediment concentration data for the UOP site presented in the 2011 RI (CH2M, 2011) and 2016 RI addendum (CH2M, 2016). Ackermans South: • Estimated removal volume is 2,275 yd³ (3,025 tons, bulk density value of 1.33 used based on RI data) • 303 tons portland cement used for stabilization. Estimate assumes that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (2,163 tons, amended), balance is non-TSCA and non-RCRA (1,165 tons, amended)	Same means and methods as Alternative 2. Quantities for Alternative 3 are: • A removal production rate of 10–20 yd³ per hour (120 yd³ per day, on average) per day is assumed for the FS. Based on the removal areas and the volume calculations presented in Section 2 (Table 2-1, Figure 2-1), the quantity assumptions are as follows (quantities include a 6-inch over-excavation allowance): OU2 west of Murray Hill Parkway: • Estimated removal volume is 12,491 yd³ (12,930 tons, bulk density value of 1.33 used for previously unremediated areas and overdredge allowance based on RI data; bulk density of 0.6 used for recently deposited sediment in 2012 NTCRA footprint). • 1,293 tons portland cement used for stabilization. • Estimate that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (9,245 tons, amended), balance is non-TSCA and non-RCRA (4,978 tons, amended). Ackermans South: • Estimated removal volume is 3,791 yd³ (5,042 tons, bulk density value of 1.33 used for NTCRA based on RI data). • 504 tons portland cement used for stabilization. • Estimate assumes that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (3,605 tons, amended), balance is non-TSCA and non-RCRA (1,941 tons, amended).	Same means and methods as Alternative 2. Quantities for Alternative 4 are: • A removal production rate of 10–20 yd³ per hour (120 yd³ per day, on average) per day is assumed for the FS. Based on the removal areas and the volume calculations presented in Section 2 (Table 2-1, Figure 2-1), the quantity assumptions are as follows (quantities include a 6-inch over-excavation allowance): OU2 west of Murray Hill Parkway: • Estimated removal volume is 14,208 yd³ (15,213 tons, bulk density value of 1.33 used for previously unremediated areas and overdredge allowance based on RI data; bulk density of 0.6 used for recently deposited sediment in 2012 NTCRA footprint). • 1,521 tons portland cement used for stabilization. • Estimate that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (10,877 tons, amended), balance is non-TSCA and non-RCRA (5,857 tons, amended). Ackermans South: • Estimated removal volume is 5,421 yd³ (7,210 tons, bulk density value of 1.33 used for NTCRA based on RI data). • 721 tons portland cement used for stabilization. • Estimate assumes that 65% of sediment removed is TSCA-regulated and RCRA nonhazardous (5,155 tons, amended), balance is non-TSCA and non-RCRA (2,776 tons, amended).
Placement of Backfill	—	The FS assumes the following:	Same base assumptions as Alternative 2.	Same base assumptions as Alternative 2.

Table 18. Alternative Components and Cost Estimating Assumptions

Cost Component	Alternative 1: No Action	Alternative 2: Removal of 1 Foot of Waterway Sediment and Backfill	Alternative 3: Removal of 2 Feet of Waterway Sediment and Backfill	Alternative 4: Removal of All Waterway Sediment and Backfill
		• Same material as used in NTCRA would be acceptable for side channels (NTCRA bid item was NJ-DOT-I-11). Estimate assumes entire volume placed to restore grade would be sand in secondary channels and areas where current velocities are lower. • FS assumes gravel or larger particle size material would be placed in main stem of Ackermans Creek, approximately 20% of the western NTCRA area, and Ackermans South Main Channel. Approximately 6 inches of sand would be placed, covered by 6 inches of coarse gravel to restore channels to existing grade. The remedial design would assess the need for additional armoring to be placed near the storm drain outfalls. • Assumes placement using a combination of long-reach excavator, Moxy/Hydrema truck, and bulldozer for spreading. • Material placement rates are informed by BCSA FS, which assumed an average placement rate of 10 to 20 yd^3/hour (120 yd^3 per day, on average). Estimated quantities for OU2 West of Murray Hill Parkway area are as follows: • 8,900 yd^3 sand backfill • 980 yd^3 gravel armor Estimated quantities for Ackermans South area are as follows: • 1,700 yd^3 sand backfill • 560 yd^3 gravel armor Costs estimate assumes additional 10% volume contingency for handling loss for all materials (i.e., 10% of quantities listed). The FS does not assume placement in multiple lifts (aside from where different size materials are needed) because the work is anticipated to be done in the dry.	Estimated quantities for OU2 West of Murray Hill Parkway area: • 11,500 yd^3 sand backfill • 990 yd^3 gravel armor Estimated quantities for Ackermans South area: • 3,230 yd^3 sand backfill • 565 yd^3 gravel armor Costs estimate assumes additional 10% volume contingency for handling loss for all materials (i.e., 10% of quantities listed).	Estimated quantities for OU2 West of Murray Hill Parkway area: • 13,220 yd^3 sand backfill • 990 yd^3 gravel armor Estimated quantities for Ackermans South area: • 4,550 yd^3 sand backfill • 875 yd^3 gravel armor Costs estimate assumes additional 10% volume contingency for handling loss for all materials (i.e., 10% of quantities listed).
Waste Characterization Sampling	—	• Assume waste characterization samples needed 1 composite sample per 500 yd^3 • Assume analysis includes the "FORM U" suite – which is full TCLP + selected totals + cyanide and paint filter for all samples. Estimate assumes a per sample rate of $835 for all analyses Since removal volumes are relatively small, it is assumed that waste characterization samples for profiling will be collected from stockpiles, rather than in situ sample collection. Estimated removal volume is 12,177 yd^3; therefore, assume 25 samples.	Assumptions same as Alternative 2. Estimated removal volume is 16,280 yd^3; therefore, assume 33 samples using a sampling frequency of 1 per 500 yd^3.	Assumptions same as Alternative 2. Estimated removal volume is 19,629 yd^3; therefore, assume 40 samples using a sampling frequency of 1 per 500 yd^3.
Confirmation Sampling and Survey	—	High-resolution topographic surveys would be required to document removal volumes, along with appropriate construction quality control checks (such as pans to measure placement or cores through the cover) to document that the correct cover thicknesses were applied. The FS assumes the postexcavation surface will be sampled to document what is left in place. This postexcavation sampling will include: • Composite samples of 4 to 5 grab samples. Each grab sample and subsample will represent approximately 500 ft^2, and the composite sample will represent approximately 2,000 to 2,500 ft^2. This approach is consistent with the postexcavation sampling used for the NTCRA. • Chemistry samples analyzed for VOCs by SW-846-8260B, SVOCs by SW-4846-8270, PCB Aroclors by SW-846-8082, and metals by SW-846 6010B/7074; approximated per sample price is $295. Based on removal footprint, assume up to 114 composites analyzed.	Same as Alternative 2.	Same as Alternative 2.
Demobilization	—	Allowance included for demobilization. The FS assumes demobilization will include removal of access roads, returning uplands staging area to current condition. Demobilization also includes an allowance to further restore vegetation to the access road area still in place from the NTCRA.	Same as Alternative 2.	Same as Alternative 2.
Institutional Controls	—	Institutional controls would be implemented to specify limitations on activities (e.g., construction) within the waterways to minimize damage to the backfill layer. Signage would be maintained around the site periphery. A deed notification for the waterways is not anticipated to be needed; however, cost estimates assume ~$15,000 to implement potential institutional controls and deed notification through NJDEP and EPA (estimates informed by previous deed notifications performed for other areas of the site). The existing fish consumption advisories for the larger BCSA and Newark Bay Complex would still be in effect.	Same as Alternative 2.	Same as Alternative 2, with the exception that controls to specify limitations on activities would not be needed.
Monitoring	—	Monitoring will include a continuation of treatability study locations, plus one new turf mat or clay pad transect (for area west of Murray Hill Parkway), which includes six sediment trap locations, two transects containing five turf mats or clay pads each, three reference pin locations, and three TSS monitoring locations. • All samples analyzed for Cr, Hg, and PCBs by 1668 (25% of analyses are 209 congeners, 75% are homolog totals). • Each monitoring event would result in 21 sediment samples and 6 surface water samples. Surface waters analyzed for hardness, TSS, total PCBs, Cr, and Hg; and dissolved PCBs, Cr, and Hg. Filtered suspended sediments also analyzed for PCBs, Cr, and Hg (6 samples total, per event) Surface sediment samples will be collected from 40 locations within the site (20 in channel, 20 in marsh) and 5 locations from the Mill Creek Marsh (reference or background area) and analyzed for metals, PCB congeners (75% homolog; 25% - 209 congeners), methyl mercury, TOC, and AVS/SEM; 50% of samples also analyzed for sediment toxicity.	Same as Alternative 2.	Same as Alternative 2.

Table 18. Alternative Components and Cost Estimating Assumptions

Cost Component	Alternative 1: No Action	Alternative 2: Removal of 1 Foot of Waterway Sediment and Backfill	Alternative 3: Removal of 2 Feet of Waterway Sediment and Backfill	Alternative 4: Removal of All Waterway Sediment and Backfill
		Biota sampling will consist of benthic invertebrates (crab and grass shrimp) and fish (mummichog) from 10 locations in the waterways (20 total samples), and marsh invertebrates from a target of 10 locations in the marsh (10 samples per event). Tissues analyzed for metals, methyl mercury, PCB congeners (dioxin like only), lipid content, and moisture content. Assume three sampling events performed during 5-year period. Assume each monitoring event will take three staff 4 weeks to complete. Assume small vessels needed for duration of each event from equipment rental agency. Analytical costs for each event are estimated at approximately $210,000. Estimate includes an allowance for data evaluation, report preparation, and stakeholder communications.		
O&M	—	Maintenance costs are assumed to include replacement of 5% of the backfill footprint within the time between implementation of this waterway source control remedy and the selection and implementation of the selected marsh remedy under a subsequent ROD.	Same base assumptions as Alternative 2.	Not applicable – complete removal remedy will have a monitoring component, but not an O&M component to replace backfill, since no contaminated sediment would remain in the waterways.
5-Year Reviews	—	Per EPA request, costs for 5-Year Reviews are included in the FS.	Same as Alternative 2.	Same as Alternative 2.
PM, CM, Procurement, Submittals, and Engineering Support	—	Percentage of direct costs based on cost range per 2002 EPA Estimating guidance. PM assumed to be 5% and CM 6%.	Same as Alternative 2.	Same as Alternative 2.
EPA and NJDEP Oversight	—	Assume 5% percent of all direct costs.	Same as Alternative 2.	Same as Alternative 2.
Contingency	—	Assume 20% of all direct costs.	Same as Alternative 2.	Same as Alternative 2.

Notes:

- = not applicable

% = percent

~ = approximately

AVS/SEM = acid volatile sulfide/simultaneously extracted metal

BCSA = Berrys Creek Study Area

BMP = best management practice

CM = construction management

Cr = chromium

DGA = dense graded aggregate

EPA = U.S. Environmental Protection Agency

EPA FS Cost Guidance = A Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA, 2000)

FS = feasibility study

ft^2 = square foot (feet)

gal = gallon(s)

gpm = gallon(s) per minute

HDPE = high-density polyethylene

Hg = mercury

ID = inner diameter

LF = linear foot (feet)

MSA = Master Services Agreement

NJDEP = New Jersey Department of Environmental Protection

NJDEPS = New Jersey Pollutant Discharge Elimination System

NJSEA = New Jersey Sports and Exposition Authority

NTCRA = Non–Time Critical Removal Action

O&M = operations and maintenance

OU = operable unit

PCB = polychlorinated biphenyl

PM = project management

RCRA = Resources Conservation and Recovery Act of 1976

RI = remedial investigation

ROD = Record of Decision

SPCC = spill prevention control and countermeasure

SVOC = semivolatile organic compound

T&D = transport and disposal

TCLP = toxicity characteristic leaching procedure

TOC = total organic carbon

TSCA = Toxic Substances Control Act

TSS = total suspended solid

UOP = Universal Oil Products

UPIC = Upper Peach Island Creek

VOC = volatile organic compound

WWTP = wastewater treatment plant

yd^3 = cubic yard(s)

APPENDIX III

ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL
08/12/2019

REGION ID: 02

Site Name: UNIVERSAL OIL PRODUCTS
CERCLIS ID: NJD002005106
OUID: 02
SSID: 02C8
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
538180	08/12/2019	ADMINISTRATIVE RECORD INDEX FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	5	Administrative Record Index		(US ENVIRONMENTAL PROTECTION AGENCY)
202554	03/28/2011	INTERIM DELIVERABLE FOR THE HUMAN HEALTH RISK ASSESSMENT - GUIDANCE FOR SUPERFUND, PART D TABLES - PATHWAY ANALYSIS REPORT FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	618	Memorandum	(US ENVIRONMENTAL PROTECTION AGENCY)	KNIGHT,ERICA (CH2M HILL)|LYTLE,GAYLE (CH2M HILL)|SELCOE,BARRIE (CH2M HILL)
458002	01/01/2016	SEMIANNUAL MONITORING REPORT FOR 2015 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	29	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458003	06/01/2016	FINAL SEMIANNUAL MONITORING REPORT FOR 2016 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	27	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458005	07/22/2016	TRANSMITTAL OF THE REMEDIAL INVESTIGATION REPORT ADDENDUM FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	2	Report	(US ENVIRONMENTAL PROTECTION AGENCY)|TOMCHUK,DOUGLAS (US ENVIRONMENTAL PROTECTION AGENCY)	(HONEYWELL INCORPORATED)|GALLOWAY,RICHARD (HONEYWELL INCORPORATED)
458006	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 1 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	858	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458007	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 2 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	4194	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)

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DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
458009	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 3 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	6931	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458010	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 4 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	11262	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458011	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 5 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	5919	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458012	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 6 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	2510	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458013	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 7 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	4944	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458014	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 8 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	1	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458015	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 9 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	6774	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)

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458016	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME I PART 10 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	6122	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458017	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME II FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	2944	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
458022	07/22/2016	REMEDIAL INVESTIGATION REPORT ADDENDUM VOLUME III FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	387	Report	(HONEYWELL INCORPORATED)	(CH2M HILL)
437493	09/27/2016	FOURTH FIVE-YEAR REVIEW REPORT FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	28	Report		MUGDAN,WALTER,E (US ENVIRONMENTAL PROTECTION AGENCY)
562500	08/24/2018	FINAL HUMAN HEALTH RISK ASSESSMENT FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	440	Report		(HONEYWELL INTERNATIONAL INC.)
562501	08/24/2018	TRANSMITTAL OF THE FINAL HUMAN HEALTH RISK ASSESSMENT FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	1	Letter	NARANJO,EUGENIA (US ENVIRONMENTAL PROTECTION AGENCY)	GALLOWAY,RICH (HONEYWELL INTERNATIONAL INCORPORATED)
562509	11/29/2018	IDENTIFICATION OF CANDIDATE TECHNOLOGIES FOR OU2 STREAMLANDS FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	23	Memorandum		(JACOBS ENGINEERING GROUP INCORPORATED)

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DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
562513	11/29/2018	DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES FOR OU2 STREAMLANDS FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	50	Memorandum		(JACOBS ENGINEERING GROUP INCORPORATED)
560783	11/30/2018	BASELINE ECOLOGICAL RISK ASSESSMENT VOLUME 1 OF 2 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	182	Report		(HONEYWELL INTERNATIONAL INCORPORATED)
560784	11/30/2018	BASELINE ECOLOGICAL RISK ASSESSMENT VOLUME 2 OF 2 FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	3737	Report		(HONEYWELL INTERNATIONAL INCORPORATED)
560785	11/30/2018	TRANSMITTAL OF THE BASELINE ECOLOGICAL RISK ASSESSMENT FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	1	Letter	NARANJO,EUGENIA (US ENVIRONMENTAL PROTECTION AGENCY)	(HONEYWELL INTERNATIONAL INCORPORATED)
562511	11/30/2018	FINAL FEASIBILITY STUDY FOR OU2 STREAMLANDS FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	198	Report		(JACOBS ENGINEERING GROUP INCORPORATED)
560787	12/04/2018	TRANSMITTAL OF THE FINAL REMEDIAL INVESTIGATION REPORT FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	1	Letter	NARANJO,EUGENIA (US ENVIRONMENTAL PROTECTION AGENCY)	(HONEYWELL INTERNATIONAL INCORPORATED)
560788	12/04/2018	FINAL REMEDIAL INVESTIGATION REPORT VOLUME 1 OF 2: TEXT, TABLES, FIGURES FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	239	Report		(HONEYWELL INTERNATIONAL INCORPORATED)

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560789	12/04/2018	FINAL REMEDIAL INVESTIGATION REPORT VOLUME 2 OF 2: APPENDIXES FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	801	Report		(HONEYWELL INTERNATIONAL INCORPORATED)
560790	12/04/2018	FINAL REMEDIAL INVESTIGATION REPORT APPENDIX A FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	397	Report		(HONEYWELL INTERNATIONAL INCORPORATED)
560791	12/04/2018	FINAL REMEDIAL INVESTIGATION REPORT APPENDIX N, T, AND U FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	590	Report		(HONEYWELL INTERNATIONAL INCORPORATED)
538415	12/07/2018	PROPOSED PLAN FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	24	Publication		(US ENVIRONMENTAL PROTECTION AGENCY)
562637	01/30/2019	CORRESPONDENCE REGARDING RATIONALE FOR POWERWATER SAMPLING AT UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	35	Memorandum	DARPINIAN,AMY (US ARMY CORPS OF ENGINEERS)	(LOUIS BERGER)
565034	02/25/2019	REVISED PROPOSED PLAN FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION) SITE	24	Publication		(US ENVIRONMENTAL PROTECTION AGENCY)
565218	04/04/2019	CORRESPONDENCE REGARDING THE SUPPLEMENTAL ALTERNATIVE EVALUATION FOR OU2 FOR THE UNIVERSAL OIL PRODUCTS SITE	9	Memorandum	Galloway, Richard (HONEYWELL INCORPORATED)	

APPENDIX IV

STATE LETTER OF CONCURRENCE

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program
Mail Code 401-06
P.O. Box 420
Trenton, New Jersey 08625-0420

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

CATHERINE R. McCABE
Commissioner

May 6, 2019

Pat Evangelista, Acting Director
Emergency and Remedial Response Division
USEPA Region 2
290 Broadway
New York, NY 10007-1866

RE: Universal Oil Products Operable Unit 2 Proposed Plan

Dear Mr. Evangelista:

The New Jersey Department of Environmental Protection (Department) has completed its review of the Proposed Plan for the Universal Oil Products Superfund Site, Operable Unit 2 (OU2) and concurs with the preferred alternative. The preferred alternative, Alternative 3, is an interim source control action for OU2 and consists of the following:

- Bank-to-bank removal and off-site disposal of 2 feet of waterway sediment and subsequent placement of backfill to the existing sediment surface elevation;
- Groundwater monitoring during design to assess whether contaminated ground water is discharging into the waterways. An appropriate response action for ground water will be selected in the future if VOCs are present in the discharge and present an unacceptable risk to the benthic community;
- Institutional controls;
- Maintenance of the backfill; and
- Post-construction performance monitoring to monitor the success of the interim action in the surrounding ecosystem and adjacent marshes and waterways hydrologically connected to the UOP project area.

The Department looks forward to working with EPA on the issuance of the Record of Decision and remediation of OU2 of the Universal Oil Products Site.

Sincerely,

Mark J. Pedersen
Assistant Commissioner

APPENDIX V

RESPONSIVENESS SUMMARY

APPENDIX 5

RESPONSIVENESS SUMMARY

Operable Unit 02 of the Universal Oil Products Superfund Site

LIST OF ATTACHMENTS
ATTACHMENT A Proposed Plan
ATTACHMENT B Public Notice
ATTACHMENT C Transcript from Public Meeting
ATTACHMENT D Public Comments Received During the Public Comment Period

Overview

This Responsiveness Summary presents the public comments submitted to EPA regarding the Proposed Plan (Attachment A) for the UOP OU2 waterways sediment interim source control remedial action and EPA's responses to those comments. A Responsiveness Summary is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 C.F.R. 300.430(f)(3)(F). All comments in this document have been considered in EPA's decision for the selection of the interim source control remedial action.

Background on Community Involvement

Interaction with the community is an important part of the Superfund process. Since UOP is geographically located within the Berry's Creek Study Area (BCSA), the community concerns for UOP and BCSA are expected to be similar. EPA provided opportunities for community participation during the UOP OU2 Remedial Investigation/Feasibility Study (RI/FS) process and Proposed Plan public comment period, and also throughout the BCSA RI/FS process, which culminated in the publication of a Record of Decision (ROD) for BCSA waterway sediment in September 2018.

In 2008 and 2017, EPA conducted community interviews with various BCSA stakeholders to understand community concerns. A common concern expressed by people living and working in the BCSA during these interviews and meetings related to the potential impacts of remedial action on flooding and mitigating future flooding issues. Much of the area is at low elevations, and a substantial portion of the area was built on fill in former marshlands. As such, the area often floods. Flooding can occur from either rainfall events that collect water because there is insufficient gradient for drainage, or from high tidal conditions that overflow the waterways. The combination of rainfall events with high tides compounds flooding problems. Concern was heightened during the past decade with sea level rise increasing both the frequency and severity of flood events; flooding from Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy caused massive disruption and damage to the area.

It is important that the UOP OU2 remedy not worsen the potential for flooding and, therefore, as described in the UOP OU2 ROD, placement of backfill following sediment removal will be limited to the pre-remediation surface sediment elevation. Plans to remove the culvert under Murray Hill Parkway in the Northern Channel of UOP OU2, along with the debris and sediment within it, will be evaluated during remedial design to determine whether replacing the culvert would be advantageous to flood control.

EPA hosted a Public Meeting in 2012 at the East Rutherford Memorial Library to discuss UOP and the UOP OU2 Non-time Critical Removal Action (NTCRA) with the community. The NTCRA was conducted in 2012-2013 to remove sediments from the former wastewater plant lagoon area in UOP OU2 and disposed of them off-site. In accordance with Superfund regulations and to ensure that the public has access to site documents, an information repository was established at the East Rutherford Memorial Library in East Rutherford, NJ.

The Proposed Plan for the UOP OU2 Waterway Sediment was released on December 10, 2018. Notice of commencement of the public comment period and availability of the Proposed Plan was published in *The Record* on December 10, 2018. The comment period was initially planned to end on January 23, 2019, but it was extended to March 22, 2019 by a second public notice, published on Tuesday, February 26, 2019 in *The Record* (see Attachment B for both notices). A public meeting was held on March 6, 2019 in Hasbrouck Heights, NJ. Additional information on UOP is available through the Administrative Record, announcements published in the local newspapers, and access to the EPA website for UOP. Two comment letters were received and one comment was given verbally at the public meeting.

Public Comments and Responses

The community was given the opportunity to provide oral comments at the public meeting on March 6, 2018, which were recorded by a stenographer (see Attachment C). Written comments were also received during the public comment period. Two letters were received during the public comment period, and both supported moving forward with the remedy. These letters are included as Attachment D.

Comment 1

The area along the east side of Route 17 at what is now the Union Avenue extension into the Meadowlands was the dump for mercury containing material. Becton and Dickinson had a large manufacturing plant on the west side of Route 17 near the present location of the Federal Reserve facility. For many years they dumped their manufacturing waste, thermometers, blood pressure and other instruments containing mercury, in the Meadowlands at the Union Avenue area as well as other locations. Waste from other sources was also dumped there. As a youngster we collected the mercury that was sealed in glassware from this site. For us kids it was a prized possession. I am sure there is many hundreds of pounds of mercury still there. This material will be a source of mercury pollution for many more years.

During World War II my mother worked at a plating company on Paterson Plank Road east of Route 17. She told how spent chemicals were dumped in the waterway behind the building. Fish and birds died as a result. This small stream leads to Berry's Creek near the Paterson Avenue Bridge. This entire area was a dead zone. The building or part of it remains standing to this day. I feel that this is a source pollution that is entering Berry's Creek.

Response 1

EPA appreciates the public's interest in this matter, as well as recollections regarding activities that may have affected human health and the environment within the larger BCSA. The agency is aware that mercury and methyl mercury are contaminants of concern in the BCSA, along with other chemicals. The BCSA interim remedy is intended to address contaminated waterway sediment in Upper Berry's Creek (UBC), Middle Berry's Creek (MBC) and major tributaries (e.g., Peach Island Creek, Ackerman's Creek) and will reduce contaminant levels in the surface sediments, surface water, and biota within Berry's Creek, consistent with the remedial action objectives and underlying approach for the UOP OU2 interim remedy. The Final RI for UOP OU2 identifies historical Becton Dickinson operations as potential sources of contamination to UOP OU2 via ditches and stormwater outfalls, and Becton Dickinson is a participant in the Berry's Creek Cooperating Parties Group. Post-construction environmental monitoring will be conducted to evaluate the performance of the interim remedy in both the BCSA and UOP OU2.

Comment 2

Thank you for coming here and putting on this slide show and explaining what's going on out there, because it's always a question that comes up in my day-to-day business, you know, when I'm talking about the Meadowlands, when I'm talking about the Hackensack River. It's got a reputation for hosting so many Superfund Sites, that people need to know that work is actually moving ahead to clean up some of these places.

On the alternatives, I was looking at the slide when you had it up with the three alternatives and the amount of material that would be removed and the cost. And you said that the soft sediment, we know for sure -- you know for sure that taking two feet out and then capping it will be okay. But there's only like another foot of soft sediment going to be left at the bottom of the waterway?

Because, you know, if you get into doing the work and it turns out that that soft sediment isn't that much deeper than the two feet, it would make absolute sense to just go ahead and take the rest of it too, because that would avoid any future releases, you know. We can't tell what might happen weather-wise, sea level rise. There's all kinds of stuff going on, you know. And I just think, you know, taking a good look at that fourth alternative (sic).

Response 2

The Final UOP OU2 Feasibility Study indicates that the average depth of soft sediment in the UOP OU2 waterways is 3 feet; however, there are areas where soft sediments may extend to a depth of 5-6 feet, including the Northern Channel and the Ackermans South Area. The characterization of nature and extent in the RI indicates that there is no benefit in risk reduction in removing more than 2 feet of sediment, because the highest detected concentrations of the contaminants of concern are predominantly in the top 2 feet of waterway sediment (concentrations decrease notably below this depth in both the marshes and the waterways). As shown in Figures 4-6a through 4-6c from the Final Remedial Investigation Report for UOP OU2, neither total PCBs nor mercury were detected above 1 milligram per kilogram (mg/kg) at depths greater than 2 feet. Similarly, chromium was not detected above 100 mg/kg at depths greater than 2 feet. Further, the remedy includes a requirement that the backfill layer placed on the sediment after excavation be maintained, protecting against future releases. As described in the ROD Section 10, Comparative Analysis of Remedial Alternatives, additional construction and disposal costs would be incurred to remove all soft sediment from the UOP OU2 waterways. The selected remedy thus provides the best balance of the nine evaluation criteria provided by the National Contingency Plan (NCP).

During the design phase for the UOP OU2 interim remedy, additional data will be collected on soft sediment depths with the remediation project's 'footprint.' Alternative 3 includes 2 feet of sediment removal plus a 6-inch design overcut. EPA will coordinate with the performing parties during the development of the remedial design to target areas with sediment only slightly deeper than the design removal depth for full removal.

Comment 3

On behalf of the Berry's Creek Study Area Cooperating Parties Group (BCSA Group), The ELM Group, Inc. provides this comment on the Proposed Plan that the U.S. Environmental Protection Agency (EPA) issued in December 2018 for the waterway sediment in Ackermans Creek, its tributaries, and the Ackermans South Area at the Universal Oil Products Superfund Site in East Rutherford, NJ. EPA defines the waterway sediment addressed by the Proposed Plan as the "UOP Project Area."

The BCSA Group supports and endorses the proposed sediment remedy for the UOP Project Area. The proposed remedy is consistent with the remedy that EPA selected for the Berry's Creek Study Area waterway sediment, which was based on extensive technical data and analyses and incorporated an adaptive approach consistent with EPA's sediment remediation guidance and sediment management principles. At a minimum, consistency among the remedial approaches for the BCSA and the UOP Project Area will create opportunities for future efficiencies in remedial design and EPA oversight, and will promote EPA's overall objectives for both site consistent with EPA guidance and principles.

Response 3

EPA acknowledges the comment and the advantages of a consistent remedial approach for the BCSA and UOP OU2 waterway sediment interim remedies. Please note that the phrase "UOP Project Area" was not carried forward into the Record of Decision, which uses only the term "UOP OU2" to identify the waterway sediment to be addressed via the interim remedy.

ATTACHMENTS

ATTACHMENT A: PROPOSED PLAN

United States Environmental Protection Agency

Universal Oil Products

Proposed Plan | December 2018

Purpose of the Proposed Plan

This Proposed Plan describes remedial alternatives for the waterway sediment in Ackermans Creek, its tributaries, and the Ackermans South Area at the Universal Oil Products Superfund Site (UOP) in East Rutherford, New Jersey. The selected remedial alternative will be implemented as an interim source control remedial action in the "UOP Project Area", which is part of the second Operable Unit (OU2) of the UOP site. The UOP Project Area consists of the waterway sediment in UOP OU2 that is located on the west side of Murray Hill Parkway. Waterway sediment in UOP OU2 that is located on the east side of Murray Hill Parkway is being addressed in a separate interim action as part of the Ventron/Velsicol Superfund Site, for which the Environmental Protection Agency (EPA) has already selected a cleanup plan.

This Proposed Plan identifies the EPA's Preferred Alternative for the UOP Project Area, which would mitigate sediment resuspension and transport of contaminated solids into surrounding marshes and downstream waterways. EPA is issuing the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and 40 C.F.R. Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Following the public comment period and review of comments received, EPA will issue a Record of Decision (ROD), selecting an interim remedial action and providing the basis for the selected remedy. EPA expects that the proposed interim source control remedial action will be adequately protective of human health and the environment until a final ROD is issued for UOP OU2.

The nature and extent of contamination and the proposed remedial alternatives discussed in this Proposed Plan are

Mark Your Calendars

Public Comment Period

December 10, 2018 through March 22, 2019

Comments submitted during this period will be part of EPA's official administrative record for the remedy. EPA encourages public participation. **Submit comments via mail or email by March 22, 2019 to:**

Eugenia Naranjo
Remedial Project Manager
290 Broadway - 19th floor - New York, NY 10007
PH: 212-637-3467 naranjo.eugenia@epa.gov

Public Meeting

6:30 p.m. on Wednesday, March 6, 2019

Hasbrouck Heights Free Public Library
320 Boulevard - Hasbrouck Heights, NJ 07604

EPA encourages the public to review the Proposed Plan, supporting documents, and the administrative record, which are available at the Information Repositories listed below or on EPA's website for UOP:
https://www.epa.gov/superfund/universal-oil

Additional information on BCSA is available online at:
https://www.epa.gov/superfund/ventron-velsicol

Information Repositories

Wood-Ridge Memorial Library
231 Hackensack Street
Wood-Ridge, NJ 07075

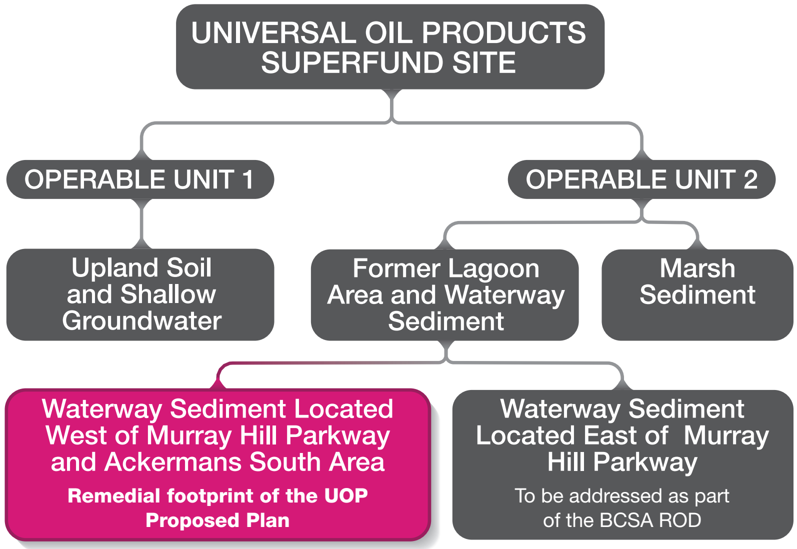
East Rutherford Memorial Library
143 Boiling Springs Ave
East Rutherford, NJ 07073

EPA Records Center
290 Broadway - 18th floor
New York, NY 10007

described in greater detail in the supporting Remedial Investigation Report (RI Report) and Feasibility Study Report (FS Report). These documents, along with the human health and ecological risk assessment reports prepared for UOP OU2, are part of the administrative record file and are publicly available electronically on the EPA UOP website and from the information repositories located at the East Rutherford Memorial Library in East Rutherford, New Jersey, Wood-Ridge Memorial Library in Wood-Ridge, New Jersey, and the EPA Records Center in New York, New York. EPA encourages the public to review these documents to gain a more comprehensive understanding of UOP OU2 and the Superfund activities that have been conducted to date at UOP.

The findings of the RI Report support an adaptive, multi-phase approach to address contaminated waterway sediment and marsh sediment; the first phase of the UOP OU2 work focuses on an interim source control remedial action for the waterway sediment. The waterway sediment presents potential risks to human health and the ecosystem and acts as a continuing source of contamination to the marshes and waterways located downstream, due to tidal exchange and sediment transport between the waterways and marshes. The FS Report evaluated four remedial alternatives for the proposed interim source control remedial action for the waterways. **EPA's Preferred Alternative** would provide source control through removal of contaminated sediment and subsequent placement of backfill that would act as a new, post-remediation surface sediment layer. The backfill would separate biota from the underlying contaminated sediment that would remain in place after construction. **The footprint of the proposed interim source control remedial action consists of the main channel of Ackermans Creek, its tributaries, the area previously addressed by a Non-Time Critical Removal Action (NTCRA), and the Ackermans South Area** *(refer to site map and map inset on Page 3)*.

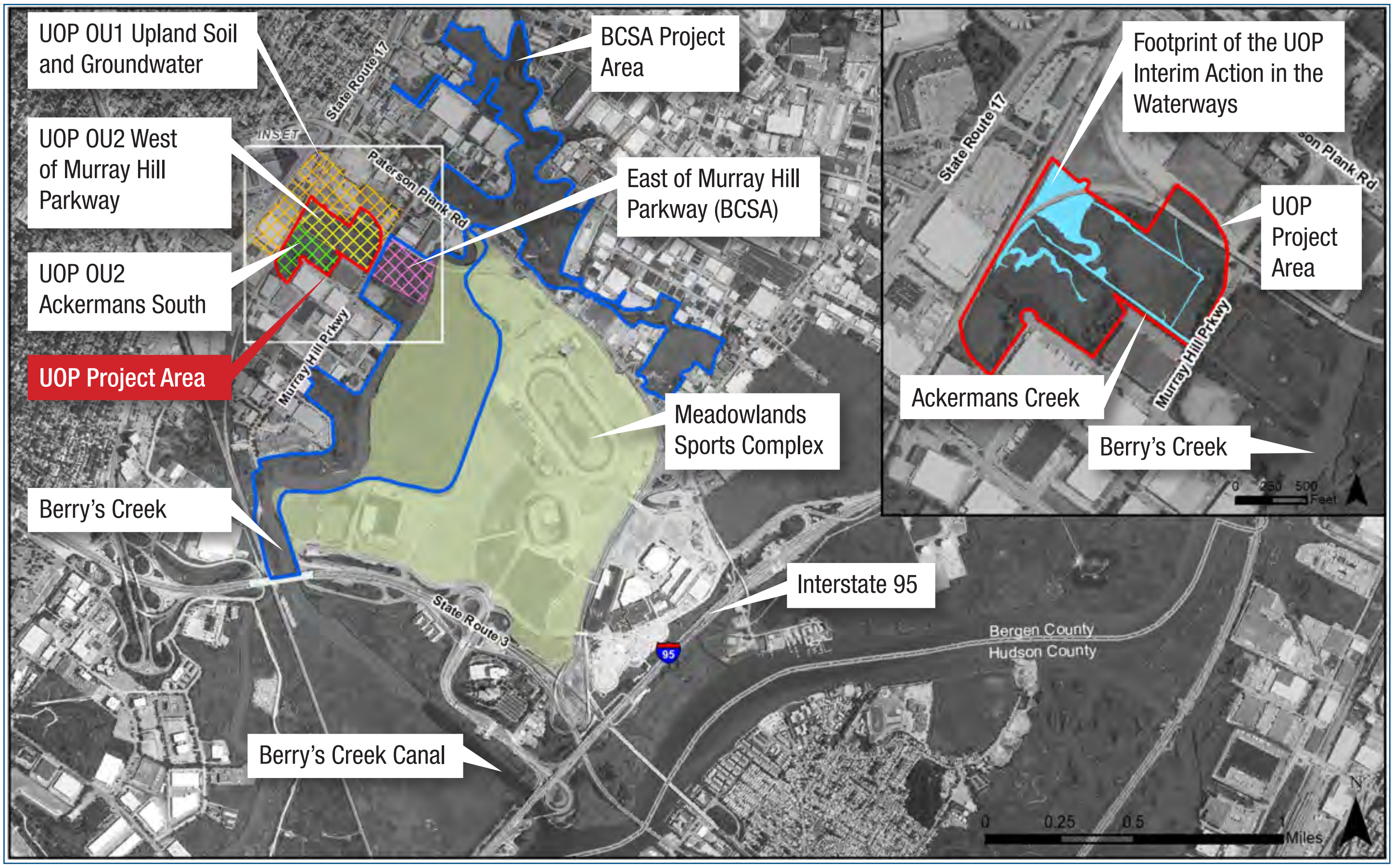
UOP ORGANIZATION CHART



EPA's Preferred Alternative includes:

1. Bank-to-bank removal and off-site disposal of 2 feet of waterway sediment and subsequent placement of backfill to the existing sediment surface elevation.
2. Dewatering, treatment, transportation, and off-site disposal of approximately 16,300 cubic yards of sediment removed from the waterways.
3. Groundwater monitoring during the remedial design to assess whether contaminated shallow groundwater is discharging to the waterways. If the presence of volatile organic compounds (VOCs) in the groundwater discharge presents an unacceptable risk to the benthic community in UOP OU2, an appropriate response will be selected in the future.
4. Institutional controls, such as the existing New Jersey fish consumption advisories.
5. Maintenance of backfill in the waterway.
6. A post-construction performance monitoring program to monitor the success of the proposed interim source control remedial action in the surrounding ecosystem and the adjacent marshes and waterways that are hydrologically connected to the UOP Project Area.

EPA is soliciting public comment on the alternatives considered because EPA may either revise the Preferred Alternative or select a different remedy based on comments received and/or review of additional data. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments.



UOP SITE MAP

Site Description

The UOP site is located near the intersection of Route 17 and Paterson Plank Road in the Borough of East Rutherford, Bergen County, New Jersey. UOP consists of approximately 75 acres of upland property and marshes. UOP is surrounded by highways and light industrial and commercial properties. The following facilities are located to the north of the UOP site: the former Matheson Tri-Gas Products facility, a metals finishing facility, a truck and car repair shop, and a hotel. The east side of the UOP site is bordered by Berry's Creek, the south side by commercial properties, and the west side by New Jersey Route 17.

EPA divided UOP into two Operable Units to assist with site management *(refer to organization chart on Page 2)*:

- **OU1** consists of upland soil and shallow groundwater
- **OU2** OU2 consists of the former lagoon area, low-lying marshes, and waterway channels located on the west side of Murray Hill Parkway, between OU1 and the Berry's Creek Study Area.

UOP is geographically located within the watershed that forms the Berry's Creek Study Area (BCSA), which is part of the Ventron/Velsicol Superfund Site. (The boundaries of this watershed are defined by New Jersey hydrologic units.) While the area east of Murray Hill Parkway was originally part of UOP OU2, it is now included in the remedial footprint of the BCSA interim action and will be remediated pursuant to the ROD issued by EPA on September 25, 2018 for the Ventron/Velsicol Superfund Site. Waterway sediment located on the west side of Murray Hill Parkway is within the UOP Project Area and is the subject of this Proposed Plan.

Site History

The upland portion of UOP is the former location of the Union Ink Company, which manufactured printing inks, lacquers, enamels, coatings, and silk screening inks from 1930 to 1945, and the former Trubek Laboratories, Inc. (Trubek) facility. Trubek began operations in 1932 as a chemical manufacturing facility. In 1955, Trubek began operating a solvent recovery facility and handling waste chemicals. Trubek constructed and began operating a wastewater treatment plant and two wastewater holding lagoons in 1956, which were located in the current OU2 marsh area. Universal Oil Products Company purchased the facility from Trubek in 1963 and became the owner and operator of the facility. Between 1956 and 1971, seepage from the wastewater lagoons and routine handling of products and wastes resulted in the release of various hazardous substances to the upland soils and groundwater (currently OU1) and the tidal marshes and waterways (currently OU2). Universal Oil Products Company was renamed UOP, Inc. in 1975. Operations at the facility ceased in 1979, and the building structures were demolished in 1980. Between 1975 and 1979, The Signal Companies acquired UOP, Inc. In 1985, the Signal Companies merged with Allied Corporation, becoming Allied Signal, Inc. Following a merger and a series of name changes, Honeywell International, Inc. (Honeywell) became the owner of the property in 2002. UOP is currently a wholly-owned subsidiary of Honeywell.

In 1983, the New Jersey Department of Environmental Protection (NJDEP) issued an Administrative Consent Order requiring UOP to conduct a remedial investigation and feasibility study (RI/FS) *(refer to sidebar at right on remedial action on OU1 Upland Soil and Groundwater)*. The UOP site was also listed on the EPA National Priority List on September 8, 1983. NJDEP was the lead agency for the site from 1982 to 2008, after which EPA assumed the role of lead agency. Honeywell and its predecessors have been conducting response actions under NJDEP and EPA oversight since the early 1980s.

To address some areas of contaminated sediment, Allied Signal, Inc. performed an interim remedial measure in 1990 under NJDEP oversight to remove PCB-contaminated sediment in the former lagoon area. Sediment was dredged and transported off-site for incineration. Honeywell began RI activities in the

Background on OU1 Upland Soil and Shallow Groundwater:

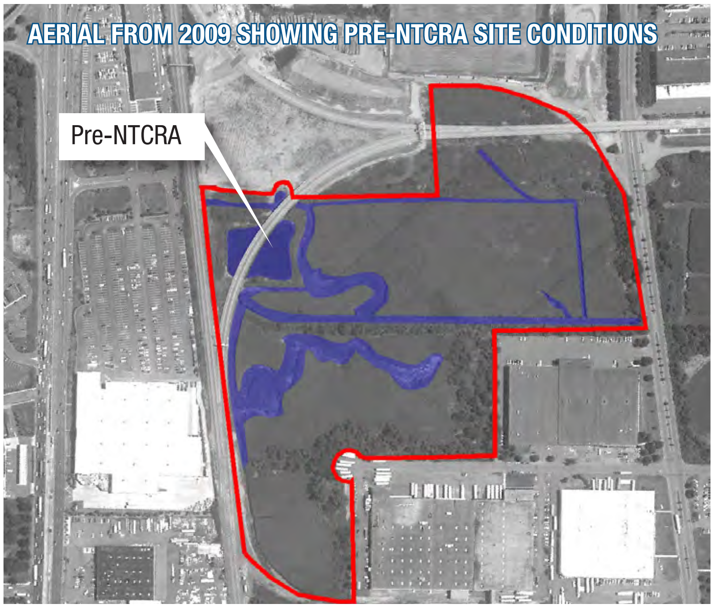
The OU1 RI revealed that soils were contaminated with polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), VOCs, and lead. The shallow OU1 groundwater was also contaminated with VOCs. NJDEP, with EPA concurrence, selected an interim remedial action for UOP OU1 upland soil and shallow groundwater in a 1993 ROD. This ROD was modified through a 1998 ROD Amendment and was further modified by a document known as an Explanation of Significant Differences in April 1999. Allied Signal, Inc. began construction in 1996. The amended remedy required excavation of contaminated soil followed by either off-site disposal or thermal treatment (based on the type of contamination) and placement of treated soil in an on-site containment area. The sanitary sewer and stormwater lines were also cleaned and excavated. As part of the remedy, approximately 6.8 million gallons of shallow groundwater were pumped, treated, and discharged to Ackermans Creek under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit.

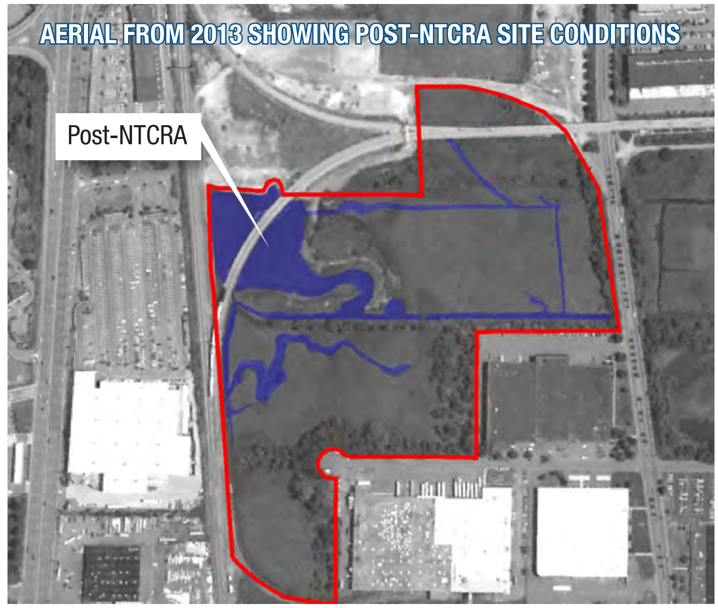
In 1997, NJDEP determined that the shallow groundwater was non-potable and changed the shallow groundwater classification at UOP to a Class III-B aquifer.[1] In November 2004, NJDEP and EPA determined that the OU1 upland soil remedial activities had been completed and the objectives of the 1993 ROD achieved. A portion of the OU1 property was then redeveloped in 2005 and is currently occupied by a shopping center; however, the 1993 ROD provided that a final evaluation would be needed to determine if the soil remedy and shallow groundwater removal were sufficient to protect the surface water quality of Ackermans Creek and groundwater. Final action on the shallow groundwater was again deferred in 2004, and a decision is currently awaiting further analysis to determine if discharging contaminated groundwater could present an unacceptable risk to the benthic community in UOP OU2.

[1] CLASS III-B AQUIFER DEFINITION

Under New Jersey Groundwater Quality Standards (GWQS), Class III-B groundwater consists of all geologic formations or units that contain groundwater having natural concentrations or regional concentrations (through the action of saltwater intrusion) exceeding 3,000 mg/L Chloride or 5,000 mg/L Total Dissolved Solids, or where the natural quality of groundwater is otherwise not suitable for conversion to potable uses. New Jersey designates Class III-B groundwater for any reasonable use at existing water quality, other than potable water. The GWQS establishes narrative descriptions of these classifications and their corresponding criteria as opposed to numerical standards.

AERIAL PHOTOS OF PRE-NTCRA AND POST-NTCRA CONFIGURATION





waterway channels and marshes (located on both the east and west sides of Murray Hill Parkway) in 2005 with collection of sediment and surface water data to investigate the nature and extent of contamination and to develop a preliminary conceptual site model. Two removal measures were performed in 2005 and 2007 under NJDEP's cleanup procedures and oversight in the marshes and lagoon area to accommodate the construction and placement of the New Jersey Transit rail line and right-of-way. The rail line was designed to cross over UOP OU2 to connect the Pascack Valley rail line with the Meadowlands Sports Complex. The removal consisted of excavation of soil and sediment to a depth of 2-4 feet below grade in the proposed construction area and areas where the railroad tracks would be supported by pilings; excavated material was disposed off-site. Contaminated soil was also buried under clean soil in areas where the railroad tracks would be elevated on soil embankments. A portion of the UOP property was then transferred to the New Jersey Sports and Exhibition Authority (NJSEA); however, responsibility for site cleanup remains with Honeywell.

In 2010, Honeywell signed an Administrative Settlement Agreement and Order on Consent (AOC) with EPA to complete the UOP OU2 RI/FS and perform the NTCRA. The 2010 AOC incorporated the former lagoon area as well as the marshes and waterway channels into one operable unit (OU2). The Ackermans South area was subsequently added to OU2 in an AOC Amendment to be issued shortly in 2018 because this area was impacted by historical UOP activities.

The NTCRA was completed in 2013 and included excavation and off-site disposal of the lagoon berms and sediment followed by placement of a 1-foot layer of sand on the bottom of the excavated area *(refer to aerial photographs above on extent of NTCRA)*. The objective of the NTCRA was to remove highly-contaminated sediment in the former wastewater lagoons and adjacent areas of Ackermans Creek that had not been addressed during the 1990 removal action. As a result of the NTCRA, the configuration of the former lagoon area was altered, and the area is now hydrologically connected with Ackermans Creek and subject to tidal fluctuations affecting the surrounding watershed. Post-NTCRA sampling in 2015 showed that newly deposited sediments had re-contaminated the NTCRA area, and post-NTCRA surface sediment concentrations were similar to pre-NTCRA conditions.

Honeywell completed the RI Report and risk assessments for UOP OU2 in 2018. The RI Report includes a discussion of the removals performed in 2005 and 2007 and the NTCRA. The risk assessments, which incorporate both the pre-NTCRA and post-NTCRA data, identified PCBs as contaminants of concern (COCs). The FS Report completed in 2018 focuses on the proposed interim source control remedial action for the waterway sediment. The RI Report and FS Report provide the basis for this Proposed Plan.

Site Characteristics

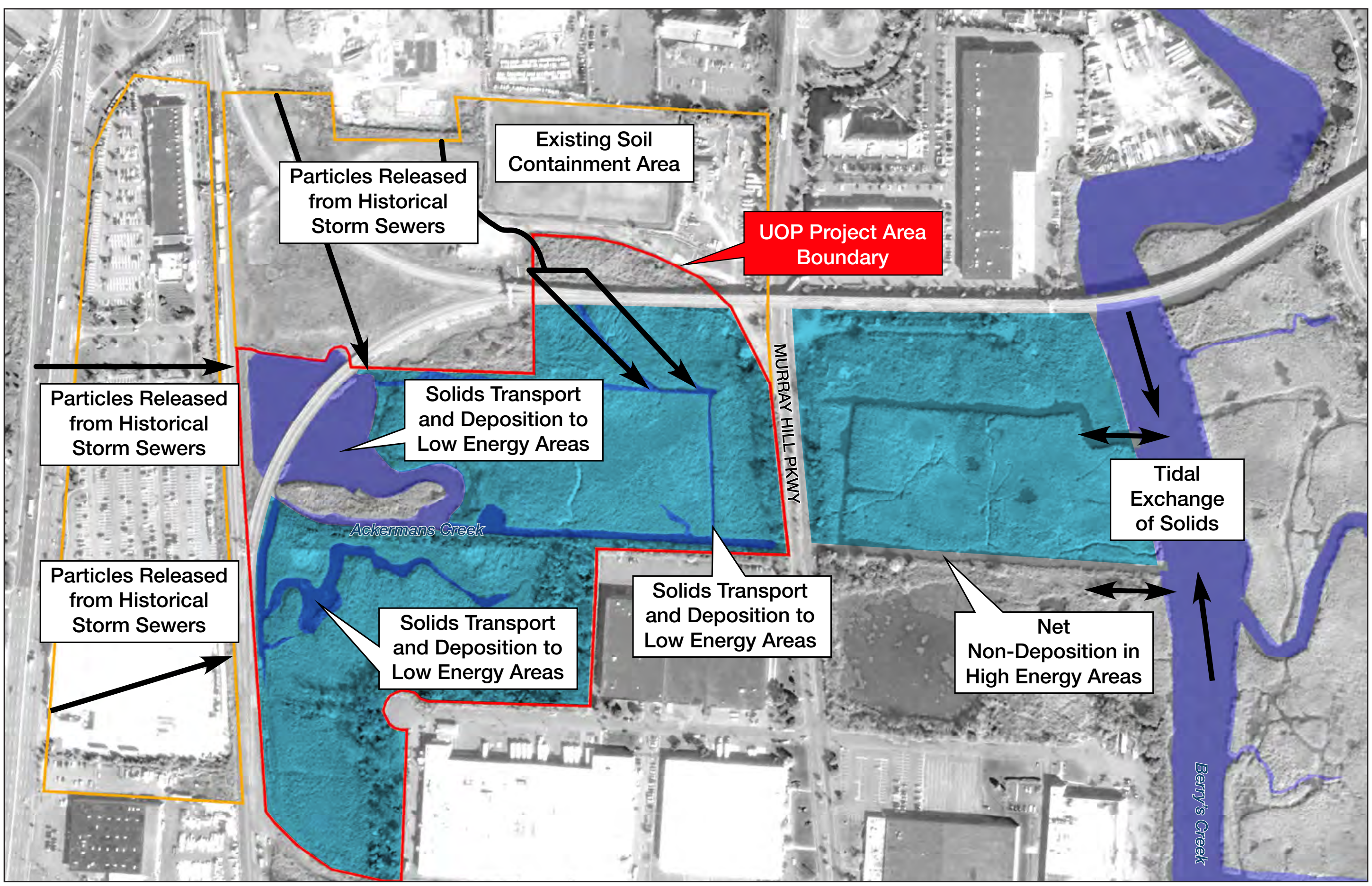
The RI Report includes a conceptual site model for UOP OU2 based on physical characteristics of the area and the nature and extent of contamination.

Physical Characteristics

The OU1 upland soil consists mainly of urban fill material that was historically placed on top of a pre-existing wetlands meadow mat. The shallow groundwater that moves within this overburden material is hydraulically connected to saline surface waters of Ackermans Creek. NJDEP has classified the shallow aquifer as a Class III-B (non-potable) aquifer because of the salinity levels. The shallow groundwater is separated from the deeper aquifer by approximately 100 feet of varved clay, but likely continues to discharge into the waterways from the north and west.

UOP OU2 is composed of open waterways and vegetated marsh areas. **Ackermans Creek consists of a main channel and a number of tributaries** *(refer to conceptual site model figure below)*. The main channel is the primary conveyance for surface water into and out of the system. It experiences the highest current velocities, which can resuspend and transport surface

PHYSICAL CONCEPTUAL SITE MODEL



sediment during the semidiurnal (twice daily) tidal cycle. Due to these high velocities, the main channel of Ackermans Creek has a much coarser-grained sediment bed compared to the tributaries. The tributaries have lower current velocities, which tend to accumulate fine-grained sediment and experience more deposition than erosion.

Surface water elevations and current velocities are influenced by daily tidal fluctuations and monthly lunar tidal cycles. On the incoming tide, surface water flows from Berry's Creek into Ackermans Creek, across the waterways and marshes on the east side of Murray Hill Parkway that are to be remediated as part of the BCSA interim action, then through a culvert to the waterways and marshes on the west side of Murray Hill Parkway. The marsh and waterway channels are affected by mixing between UOP and Berry's Creek during each tidal cycle. Storms can also cause sediment resuspension when stormwater discharges from outfalls into the waterways, or when stormwater enters as runoff along the rail line or from Murray Hill Parkway.

The surface and subsurface sediments in the waterways are dominated by clays and silts. The marsh sediment is dominated by root mat material surrounded by clay or silt. The main channel of Ackermans Creek and the two north-south side-channels connecting Ackermans Creek to the north channel typically exhibit soft sediment thicknesses between less than 1 foot to 3 feet thick. The marshes and the northern channel exhibit thicker deposits ranging from 1 to 7 feet. Thick sediment deposits were previously measured in the former lagoon areas; however, this material was removed as part of the NTCRA. New sediment deposits in the NTCRA area are 0.75 to 1 foot thick (measured two years after excavation).

Nature and Extent of Contamination

Based on the conceptual site model, several sources and release pathways have resulted in, or have potentially contributed to the contamination at UOP, including: historical discharges from the former UOP operators and adjacent properties, historical overflow and releases from the former lagoon system, surface water drainage, tidal mixing and deposition of contaminated solids, groundwater-to-surface water discharge, and atmospheric deposition. The historical discharge from the storm drains and surface water drainage have been the most significant transport pathways because these pathways would have captured historical spills, wastewater, grit, and other byproducts of the historical industrial processes, discharging them to the environment. These historic releases have been controlled, or are within permit conditions, so that at present the primary sources of contamination are remobilization of existing contaminated sediment, transport and deposition of contaminated solids from Berry's Creek, and resuspension and deposition of contaminated solids from the marshes.

For the waterway sediment, remedial investigations within UOP and the BCSA have shown that PCBs and mercury are the most significant contaminants from a human and ecological health risk perspective, although other contaminants, such as chromium and VOCs, were detected with high frequency. Prior to completion of the NTCRA, the highest contaminant concentrations of PCBs, VOCs, mercury, and chromium were detected on the west side of Murray Hill Parkway in the waterways (north and east of the former lagoon) and near historical stormwater outfalls. VOCs, mercury, and chromium concentrations also appeared to be relatively higher near the historical surface drainage feature on the north side of UOP OU2. These heavily contaminated sediments were removed during the NTCRA.

An evaluation of the pre-NTCRA data suggested the existence of a common source of chromium and mercury on the west side of Murray Hill Parkway, and a different source of mercury on the east side of Murray Hill Parkway, which was more heavily influenced by Berry's Creek. Statistical evaluations of PCB patterns in the pre-NTCRA sediment revealed different sources of PCBs, with certain PCB compounds having high concentrations closer to the discharge location(s) from historical operations at the UOP facility, and decreasing in concentration across UOP OU2 from west to east. The evaluation of these patterns suggested a greater influence of UOP-related PCBs on the west side of Murray Hill Parkway and a greater influence from Berry's Creek on the east side of Murray Hill Parkway. The pre-NTCRA data also suggested that marsh sediment exhibited lower average chemical concentrations than waterway sediment. Statistical evaluations of the PCB patterns in the pre-NTCRA sediment suggested the transport of contaminated fine-grained sediment from the waterways into marsh areas. The marsh areas would flood during the slow-moving peak tide, velocities would decrease as the tidal waters entered the marshes, and solids would be deposited. The marshes would then trap and retain solids during the subsequent ebb tide.

Following the NTCRA, the residual sediment waterway concentrations were lower and were similar to the existing marsh concentrations. PCBs, chromium, and mercury in waterway sediment from the 2013 post-NTCRA data set were lower than concentrations detected in pre-NTCRA conditions. (Note that the post-NTCRA sampling did not include VOC analysis.) PCBs in the 2013 post-NTCRA data were also comparable to those observed in the Mill Creek reference area (a tributary of the Hackensack River), whereas mercury was statistically lower than reference concentrations. However, the 2015 monitoring data indicated that sediment contaminant concentrations had increased, relative to the 2013 results. This recontamination was determined to be associated with resuspension and transport of sediments within OU2, exposure of previously buried contaminated waterway sediment, or export of contaminated sediment from the marshes to the waterways. **PCB, mercury, and chromium concentrations in waterway sediment are currently higher than concentrations detected in the Mill Creek reference area waterway** *(refer to data table below and figure on Page 9 showing surface sediment concentrations in UOP relative to reference areas)*. In UOP OU2, the highest contaminant concentrations are typically within the top 2 feet of waterway sediment, and a notable decrease in concentration is observed below 2 feet in depth. Samples collected from the underlying clay had either very low or non-detect contaminant concentrations.

A limited tissue dataset (including benthic macroinvertebrates and mummichog) was collected in 2010, 2013, and 2015 to assess the efficacy of the NTCRA; however, these data had limited utility since the 2015 sediment chemistry data demonstrated that the NTCRA area was recontaminated. Overall, residual contaminant concentrations in the tissue showed no significant difference between the pre-NTCRA and post-NTCRA conditions, and tissue contaminant concentrations were higher in UOP OU2 samples compared to the Mill Creek reference area.

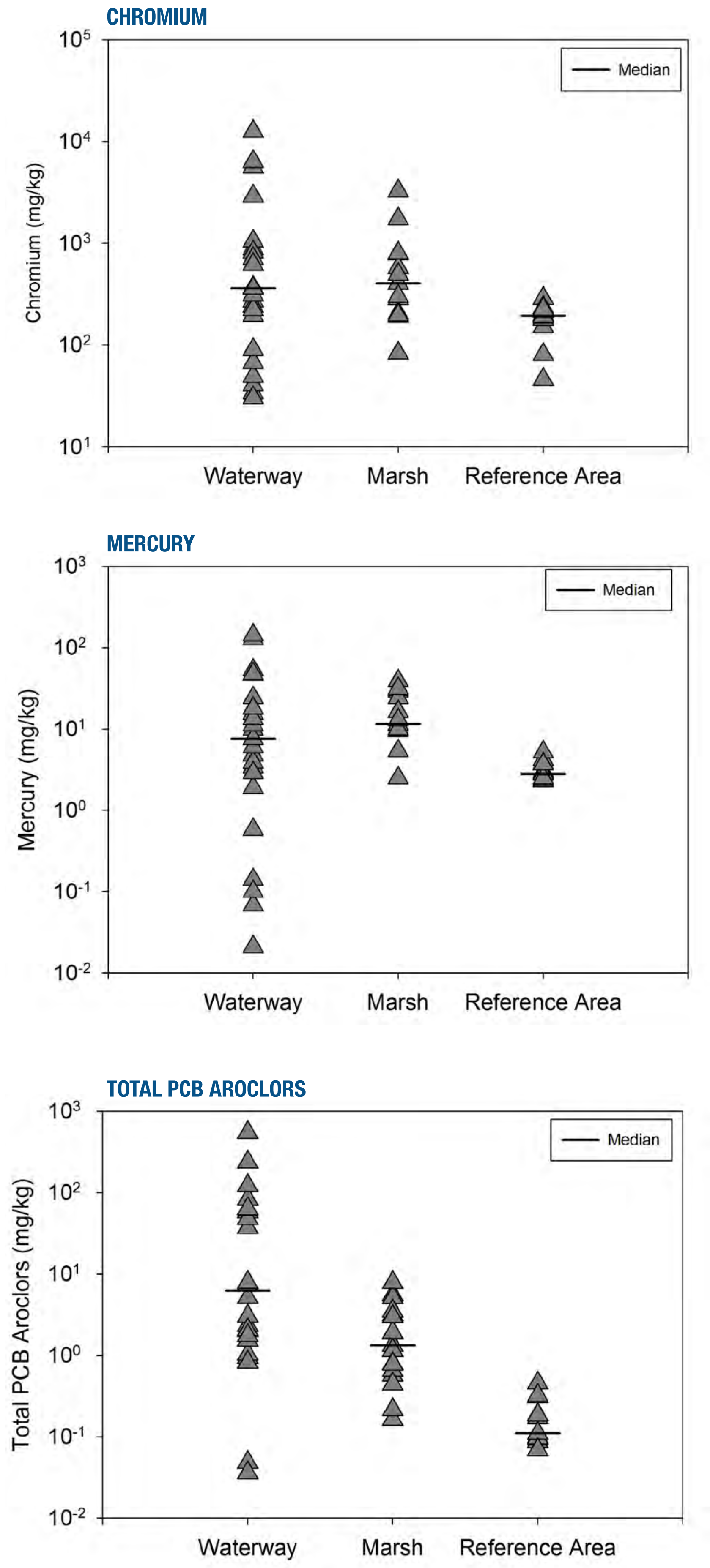
A limited surface water and groundwater dataset was also collected in 2010. While these data showed low VOC levels and while NJDEP does not identify numerical standards for Class III-B (non-potable) aquifers, based on these data EPA was unable to rule out the possibility that groundwater discharge was a transport pathway for VOC contaminants to the surface water and benthic macroinvertebrates in the waterway sediments. Due to the uncertainty, which has yet to be resolved, the groundwater-to-surface water discharge pathway will be further evaluated during the remedial design.

	2015 Surface Sediment Concentration (Median mg/kg)		
	PCB Aroclors	Mercury	Chromium
Waterway sediment in UOP OU2 West Side of Murray Hill Parkway	6.3	7.6	320
Waterway sediment in Ackermans South	33	24	360
Waterway sediment across entire UOP OU2	6.3	7.6	360
Waterway sediment from UOP Reference Area	0.11	2.8	190
Waterway sediment from BCSA Reference Area	0.20	1.3	43

Note 1: Waterway sediment from BCSA Reference Area
Note 2: BCSA Reference Area includes Mill Creek, Bellmans Creek, and Woodridge Creek

Principal Threat Waste

In general, EPA identifies as principal threat waste 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 (with a potential cancer risk of 10^{-3} or greater) should exposure occur. No principal threat waste remains in OU1 due to the implementation of the interim remedy, which included excavation of contaminated soils followed by off-site disposal or thermal treatment (based on the type of contamination) and placement of treated soil in an on-site containment area. In the UOP Project Area, the detected PCBs, VOCs, mercury, and chromium in the sediment act as a source to surface water contamination, and PCBs cause potential risk; however, these contaminated sediments are not highly mobile and can be reliably contained, so they are not considered principal threat wastes at UOP OU2. Although some contaminant concentrations are high and exposure point concentrations, which are the statistical values calculated to represent reasonable maximum exposures to both human and ecological receptors, result in potential risks that exceed acceptable levels, these potential risks do not meet the principal threat waste threshold.



NATURE AND EXTENT SEDIMENT CONCENTRATION SUMMARY:
TOTAL PCB AROCLORS, MERCURY, AND CHROMIUM

Summary of Site Risks

Human health and ecological risk assessments were conducted to estimate the risks associated with exposure to contaminants based on current and likely future uses of the UOP Project Area.

The Human Health Risk Assessment (HHRA) was conducted to assess the cancer risk and noncancer health hazards associated with exposure to COCs present at the UOP Project Area. The HHRA was completed using the standard EPA risk assessment process comprised of Hazard Identification, exposure assessment, toxicity assessment, and risk characterization. The HHRA incorporated sediment (waterway and marshes), surface water, and fish tissue data (collected between 2006 and 2015) to estimate exposures and health risks to current and potential future human receptors in the UOP Project Area. The shallow (Class III-B, non-potable) groundwater was included in the assessment. The following receptors and exposure pathways were evaluated quantitatively in the HHRA:

What is Human Health Risk and How is it Calculated?

A Superfund baseline Human Health Risk Assessment (HHRA) 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 the hazardous substances under current and future land uses. A four-step process is utilized for assessing site-related human health risks for actual and/or plausible exposure scenarios. **(1) Hazard Identification:** In this step, the chemicals of potential concern (COPCs) at the site in various media (e.g., sediment, surface water, and fish tissue) are identified based on such factors as: toxicity, concentration, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation. **(2) Exposure Assessment:** In this step, the different exposure pathways through which people might be exposed to the COPCs in the various media identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated surface water and sediment. Factors relating to the exposure assessment include, but are not limited to, COPC 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. A "central tendency exposure" scenario, which portrays the average or typical level of human exposure that could occur, is calculated when the reasonable maximum exposure scenario results in unacceptable risks, as discussed below under Risk Characterization. **(3) 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 COPC-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. **(4) 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 lifetime cancer risk;" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to COPCs 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 (which is considered the overall hazard from exposure to multiple COPCs from all relevant exposure pathways for a receptor) 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, even for sensitive members of the population. The goal of protection is a 10-6 cancer risk and an HI of 1 for a noncancer health hazard. Cumulative risks that exceed a 10-4 cancer risk or an HI of 1 require remedial action at the site. COPCs that exceed these goals are considered contaminants of concern (COCs) in the FS.

- Current/potential future on-site trespassers, including an older child (6 to 18 years old) and adult trespassers potentially exposed to sediment (0-6 inches) via ingestion and dermal contact and to surface water via dermal contact.
- Current/potential future fish consumers, including younger children (0 to 6 years old), older children, and adults assumed to consume white perch caught on-site. Consumption of crab was not evaluated because edible-size blue crabs were not observed at UOP during the long-term monitoring sampling events.
- Current/potential future off-site trespassers, including an older child (6 to 18 years old) and adult trespassers potentially exposed to sediment (0 to 6 inches) in Ackermans South Area via ingestion and dermal contact.

The estimated lifetime cancer risks (ELCRS) for current and potential future trespassers (older child and adult) exposed to sediment and surface water (ECLRs = 9×10^{-7} to 2×10^{-5}) were less than or within EPA's target cancer risk range of 1 in 10,000 (i.e., 10^{-4}) to 1 in 1,000,000 (i.e., 10^{-6}); however, the estimated noncancer Hazard Index (HI) for current and potential future older child and adult trespassers exposed to sediment and surface water (HI values = 2), exceeded EPA's HI threshold of 1 due to PCBs in sediment. PCBs were identified as a COC for sediment. Direct contact with surface water did not result in cancer risk or non-cancer health hazards above regulatory thresholds.

The ELCRs for current and potential future fish consumers (younger child, older child, and adult) (ELCRs = 7×10^{-5} to $1 \times 10\text{-}^{4}$) were within EPA's target cancer risk range of 10^{-4} to 10^{-6}; however, the estimated noncancer HI exceeded EPA's HI threshold of 1 due to PCBs in white perch (HI values = 3

What Is Ecological Risk and How Is It Calculated?

A Superfund Baseline Ecological Risk Assessment (BERA) is an analysis of the potential adverse health effects to biota caused by hazardous substance releases from a site in the absence of any actions to control or mitigate them under current and future land uses. The four-step process is used to assess site-related ecological risks. **(1) Problem Formulation:** In this step, the contaminants of potential concern (COPCs) at the site are identified. Assessment endpoints are defined to determine what ecological entities are important to protect. Then, the specific attributes of the entities that are potentially at risk and important to protect are determined. This provides a basis for measurement in the risk assessment. Once assessment endpoints are chosen, a conceptual model is developed to provide a visual representation of hypothesized relationships between ecological entities (receptors) and the stressors to which they may be exposed. **(2) Exposure Assessment:** In this step, a quantitative evaluation is made of what plants and animals are exposed to and to what degree they are exposed. This estimation of exposure to the COPCs includes various parameters to determine the levels of exposure to a chemical contaminant by a selected plant or animal (receptor), such as area use (how much of the site an animal typically uses during normal activities); food ingestion rate (how much food is consumed by an animal over a period of time); bioaccumulation rates (the process by which chemicals are taken up by a plant or animal either directly from exposure to contaminated soil, sediment, or water, or by eating contaminated food); bioavailability (how easily a plant or animal can take up a contaminant from the environment); and life stage (e.g., juvenile, adult). **(3) Ecological Effects Assessment:** In this step, literature reviews, field studies or toxicity tests are conducted to describe the relationship between chemical contaminant concentrations and their effects on ecological receptors, on a medium-, receptor- and chemical-specific basis. In order to provide upper and lower bound estimates of risk, toxicological benchmarks are identified to describe the level of contamination below which adverse effects are unlikely to occur and the level of contamination at which adverse effects are more likely to occur. **(4) Risk Characterization:** In this step, the results of the previous steps are used to estimate the risk posed to ecological receptors. Individual risk estimates for a given receptor for each chemical are calculated as a hazard quotient (HQ), which is the ratio of COPC concentration to a given toxicological benchmark. In general, an HQ above 1 indicates the potential for unacceptable risk. The risk is described, including the overall degree of confidence in the risk estimates, summarizing uncertainties, citing evidence supporting the risk estimates, and interpreting the adversity of ecological effects.

to 16). PCBs were identified as COCs for sediment based on exposure through consumption of white perch in the UOP Project Area.

The **Baseline Ecological Risk Assessment (BERA)** was completed using the standard four-step process developed by EPA, consisting of problem formulation, exposure assessment, ecological effects assessment, and risk characterization. The BERA incorporated sediment (waterway and marshes), surface water, and fish tissue data (collected between 2006 and 2015) to estimate exposures and risks to potential current and future ecological receptors. The BERA evaluated exposures in the waterway and marsh habitats in the UOP Project Area. The estuarine aquatic and wetland habitats support a wide range of ecological receptors including the following:

- Benthic invertebrates (represented by worms and crustaceans that live in/on the sediment)
- Estuarine fish (represented by mummichog and white perch)
- Water-dependent birds (represented by great blue heron and spotted sandpiper)
- Water-dependent mammals (represented by raccoon and muskrat)
- Wetland birds (represented by marsh wren and red-winged blackbird)

The BERA evaluated environmental impacts to ecological organisms. Wildlife, fish, and invertebrates are exposed to contaminants either through association with surface water and sediment, incidental ingestion of sediment, or through bioaccumulation of contaminants from the local estuarine food web. Although environmental risks appear to have decreased due to the NTCRA remedial work, they remain unacceptably elevated, particularly for organisms that consume benthic invertebrates and incidentally ingest sediment during foraging (e.g., spotted sandpiper). PCBs were identified as a COC in marsh sediment with HQ values as high as 500 (wren), and PCBs were identified as COCs in waterway sediment based on wildlife exposures, with HQ values as high as 3,000 (spotted sandpiper). While direct contact with surface water was not identified in the BERA as being a pathway of concern, the data could not rule out the possibility that groundwater discharge is a possible transport pathway for VOC contaminants to the surface water and benthic macroinvertebrates in the waterway sediments and may pose a risk.

Basis for Action

It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect the health or welfare of the environment from actual or threatened releases of hazardous substances into the environment, by mitigating an unacceptable risk to humans and the ecosystem that is due primarily to PCB contamination in the sediments.

Scope and Role of Action

The findings of the RI Report support an adaptive, multi-phase approach to address contaminated waterway sediment and marsh sediment, which is consistent with the the ROD (issued on September 25, 2018) for the BCSA. EPA determined that the waterway surface sediment had the highest contaminant concentrations. The proposed UOP interim source control remedial action will address the waterway sediment, which is the primary source of exposure and risk and is the on-going source of contamination to marshes and downstream waterways due to resuspension and transport with tidal exchange.

EPA intends to coordinate the UOP and BCSA remedial construction, so that the work could proceed concurrently.

Following an adaptive, multi-phase approach, additional UOP remedial actions, including remedial actions for the tidal marshes and discharging groundwater (if required), will be evaluated in one or more subsequent site decision documents based on the results of monitoring associated with this interim source control remedial action for the waterway sediment.

ACKERMANS CREEK, FACING EAST

Remedial Action Objectives

Remedial Action Objectives (RAOs) provide a general description of what the proposed interim source control remedial action is intended to accomplish. When developing the RAOs for the UOP Project Area, EPA considered reducing risks to human health and the environment, controlling the source of those risks, and maintaining the stability of the marsh habitat. For the UOP Project Area, unacceptable risk to humans and the ecosystem is due primarily to PCB contamination in the sediments; therefore, PCBs are the COCs. The two RAOs for the proposed interim source control remedial action are:

- Control sources of COCs by replacing the current biologically active zone in waterway soft sediment, thereby reducing exposure of human and ecological receptors to COCs in the waterways.
- Control sources of COCs by replacing the current biologically active zone in waterway soft sediment, thereby reducing resuspension of COCs into the water column and transport into adjacent marshes and downstream areas.

While the remedial construction will be designed for 100 percent bank-to-bank sediment removal, a performance metric has been identified that would allow EPA to determine when the proposed interim remedy has been successfully completed. This metric is removal of at least 95 percent of the targeted surface area of the remedial footprint, which would result in a significant reduction in on-site contaminant mass and source material. Greater percentages of success are anticipated in the main stem waterways as compared to the narrow, shallow tributaries where implementation will be more challenging. Since this Proposed Plan evaluates alternatives for an interim remedy, any residual contamination that may remain upon completion would be characterized through the post-construction performance monitoring program. This program would include, among other things, sampling of surface sediment, surface water, and biota in the remedial footprint to evaluate remedy effectiveness and degree of recontamination. Metrics to evaluate the monitoring program results will be determined in the remedial design. Human health and ecological risks will be estimated to assess whether any future action in the waterways is needed, and if so, risk-based remedial goals and appropriate actions will be selected in a future ROD.

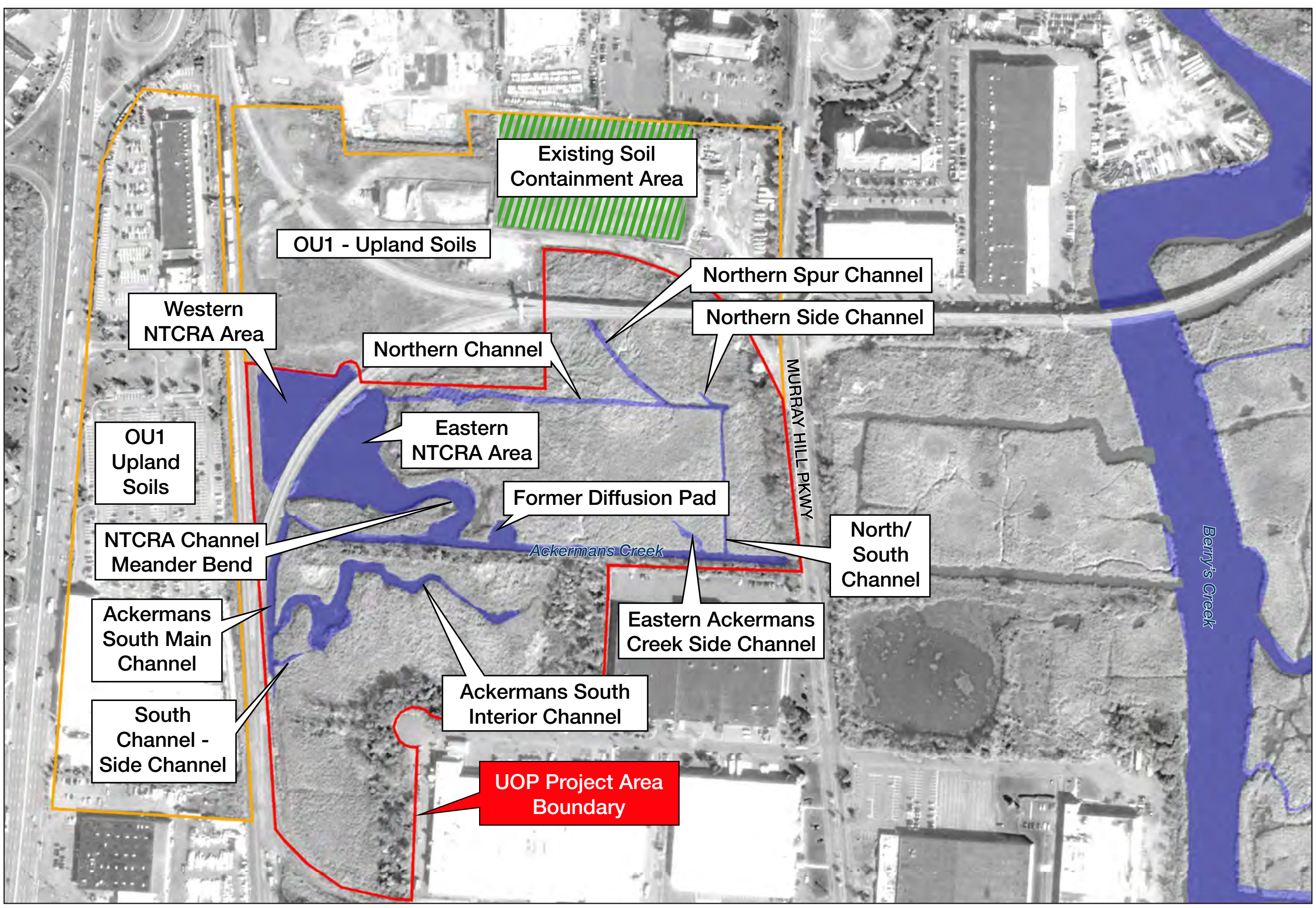
BIOLOGICALLY ACTIVE ZONE (BAZ) DEFINITION:
The upper layer of the surface sediment where plants and benthic organisms are actively living (also referred to as the biotic zone).

VIEW OF THE LAGOON IN UOP PROJECT AREA POST-NTCRA CONSTRUCTION, FACING EAST

Summary of Interim Remedial Alternatives

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. CERCLA § 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains applicable or relevant and appropriate requirements (ARARs) under federal and state laws, unless a waiver can be justified pursuant to CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4).

Four remedial alternatives were developed for the interim source control remedial action for the UOP Project Area *(refer to schematic diagrams, page 17, showing post-construction cross-sections of the waterway)*. The footprint of the interim source control remedial action includes the main channel of Ackermans Creek, its tributaries, the area of the previous NTCRA, and the Ackermans South Area. This Proposed Plan presents EPA's Preferred Alternative and evaluates whether it satisfies the various mandates of CERCLA. Interim source control remedial actions should be designed to be protective of human health and the environment, cost effective, and consistent with the final remedy. The alternatives evaluated in the FS Report, except for the No Action alternative for the UOP Project Area, all mitigate risk to human health and the environment (thus satisfying the RAOs), comply with ARARs, and are cost-effective.



FOOTPRINT OF PROPOSED INTERIM SOURCE CONTROL REMEDIAL ACTION IN UOP PROJECT AREA

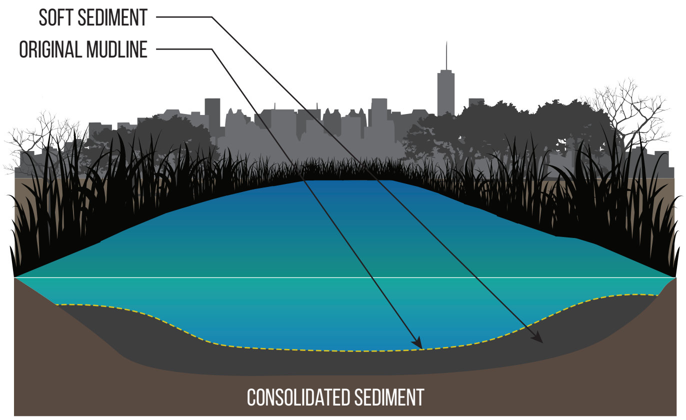
Common Elements:

Common elements among the alternatives, other than the No Action alternative, include: implementation of the BCSA interim action (including remediation of the waterway sediment on the east side of Murray Hill Parkway) according to the ROD issued on September 25, 2018, implementation of a post-construction performance monitoring program, continuation of the NJDEP fish consumption advisories, and maintenance of the backfill in the waterway. Another common element among the active alternatives will be the implementation of a groundwater monitoring program during the remedial design to assess whether shallow groundwater (contaminated with VOCs) is discharging to the waterways. If groundwater VOC discharge presents an unacceptable risk to the benthic community in UOP OU2, an appropriate response will be selected in the future. The response to the groundwater monitoring results will not affect the implementation of the waterway sediment remedy.

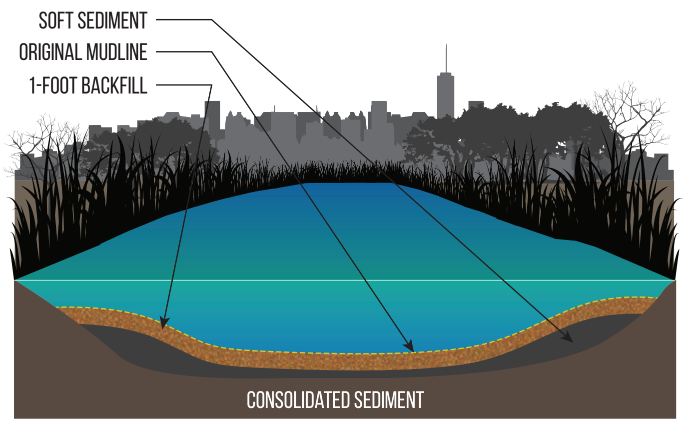
The active alternatives include bank-to-bank excavation. The area considered for this proposed interim source control remedial action is the same for all of the active alternatives, so the only significant difference between the alternatives is the depth of excavation, which affects the volume of material being removed, and the corresponding volume of backfill. Fixed excavation depths were used to estimate removal volumes and construction costs for comparative evaluation purposes only. The remedial design process will include sediment probing and coring work in the waterways to define the thickness of accumulated sediment overlying the clay stratum to generate more accurate removal estimates. If the clay layer is encountered at a shallower depth, only the soft sediment will be removed, resulting in less excavation. A 6-inch over-excavation allowance was included in the alternative design and cost estimate.

Alternative-Specific Elements:

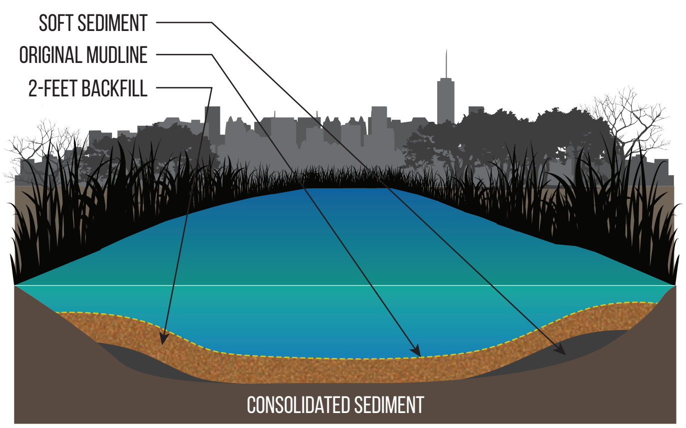
	Description	Volume of Sediment Removal and Backfill (Ea.)	Estimated Present Value	Estimated Construction Time
Alternative 1	**No Action** provides a baseline for comparison to other alternatives. Alternative 1 does not include any remedial actions within the waterways, monitoring, or institutional controls.	None	-	-
Alternative 2	The removal of **1 foot** of waterway sediment and placement of backfill to the existing surface sediment elevation would address the RAOs by reducing human and ecological exposure pathways and mitigating the potential for contaminated surface sediment resuspension and transport.	12,200 cubic yards	$14.6 million	8.5 months
Alternative 3	The removal of **2 feet** of waterway sediment (where most of the contaminated sediment is located) and placement of backfill to the existing surface sediment elevation would address the RAOs. Alternative 3 has the same general approach and objectives as Alternative 2 but would remove a greater amount of sediment from the waterway.	16,300 cubic yards	$18.2 million	11.5 months
Alternative 4	The removal of all waterway sediment to the native clay layer **(approximately 3 feet)** and placement of backfill to the existing surface sediment elevation would address the RAOs by eliminating the source of contamination to the marsh as well as removing the human and ecological exposure pathways.	19,600 cubic yards	$21.6 million	14 months



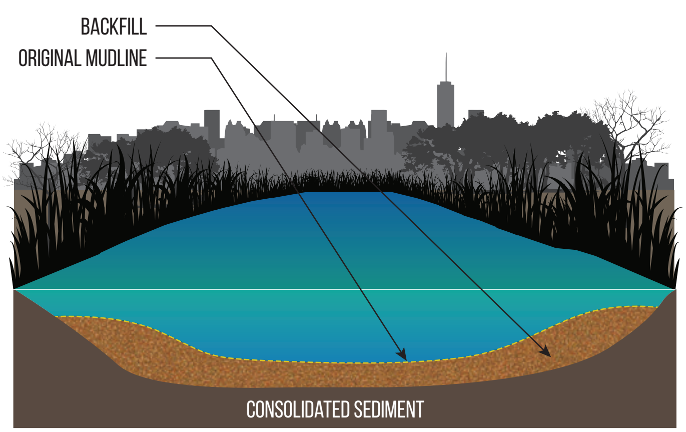
ALTERNATIVE 1: NO ACTION



ALTERNATIVE 2: 1-FOOT REMOVAL OF SEDIMENT AND BACKFILL



ALTERNATIVE 3: 2-FOOT REMOVAL OF SEDIMENT AND BACKFILL



ALTERNATIVE 4: ALL SOFT-SEDIMENT REMOVED (APPROXIMATELY 3 FEET) AND BACKFILL

SCHEMATIC DRAWING OF FOUR ALTERNATIVES POST REMEDIAL WORK

Evaluation of Interim Remedial Alternatives

The alternatives for the interim source control remedial action were evaluated and compared to each other using the nine criteria set forth in the NCP at 40 C.F.R. Section 300.430(e)(9)(iii). These criteria fall into three categories: threshold criteria, balancing criteria, and modifying criteria, which are briefly defined below.

THRESHOLD CRITERIA

CRITERION 1 — **OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT** evaluates whether an alternative eliminates or effectively controls threats to human health and the environment.

CRITERION 2 — **COMPLIANCE WITH ARARS** evaluates whether the alternative meets federal and state environmental statutes, regulations, and other promulgated requirements that pertain to the site, or whether a waiver is justified.

BALANCING CRITERIA

CRITERION 3 — **LONG-TERM EFFECTIVENESS AND PERMANENCE** considers the ability of an alternative to maintain protection of human health and the environment over time.

CRITERION 4 — **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, or the amount of contamination present.

CRITERION 5 — **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.

CRITERION 6 — **IMPLEMENTABILITY** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

CRITERION 7 — **COST** includes estimated direct and indirect capital and operation and maintenance costs. Costs are presented as a Present Value Cost, which is the total cost of an alternative over time in terms of today's dollar value, calculated using a discount rate of 7 percent. Cost estimates are expected to be accurate within a range of +50 to -30 percent of the actual cost to implement the alternative. A remedy is cost effective if its costs are proportional to its overall effectiveness.

MODIFYING CRITERIA

CRITERION 8 — **STATE/SUPPORT AGENCY ACCEPTANCE** considers whether the state agrees with the EPA's analyses and recommendations.

CRITERION 9 — **COMMUNITY ACCEPTANCE** considers whether the local community agrees with EPA's analyses and Preferred Alternative. Public comments received on the Proposed Plan are an important indicator of community acceptance.

All NCP evaluation criteria, except the two modifying criteria (i.e., state acceptance and community acceptance) were evaluated as part of the FS. State acceptance will be determined after NJDEP completes its review of the Proposed Plan. Community acceptance will be evaluated following receipt and consideration of public comments on this Proposed Plan.

A summary of the comparative analysis of alternatives for the UOP Project Area is provided below. In the evaluation of balancing criteria, each alternative was assigned a relative rating from low to high. A low rating shows that the alternative has a low level of achievement for some or all of the factors considered for the criterion compared to other alternatives, while a high rating indicates a relatively high level of achievement. Intermediate levels of achievement are rated as low-to-moderate, moderate, and moderate-to-high. Qualitative ratings were based on professional judgment and knowledge of the conceptual site model. In this qualitative analysis, EPA assumed that the greater sediment removal depth would yield better protection by eliminating the human and ecological exposure pathway, and that proper engineering controls would be effective in containing underlying contaminated sediment.

Conditions within UOP will benefit from the BCSA interim action because areas of UOP OU2 located on the east side of Murray Hill Parkway will be remediated as part of the BCSA interim action. Moreover, the BCSA interim action will have an indirect benefit on the portion of UOP OU2 located on the west side of Murray Hill Parkway, because Ackermans Creek is hydrologically connected to Berry's Creek. Consequently, the following comparative analysis was completed with the understanding that the benefit of the BCSA interim action is common to all of the alternatives.

CRITERION 1 Overall Protection of Human Health and the Environment

Alternative 1 (No Action Alternative) will not meet the RAOs or be protective of human health and the environment because it will not reduce the exposure of human and ecological receptors to COCs in the waterway sediment or reduce the resuspension or transport of sediment and COCs to the water column within a reasonable timeframe. Alternative 2 (1 foot removal and backfill) would mitigate exposure to humans and the ecosystem because the backfill placed over underlying contaminated sediment (following the removal of 1 foot of sediment) would reduce the exposure pathways for human and ecological receptors and would mitigate the potential for COC resuspension or transport from underlying contaminated sediment to the water column. Alternative 3 (2 feet removal and backfill) and Alternative 4 (removal of all sediment and backfill) are considered more protective of human health and the environment because these alternatives would remove the majority or all of the contaminated sediment and employ thicker layers of backfill, thereby further reducing or eliminating the exposure pathways and potential for resuspension and migration of COCs from sediment into the adjacent marshes, waterways east of Murray Hill Parkway, and Berry's Creek.

CRITERION 2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 1 (No Action) will not trigger action-specific ARARs or location-specific ARARs because no action would be conducted within the UOP Project Area. Action-specific and location-specific ARARs are identified in the FS Report, including the requirements of the Clean Water Act that apply to dredging, 33 U.S.C. §404(b)(1) and 40 C.F.R Part 230, which require that disturbance to aquatic habitat be minimized to the extent possible, the New Jersey Flood Hazard Control Act Rules, and federal floodplain management requirements. Alternatives 2 through 4 will be designed to comply with action-specific and location-specific ARARs that apply to the scope of the proposed interim source control remedial action. Note that there are no chemical-specific ARARs for sediment. The alternatives are not intended to achieve a risk-based preliminary remedial goal; rather the alternatives are intended to achieve targeted excavation depths (bank-to-bank) in the waterways.

CRITERION 3 Long-term Effectiveness and Permanence

Alternative 1 (No Action) would not provide any long-term effectiveness and permanence since no action would be taken. Active alternatives would remove the sediment that serves as the current source for potential human and ecological exposures and COC transport. Comparatively, Alternative 3 (2 feet removal and backfill) and Alternative 4 (removal of all sediment and backfill) would have more long-term effectiveness and permanence than Alternative 2 (1 foot removal and backfill), since Alternative 2 includes only 1 foot of excavation, whereas most or all of the contaminated sediment would be removed from the waterways under Alternatives 3 and 4. A thicker backfill layer would also provide more protection and control of post-construction risk. The sediment removal and backfill thicknesses for Alternatives 3 and 4 would be more than adequate and would have high long-term effectiveness.

CRITERION 4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternative 1 (No Action) will not reduce the toxicity, mobility, or volume of contaminants because no action is occurring in the UOP Project Area. Alternatives 2 through 4 include bank-to-bank excavation. The area considered for this proposed interim source control remedial action is the same for all of the active alternatives, so the only significant difference between the alternatives is the depth of excavation, which affects the volume of material being removed, and the corresponding volume of backfill.

CERCLA expresses a preference for remedial alternatives that employ treatment technologies that permanently or significantly reduce the toxicity or mobility of hazardous substances, specifically principal threat wastes; however, the UOP waterway sediment is not a principal threat waste. The waterway sediment consists of material that can be effectively removed and placed in a permitted disposal facility where it would be appropriately managed. Although the risk assessment concluded that the sediment has unacceptable levels of COCs, these levels are not highly toxic. In addition, the COCs in the sediment are not highly mobile. Notwithstanding these factors, the criterion for treatment is being addressed by managing the excavated material. Active alternatives will include ex-situ sediment dewatering followed by the addition of a treatment amendment for solidification to meet transportation and disposal requirements. This treatment will reduce the toxicity and mobility of COCs in the sediment, compared to untreated sediment. All active remedial alternatives are rated moderate for this criterion.

CRITERION 5 Short-term Effectiveness

No action would be taken under Alternative 1; therefore, the short-term effectiveness criterion is not applicable. For the remaining active alternatives, short-term impacts to the local community may include: increased local traffic, exhaust emissions, dust, noise, and possible odors associated with construction, as well as potential accident risks to construction workers and short-term impacts to water quality and sediment quality associated with construction operations. Due to the similarities of the active alternatives, the overall risks to workers, community, and environment are similar since the same technology will be implemented in the UOP Project Area. The differentiating factor between the active alternatives is the construction duration and the amount of material requiring transport to or from the work site (which can affect neighboring communities). The durations of Alternatives 2, 3, and 4 range from approximately 8.5 to 14 months, which directly reflects the total quantity of sediment that is estimated to be removed (approximately 12,200 to 19,600 cubic yards). The sediment removal quantities are directly related to quantity of backfill required and the quantity of sediment requiring disposal. As such, the alternatives have been ranked for short-term effectiveness in order from high to low based on the construction duration: Alternative 2 will have the highest short-term effectiveness (and lowest construction duration), followed by Alternative 3 and then Alternative 4, which will have the lowest short-term effectiveness and longest construction durations.

CRITERION 6 Implementability

All of the active alternatives can be implemented with readily available materials and methods. Based on the NTCRA experience, excavation (in the dry) and backfill are feasible. Unlike in the BCSA, excavation (in the dry) is feasible in the UOP Project Area because the channels and tributaries of Ackermans Creek are shallower than Berry's Creek, resulting in less volume of water to manage and control. As demonstrated during the NTCRA, excavation (in the dry) would better handle the challenges associated with working in the marsh area. Bank stability (e.g., banks along the shoreline collapsing during construction) is not anticipated to be a concern based on the NTCRA construction, but stability will be further evaluated in the remedial design. The implementability of all alternatives is considered moderate to high based on the previous NTCRA work.

CRITERION 7 Cost

Alternative 1 (No Action) has no capital costs because no active remediation will occur.

Alternative 2 (1-foot excavation and backfill) has a Present Worth total estimated cost of $14.6 million (associated with approximately 12,200 cubic yards of sediment removed).

Alternative 3 (2-feet excavation and backfill) has a Present Worth total estimated cost of $18.2 million (associated with approximately 16,300 cubic yards of sediment removed).

Alternative 4 (removal of all sediment and backfill) has a Present Worth total estimated cost of $21.6 million (associated with approximately 19,600 cubic yards of sediment removed).

CRITERION 8 State/Support Agency Acceptance

This Proposed Plan is currently under review by NJDEP.

CRITERION 9 Community Acceptance

After EPA has received comments and questions during the public comment period, EPA will summarize the comments and provide responses in the Responsiveness Summary section of the ROD. Community acceptance of the Preferred Alternative will be evaluated based on this activity.

ACKERMANS CREEK, FACING WEST

Summary of EPA's Preferred Alternative

EPA's Preferred Alternative for the UOP Project Area is Alternative 3 (removal of 2 feet of waterway sediment and backfill to the existing sediment surface elevation). The footprint of the interim source control remedial action includes the main channel of Ackermans Creek, its tributaries, the area of the previous NTCRA, and the Ackermans South Area. This Preferred Alternative is consistent with the BCSA ROD (issued on September 25, 2018). Moreover, the footprint of the BCSA interim action will include the part of UOP OU2 on the east side of Murray Hill Parkway. The means and methods for implementing the alternative selected in the UOP ROD will be presented in the remedial design along with guidelines for the backfill material.

EPA's Preferred Alternative includes:

1. Bank-to-bank removal and off-site disposal of 2 feet of waterway sediment and subsequent placement of backfill to the existing sediment surface elevation.
2. Dewatering, treatment, transportation, and off-site disposal of approximately 16,300 cubic yards of sediment removed from the waterways.
3. Groundwater monitoring during the remedial design to assess whether shallow groundwater is discharging to the waterways. If the presence of VOCs in the groundwater discharge presents an unacceptable risk to the benthic community in UOP OU2, an appropriate response will be selected in the future.
4. Institutional controls, such as the existing New Jersey fish consumption advisories.
5. Maintenance of backfill in the waterway.
6. A post-construction performance monitoring program to monitor the success of the proposed interim source control remedial action in the surrounding ecosystem and the adjacent marshes and waterways that are hydrologically connected to the UOP Project Area.

Selection of the Preferred Alternative was accomplished through evaluation of the seven threshold and balancing criteria as specified in the NCP. The Preferred Alternative would satisfy the statutory requirements of CERCLA Section 121(b). EPA prefers Alternative 3 because it provides equivalent risk reduction to Alternative 4 at a lower cost and with fewer construction-related impacts to the environment and community. EPA has concluded that the Preferred Alternative would provide the best balance of the seven threshold and balancing criteria and is consistent with the BCSA interim action. EPA is inviting the community to comment on the Proposed Plan to help determine the ninth criterion, which is community acceptance. EPA recognizes the community concerns regarding potential flooding. The Preferred Alternative would address this concern by backfilling to the existing surface sediment elevation only.

Since this Proposed Plan proposes an interim source control remedial action, EPA will continue to evaluate the effectiveness of the remedy through a post-construction performance monitoring program and a Five-Year Review. Additional determinations will be necessary for EPA to finalize the decision for the waterway sediment remedy. EPA, in consultation with NJDEP, will also evaluate further remedial actions, including appropriate remedial actions for the tidal marshes and discharging groundwater, if required.

Community Outreach Considerations

Since UOP is geographically located within the watershed the forms the BCSA, EPA expects that the community concerns for UOP and the BCSA are similar. In 2008 and 2017, EPA conducted community interviews with various BCSA stakeholders to understand community concerns. A common concern expressed during these interviews and meetings related to the potential impacts of remedial action on flooding and mitigating future flooding issues. EPA also hosted a Public Meeting in 2012 at the East Rutherford Memorial Library to discuss the NTCRA with the community.

Public comment on the Proposed Plan for the proposed UOP interim source control remedial action will be accepted during the public comment period from **December 10, 2018 to March 22, 2019.** EPA will present the details of the Proposed Plan during a public meeting scheduled for **March 6, 2019 beginning at 6:30 p.m. at the Hasbrouck Heights Free Public Library.**

Additional information on UOP is available through the administrative record, announcements published in the local newspapers, and access to the EPA website for UOP. These activities will:

- Help the public to understand the alternatives presented in the Proposed Plan, including the Preferred Alternative, and EPA's evaluation criteria, so that the public can effectively provide input on the Proposed Plan.
- Make the public aware of the full range of opportunities to learn about the Proposed Plan and how to provide input.

EPA is committed to maintaining a transparent, proactive community interaction process during each remedial phase.

Contact Information

View Proposed Plan and Supporting Materials

EPA encourages the public to review the Proposed Plan, supporting documents, and the administrative record, which are available at the Information Repositories listed below or on EPA's website for UOP: https://www.epa.gov/superfund/universal-oil

Additional information on BCSA is available online at: https://www.epa.gov/superfund/ventron-velsicol

Information Repositories:

Wood-Ridge Memorial Library
231 Hackensack Street
Wood-Ridge, NJ 07075

East Rutherford Memorial Library
143 Boiling Springs Ave
East Rutherford, NJ 07073

EPA Records Center
290 Broadway - 18th floor
New York, NY 10007

How to Submit Formal Comments

Comments submitted during this period will be part of EPA's official administrative record for the remedy. EPA encourages public participation. If you have any questions or would like additional information, please contact one of the project contacts listed below.

Submit comments via mail or email by March 22, 2019 to:

Eugenia Naranjo
Remedial Project Manager
290 Broadway - 19th floor
New York, NY 10007
PH: 212-637-3467
naranjo.eugenia@epa.gov

Keep in touch with the project online:

EPA UOP website:
https://www.epa.gov/superfund/universal-oil

Follow EPA Region 2 on Twitter at: http://twitter.com/eparegion2

and Facebook at: http://facebook.com/eparegion2

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United States
Environmental Protection
Agency

ATTACHMENT B: PUBLIC NOTICE

Judge: Missouri clinic can't resume abortions

ASSOCIATED PRESS

COLUMBIA, Mo. – Planned Parenthood cannot resume abortions at a clinic in central Missouri after a federal judge ruled that state restrictions were not "undue" burdens on women seeking abortions.

Current Missouri law requires clinics that provide abortions to have physicians with admitting privileges at a nearby hospital. The Columbia clinic has been unable to secure a physician with those privileges after a panel of medical staff at University of Missouri Health Care decided to stop offering the privileges in 2015 during a Republican-led legislative investigation on abortion in the state.

The clinic filed a motion in December asking for an exemption from that requirement so the Columbia clinic could resume abortions. St. Louis has the only clinic able to offer abortions in the state.

U.S. Western District Judge Brian Wimes ruled Friday that the admitting privileges did not affect enough women to constitute an undue burden, The Columbia Missourian reported.

Wimes also wrote that requiring women to drive farther to obtain an abortion was not enough of a burden to rule in Planned Parenthood's favor. The judge said the organization didn't provide evidence of trying to find doctors with the necessary hospital privileges in Columbia, or evidence of fewer doctors, longer wait times and increased crowding at the St. Louis clinic.

"Finally," he continued, "the record does not provide a basis in evidence to approximate the number of women who will forego or postpone surgical abortion incidental to the inoperability of the Columbia Facility."

Dr. Brandon Hill, CEO and president of Planned Parenthood Great Plains, said in a statement Monday that the state requirement for a physician with admitting privileges is "virtually identical" to a law struck down by the U.S. Supreme Court in 2016. He said the Columbia clinic hadn't found a qualified physician because of political pressure.

A federal judge ruled Friday that a Planned Parenthood clinic in Columbia, Missouri, cannot resume abortions without securing a physician with privileges at University of Missouri Health Care. AP

"Let's call this what it is – politicians ignoring medical evidence to push sexual and reproductive health care out of reach for people across Missouri," Hill said. "Abortion is incredibly safe, yet politicians continue to pursue restrictions that defy medical experts and make abortion as inaccessible as possible. Missourians deserve better."

The organization and the state have been in a legal fight over the restrictions since November 2016, when Planned Parenthood challenged the requirements for ambulatory surgical center licensing and admitting privileges to local hospitals for doctors. It filed its latest injunction in December when the licensing process for the Columbia clinic was completed but abortion services were still not permitted because of the admitting privileges requirement.

The Columbia clinic was damaged by an arson fire earlier this year. The FBI is investigating the fire as a possible hate crime. The clinic reopened to provide other reproductive health services on Feb. 19.

Pence announces new sanctions on Venezuela

Ben Fox and Joshua Goodman
ASSOCIATED PRESS

BOGOTA, Colombia – The Trump administration on Monday announced new sanctions on allies of Venezuela's Nicolas Maduro as it struggles to find new ways to boost his opponent Juan Guaido after an effort to deliver humanitarian aid to the economically devastated nation faltered amid strong resistance from security forces who remain loyal to the socialist leader.

Vice President Mike Pence arrived in the Colombian capital for an emergency summit of regional leaders to discuss the deepening crisis and immediately met with Guaido, whom the U.S. and 50 other nations recognize as Venezuela's rightful leader.

In a speech to the group, Pence urged regional partners to freeze oil assets controlled by Maduro, transfer the proceeds to Guaido and restrict visas for Maduro's inner circle. He said the U.S. was imposing more sanctions on four pro-government governors.

"It's time to do more," said Pence. "The day is coming soon when Venezuela's long nightmare will end, when Venezuela will once more be free, when her people will see a new birth of freedom, in a nation reborn to libertad."

Pence's appearance before the Lima Group comes at an important crossroads for the coalition of 14 mostly conservative Latin American nations and Canada that has joined forces to pressure Maduro. A month after Guaido declared himself interim president at an outdoor rally, hopes that support for Maduro inside the military would quickly crumble have faded.

Over the weekend, security forces on the borders with Colombia and Brazil fired tear gas and buckshot on activists waving Venezuelan flags while escorting trucks with emergency medical and food kits.

Four people have been reported killed and at least 300 wounded, although only a few were hospitalized.

While Colombian authorities said more than 160 soldiers deserted their posts and sought refuge across the border over the weekend, the highest-ranking among them was a National Guard major.

Vice President Mike Pence is welcomed by Colombian officials Monday in Bogota, where he attended a summit of regional leaders. AFP/GETTY

No battalion or division commanders have come forward to challenge Maduro despite almost-daily calls by Guaido and the U.S. to do so.

That's left many asking what Guaido and the U.S. can do to break the stalemate.

For now, the U.S. is showing no signs it is considering a military intervention to remove Maduro.

During his visit, Pence repeated President Donald Trump's threat that "all options are on the table" but gingerly avoided talking about the potential for military action.

Instead, he stuck to traditional policy tools that so far have only hardened Maduro's resolve. Foremost among them was the addition of four governors to a growing list of more than 50 Venezuelan officials under sanctions and blocked from doing business or having accounts in the U.S.

Pence also said the U.S. would continue to search for places to pre-position aid for eventual delivery to Venezuela, and announced $56 million in new assistance to countries in the region helping to absorb an exodus of more than 3 million Venezuelans who have fled hyperinflation and shortages in recent years.

ATTACHMENT C: TRANSCRIPT FROM THE PUBLIC MEETING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

--X

Public Comment Session
Re: Universal Oil Products in East Rutherford, New Jersey.

--X

Hasbrouck Heights Free Public Library
320 Boulevard
Hasbrouck Heights, New Jersey
March 6, 2019
7:00 p.m.

APPEARANCES:

Carsen Mata, Community Involvement Coordinator

Eugenia Naranjo, Remedial Project Manager

Michael Sivak, Chief, Passaic, Hackensack, Newark Bay Remediation Branch
Doug Tomchuk, Remedial Project Manager
Other EPA and EPA Contractor Staff
The Public
Capt. Bill Sheehan, Hackensack Riverkeeper

Job No. 11855
Reported by:
Kari L. Reed

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MS. MATA: We're going to get started. Thank you all for coming this evening. My name is Carsen. I'm the Community Involvement Coordinator on this site. And if you've been to our past meetings, you might recognize me from the Berry's Creek site, I'm also the CIC on that site as well. So thank you so much for coming. We have actually representation from Congressman Pascrell's office, Leo has joined us tonight, and I just want to thank him for coming. And the congressman has been very supportive of our project, and we thank him for that.

And now I'm going to turn it over to Eugenia, who is the project manager for this site.

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Most of you have probably already met her while we've been here for the last twenty minutes or so. So she's going to run us through the presentation, and we'll take questions after she's finished. And we'll just take it from there. Thank you, folks.

MS. NARANJO: All right. Hello, everyone. My name is Eugenia Naranjo. I am one of two project managers working on the Universal Oil Products Superfund site, or UOP. The other one is Doug Tomchuk, who everybody knows, and then our supervisor, Michael Sivak, is also here.

The presentation tonight is going to describe the interim cleanup that EPA is proposing in

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the sediments of the waterways for the UOP site. I'm going to ask that if you have any clarifying questions, please go ahead and ask them. But more longer comments or questions, let's just hold those for the end. And there's a stenographer here to record the meeting and all your comments and your questions.

I should also say that we issued a Proposed Plan and it was published last December. And right now we're in the middle of the comment period. So we are receiving comments until March 22nd, either by email, or if you have some verbal comments, please feel free to make them during our meeting.

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So let's get started. Next slide. So where are we right now? The Universal Oil Products site is located south of where we're located -- forgot the pointer. This is the UOP site, which is located south of Borough Hall in Hasbrouck Heights, where we are here, and it's southwest of the Teterboro Airport. It's by Berry's Creek, and here you can see the Meadowlands Sports Complex and the Hackensack River. I guess everybody here is familiar with this area, so let's go to the next slide.

So, EPA often breaks up Superfund sites into smaller pieces or components, just to make them more manageable or easier to investigate, to study,

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and also to clean up. So we're here to talk about the Universal Oil Products site. And this is divided into two separate components. We have what we call Operable Units, and we also refer to them as OU. So we have OU 1, which is mainly the land side. It includes the upland soil and the shallow groundwater.

Operable Unit 2, which is what we are going to talk to, we're going to talk about tonight, includes the waterways. And mainly the sediments and the waterways including a former lagoon on the site and the marshes.

What the EPA is proposing right now, and what we are here to discuss, is pretty much the

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clean up of the sediment and the waterways west of Murray Hill Parkway. And I should make that distinction. We have waterways in the east and in the west. The waterways in the east of Murray Hill Parkway are being addressed under the Berry's Creek Study Area ROD, but in the west is being addressed by the UOP ROD. And again, this is our administrative process just to make sites easier to investigate or more manageable, as well as easier to clean up.

So let's go back to the site map. In red outline -- I don't know this slide -- this is the Universal Oil, this is OU2 area we are talking about. And in orange hatch you can see the upland side of it, which is OU1.

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That includes the upland soil and groundwater.

In the yellow outline, that's the Berry's Creek Study Area. And then again, here's the Murray Hill Parkway. And we are addressing the sediments in the waterways west of the Murray Hill Parkway because the east sediments -- the east side of the Murray Hill Parkway is addressed by the Berry's Creek Study Area.

So this is just a map showing the area. And then if we look at the inset, this is the footprint of the area that's going to be remediated, and it's pretty much all the waterways that you see highlighted in light blue. That includes Ackermans Creek, which runs east

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to west, and some tributaries. The north channel, this area which is called -- which is Ackerman South, and the former lagoon in the UOP area.

Next slide. So this is the boundary of the UOP site. This is the redeveloped shopping center, that I'm sure everybody is familiar with. It has some restaurants, Starbucks, Lowe's. And this is the Ackermans Creek. Ackermans Creek runs east to west. The former lagoon, the Ackerman South area, and the tributaries or channels to Ackermans Creek.

Next slide. So let's take a step back for a moment, and I'm going to summarize the history of the site that has led the EPA to the point where we

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need to propose a clean up for the site.

The UOP site was the home of the former Trubek Laboratories that started operating in 1932. They made specialty chemicals. It was a chemical manufacturing facility. And in 1955 they added a new plant, and it began operating a solvent recovery facility that processed waste chemicals that came from all over the United States. In 1956, Trubek Labs began operating a wastewater treatment plant with lagoons at the edge of the marshes. Then, in 1963, Universal Oil Products or UOP purchased the facility. And in 1971 -- 1979, the plant was shut down, and then in 1980 the buildings were demolished.

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From 1956 to 1971 there was seepage from the wastewater plant's lagoon and the routine handling of chemicals that resulted in releases to both the OU1 and OU2 site. And then, in 1983, NJDEP started investigating the potential contamination on the site and required UOP to conduct a study. Between 1993 and 2005 the OU1 soils were investigated, and it was remediated and then the current shopping center was developed along Route 17.

Did I skip this? I can't remember.

MR. WARNER: You skipped '83, the listing on the NPL.

MS. NARANJO: Yeah.

MR. WARNER: But it's just -- after the DEP started

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then in '83 with the investigation it was -- the site was listed on the National Priorities List.

MS. NARANJO: Yeah. After '83 the DEP started with the investigation, EPA listed the site on the EPA National Priority List.

And then from 2010 to 2018 a remedial investigation, a human health and ecological risk assessment was -- and a feasibility study was conducted for OU2, which is the basis for tonight's proposed interim remedy and tonight's presentation.

There was also a removal done in 2012-2013 to remove the highly contaminated sediments from the former wastewater plant

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lagoon area.

So the next slide. And just a view from the redeveloped shopping center. This is the view of the lagoon and looking east.

The conceptual site model. A conceptual site model is a description for the understanding on what is going on in the site and how it got contaminated and where the contaminants are going to or where they came from and where they are going. So we study this in the remedial investigation. And this slide just shows -- what I'm trying to show with this slide is the potential pathways for the contaminant releases that EPA has investigated in OU2. So

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when historical discharges from the former UOP operations and the neighboring properties into the OU1 and OU2 area, historical overflows and releases from the former lagoon system as well, that could have entered the waterways and the marshes. Surface water drainage as well that flowed from the OU1 and neighboring sites into the OU2 area, that could have mobilized contaminants into the waterways and the marshes, flowing over the ground and through the stormwater outfalls, either north or west sides of OU2. There's the potential from groundwater to surface water discharge and that could carry contaminants into OU2, and the EPA is investigating that. And

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also there's tidal mixing and deposition of contaminated solids. The Ackermans Creek is connected to Berry's Creek, and when the tides move up or move back and forth, that carries sediment and contaminants with the sediment as well.

So let's look at this slide. This just shows some of the pathways that I -- that we just discussed that can move the contamination within the site. On the left side we are showing particles released from historical storm sewers that could carry contaminants into the site. Then there's also the tidal exchange of solids coming from Berry's Creek and making it into the creek and solids moving back and forth into the area.

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The Ackermans Creek is a high energy area, so solids don't deposit there. It's also very sandy. But, solids would tend to deposit into the low energy areas, which would be the marshes. And the marshes become like a trap of solids or sediments with contaminants.

Oh, also the label on the top here is showing the existing soil containment area, which is just where some of the soils of the OU1 cleanup were placed under a cap as part of the remediation.

And again, that's the project boundary, Murray Hill Parkway, and these waterways are the waterways that are going to be addressed by this Proposed Plans.

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So, to assess the levels of contaminants and contamination into the sediment, EPA takes data from a potential contaminated site and then compares it to data in an area that hasn't been affected by the site, so, or that is believed that it hasn't been affected by the site. So for UOP, Mill Creek, which is a tributary of the Hackensack River, was selected. So this chart, what it does, it compares detected concentrations of the contaminants of concern at UOP for PCBs, mercury and chromium, and about concentrations measured in Mill Creek. And, as you can see, the samples that were taken in the UOP are much higher -- have much higher

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concentrations than the samples that were taken in the reference areas. And the units, milligrams per kilograms, correspond to parts per million.

So, next slide. So, once EPA has collected, once data has been collected from a site, the contaminants, and analyzed it for different contaminants, in this case from the sediment, then risk assessments are conducted to determine whether the contamination poses unacceptable risk to cancer or non-cancer to humans, as well as to the environment. So, in this case, for UOP, for sediments, PCBs have been identified as the major contaminant of concern based on human exposure through either

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consumption of fish, specifically white perch, as well as potential direct contact and exposure to the sediment.

Exposure of the same thing for the ecology, exposure of wildlife to PCBs in the sediment. For example, the spotted sandpiper was also calculated and resulted in unacceptable risk.

In the future or as we move into the site, there will be further sampling conducted to determine if there's any risk due to the groundwater discharge from OU1 into OU2.

So, once EPA collected the data, gets the concentrations for the different contaminants in the sediments, does the calculations, and determines

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that there's risk or no risk, and we find that there's unacceptable risk for human health and/or the environment, then that justifies the agency to take an action.

So next slide. So another break. This is Ackermans Creek looking at east. You can see the city on the other side.

So we do a risk assessment calculations. The agency determines that there's unacceptable risk. So once there's unacceptable risk, due to the contamination of the site, the agency develops remedial action objectives to guide the clean up of the site. For UOP, the remedial action objectives are to prevent the exposure of humans and the

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ecological receptors to the contaminants in the upper layers of the sediment, and also to control the spread of contaminants from the surface sediments due to the tide and energy and the water moving in the system.

We also found that most of the higher contamination is in the top, in what is the biological active zone, which is the top layer of sediment in the waterway.

Next slide. So, at any time when EPA is managing or studying a site, a Superfund Site, the EPA can determine that an interim action is appropriate and it makes sense. And, as I mentioned, some reasons to take an interim action would be to

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prevent further migration of contaminants, to isolate the contaminants, and to prevent exposure of the contaminants to humans and the environment.

An interim remedy, however, has to be consistent with what would be an anticipated final remedy. And in this case, for UOP we are trying to be consistent with the Berry's Creek interim remedy. And there will be a future final remedy that will be consistent for both UOP and Berry's Creek.

Okay. This slide pulls together what we've learned from the OU2, from the UOP remedial investigation and the conceptual site model, and lays out some of the specific things that the interim remedy would have to

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accomplish. So we found the highest levels of PCBs in the sediments of the waterway an unacceptable human health and ecological risk. That provides the agency for a basis for action.

The agency evaluated different remedial alternatives for an interim source control remedy. A bank-to-bank remedy in the waterway sediment west of Murray Hill Parkway would be consistent with what's being done in the Berry's Creek Study Area ROD. And the remediated area will have a clean upper sediment layer upon completion. And there will be a period of monitoring just to monitor how the system is responding. And EPA will select a final risk-

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based remedial goals when the remedy is selected.

Next slide. So this table shows a list of the cleanup alternatives considered by EPA. It's four alternatives.

The no action alternative, number one, is a point of reference to compare the other alternatives. The other three alternatives, it's the same footprint for the three of them, but the main difference will be the depth of removal. So, for alternative one -- step back -- for alternative one, no action, we will be doing nothing on the site.

Then we studied three different alternatives for the same footprint, pretty much bank-to-bank in the waterways.

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The main difference between each alternative is the depth of excavation, and, therefore, the volume of sediment would be different and the cost of remedy would be different, and the duration, the construction duration will be different.

So, Alternative Two, we would be removing the top foot of sediment. Alternative Three, we would be removing two feet of sediment. And Alternative Four, we'll remove all the sediment, which is about three feet, in some areas maybe more, down to native clay.

Next slide. This is a cartoon pretty much of the four remedial alternatives that I just described from a cross-section view.

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No action. This is how the site looks if we do nothing.

Alternative Two, one foot. Three, two foot -- three, two feet. And then Four, all of the sediment would be removed. And again, just to remind ourselves, that the footprint is the same for all the -- for the three active alternatives it will be bank-to-bank remediation of the blue waterways. And the main difference would be just the depth of excavation.

So, common elements. With the exception of the no action alternative, the other three alternatives have common elements. First of all, as I mentioned before, the remedial investigation shows that the contamination is in the top two

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feet of sediment. So going deeper than two feet is not going to reduce further risk and could potentially create problems in the marshes during construction, as well as longer construction time, and that may impact the community a little bit more.

So there will be, for the three active alternatives there will be post construction monitoring. The New Jersey DEP fish advisories and other institutional controls will be kept in place. The integrity of the backfill is going to be maintained as needed. And, as I previously mentioned, the monitoring of groundwater discharge during remediation of the site, it will be done just to confirm that the groundwater is not contributing to sediment contamination. And the alternatives are consistent with the Berry's Creek Study Area ROD which is being done east of the Murray Hill Parkway.

And, oh, in any case I should mention the waterways east of the Murray Hill Parkway will be excavated to a depth of two feet as part of the Berry's Creek clean up.

So, EPA has specific criteria that it needs to follow that we use to evaluate cleanup alternatives. And these are like the nine criteria that the agency has to follow. Today we're in the community acceptance criterion. We're going -- we issued a Proposed

Proceedings

Plan and are receiving comments, open to comments from the community and from stakeholders.

The major difference, like I said before, is mainly the depth of excavation. And given that the alternatives are so similar, the minor difference, the main difference is mainly risk reduction, but then we will have other impacts like construction impacts, duration, and cost.

So next slide. So again, most contaminants are in the top sediments, and EPA's preferred alternative is therefore Alternative Three, which would remove the top two feet of sediment. So we're talking about bank-to-bank removal of the waterway sediments two feet

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and placement of backfill, treatment and off site disposal of approximately 16,300 cubic yards of sediment. Groundwater monitoring would be performed during the remedial design. Institutional controls will be kept in place, such as the existing New Jersey fish advisories. The backfill in the waterway is going to be maintained. And there will be a post-construction monitoring program. Alternative Three would result in the best risk reduction with a less intrusive remedy for the community.

Next slide. So, if we remove and replace the top two feet of sediment, we are keeping the ecological receptors safely away from those potential

Proceedings

contaminated sediments that are -- that may present risk with like deeper sediments. EPA will assess, though, if there's softer sediment that is slightly deeper than those two feet, then that will be assessed and, if needed, we'll excavated deeper.

And, as I mentioned before, Alternative Three provides equivalent risk reduction to Alternative Four, which is full removal, at a lower cost and with fewer construction-related impacts to the community, damages to the marsh due to deeper excavation. And also, I don't know, did I mention that it was consistent with the Berry's Creek Study Area ROD. So it is consistent, which that will be -- it would be

Proceedings

consistent with what is being done east of the Murray Hill Parkway. And then EPA will monitor the remediation, with the goal that most of the surface area, 95 percent of the targeted surface area has been excavated.

I'm almost done. So, EPA encourages comments on all alternatives. EPA will prepare a summary with all the comments and questions that we receive during the public comment period, either by email or mail or any verbal questions or comments that you want to give to us tonight. As I noted, as I mentioned, we have a stenographer with us, taking, recording your comments and questions.

Proceedings

There's also Proposed Plan copies there, fact sheets. And you can find also -- next slide -- there's information repositories at these libraries as well as on the EPA website. And we have, as I mentioned, copies of the Proposed Plan with us, if you would like to take a copy.

Next slide. And this is where we are, this is the anticipated schedule. We are discussing the remedy tonight. We will be, EPA will be receiving comments until March 22nd. The expectation would be to issue a Record of Decision by the summer, sometime probably mid July. And the plan is to have the design in conjunction with the Berry's Creek Study

Proceedings

Area, since it's going to be consistent. And this will be approximately the construction time. And then the interim remedy would be -- the interim remedy would be evaluated every five years.

And thank you very much. And if you have any questions or comments, I'll be taking those now.

MS. MATA: Folks, just a note for our stenographer, if you do have a comment or a question for Eugenia, if you could tell us what your organization is or where you're associated with and your name, stated clearly so that the stenographer can record it for us, that would be really helpful. So we are open to

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questions or comments, concerns, anything that anyone wants to express while we have Eugenia here and the whole project team. So.

CAPTAIN BILL SHEEHAN: Somebody has got to say something.

MS. NARANJO: Yeah, please.

CAPTAIN BILL SHEEHAN: I guess it would be unlike me to not say something.

First, thank you for coming here and putting on this slide show and explaining what's going on out there, because it's always a question that comes up in my day-to-day business, you know, when I'm talking about the Meadowlands, when I'm talking about the Hackensack River. It's got a reputation for hosting so many Superfund Sites,

Proceedings

that people need to know that
work is actually moving ahead to
clean up some of these places.

On the alternatives, I was
looking at the slide when you
had it up with the three
alternatives and the amount
of --

MS. NARANJO: The table.

CAPTAIN BILL SHEEHAN: -- the
amount of material that would be
removed and the cost.

MS. NARANJO: Mm-hmm.

CAPTAIN BILL SHEEHAN: And
you said that the soft sediment,
we know for sure -- you know
for sure that taking two feet out
and then capping it will be okay.
But there's only like another
foot of soft sediment going to
be left at the bottom of the
waterway?

Proceedings

MS. NARANJO: In some areas. In some areas it may go deeper than three feet.

CAPTAIN BILL SHEEHAN: Yeah. Because, you know, if you get into doing the work and it turns out that that soft sediment isn't that much deeper than the two feet, it would make absolute sense to just go ahead and take the rest of it too, because that would avoid any future releases, you know. We can't tell what might happen weather-wise, sea level rise. There's all kinds of stuff going on, you know. And I just think, you know, taking a good look at --

MS. NARANJO: Do you want to?

CAPTAIN BILL SHEEHAN: -- at that fourth alternative.

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MS. MATA: I know you're dying to answer this one.

CAPTAIN BILL SHEEHAN: Not to slow things down either, I want to make this happen, you know.

MR. SIVAK: Yeah, no, that's a great point, thank you, Captain Bill. So that slide says that the average soft sediments are about three feet deep. But we do have areas where those soft sediments extend down to around five feet.

MS. NARANJO: Six feet.

MR. SIVAK: Five and six feet. Certainly some of the areas -- we have 4,000 maps in this presentation and I can't find one that works. But in areas kind of closer to the facility itself up here, yeah. And --

CAPTAIN BILL SHEEHAN: Also the north end on the northern channel.

MR. SIVAK: Correct. And some of those, some of those low energy areas where we get --

CAPTAIN BILL SHEEHAN: Yeah.

MR. SIVAK: -- a lot of sediment deposition.

CAPTAIN BILL SHEEHAN: Yeah, that makes sense, because it's further in from the creek.

MR. SIVAK: Yeah, some of those sediments are like four to five feet deep and maybe even a little bit deeper than that. And so to remove all of those sediments, we have the same concerns here as we did when we were evaluating these alternatives under Berry's Creek, which is we run the risk

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of possibly compromising the integrity of the marshes.

CAPTAIN BILL SHEEHAN: Right.

MR. SIVAK: And we also run the risk of releasing materials that are buried in those marshes if we go down really deep and those marshes start to become compromised a little bit and start to erode a little bit.

CAPTAIN BILL SHEEHAN: Yes.

MR. SIVAK: Plus we then start to add costs to those alternatives if we have to shore up those marshes while we go deeper.

CAPTAIN BILL SHEEHAN: Right.

MR. SIVAK: So, because we're not getting the additional risk reduction by going deep, there are benefits to it, you mentioned we won't have to do

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the long term monitoring in those areas, but because there are a lot of cons to that alternative by removing all those soft sediments and going deeper in those areas, we believe that Alternative Three, which is the top two feet, plus the over-dredge, plus, as we presented on the slide, if the soft sediments are a little bit deeper, we'll just take them all out there because there's no reason to leave six inches of soft sediment underneath a cap, let's just get all of it out of there, that would be our goal. So we think that the alternative, that we think that is our preferred alternative, is a good mix of what you suggested. But also, of

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preserving the integrity of the marshes and ensuring that we're not releasing more materials that's kind of captured in those marshes.

CAPTAIN BILL SHEEHAN: Thank you.

MR. SIVAK: Sorry, Eugenia.

MS. NARANJO: All right, any other questions or comments on any other of the alternatives?

(No response)

MS. MATA: Going once, twice?

(No response)

MS. NARANJO: Well, thank you very much. Feel free to take a copy of the Proposed Plan and fact sheet.

MS. MATA: Thank you.

MS. NARANJO: All right, thank you.

(Time noted: 7:37 p.m.)

C E R T I F I C A T E

STATE OF NEW YORK)
) SS:
COUNTY OF ORANGE)

I, KARI L. REED, a Shorthand Reporter (Stenotype) and Notary Public with and for the State of New York, do hereby certify:

I reported the proceedings in the within-entitled matter and that the within transcript is a true record of such proceedings.

I further certify that I am not related, by blood or marriage, to any of the parties in this matter and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 25th day of March, 2019.

____
KARI L. REED

ATTACHMENT D: PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

Eugenia Naranjo

EPA project manager

290 Broadway, 19th floor

New York, NY 10007

December 18, 2018

In the matter of Meadowlands toxic sites insure that the EPA is aware and addresses the following.

The area along the east side of route 17 at what is now the Union avenue extension into the meadowlands was the dump for mercury containing material. Becton and Dickinson had a large manufacturing plant on the west side of route 17 near the present location of the Federal Reserve facility. For many years they dumped their manufacturing waste, thermometers, blood pressure and other instruments containing mercury, in the meadowlands at the Union Avenue area as well as other locations. Waste from other sources was also dumped there. As a youngster we collected the mercury that was sealed in glassware from this site. For us kids it was a prized possession. I am sure there is many hundreds of pounds of mercury still there. This material will be a source of mercury pollution for many more years.

During World War 2 my mother worked at a plating company on Paterson Plank Road east of route 17. She told how spent chemicals were dumped in the waterway behind the building. Fish and birds died as a result. This small stream leads to Berry's Creek near the Paterson Avenue Bridge. This entire area was a dead zone. The building or part of it remains standing to this day. I feel that this is a source pollution that is entering Berry's Creek.

Robert Genneken

Robert Genneken

103 Arbor Drive

Ho-Ho-Kus, NJ 07423

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March 22, 2019

Eugenia Naranjo
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, New York 10007-1866
naranjo.eugenia@epa.gov

Re: Comment on Proposed Plan for Universal Oil Products Waterway Sediment

Dear Ms. Naranjo:

On behalf of the Berry's Creek Study Area Cooperating Parties Group (BCSA Group), The ELM Group, Inc. provides this comment on the Proposed Plan that the U.S. Environmental Protection Agency (EPA) issued in December 2018 for the waterway sediment in Ackermans Creek, its tributaries, and the Ackermans South Area at the Universal Oil Products Superfund Site in East Rutherford, NJ. EPA defines the waterway sediment addressed by the Proposed Plan as the "UOP Project Area."

The BCSA Group supports and endorses the proposed sediment remedy for the UOP Project Area.[1] The proposed remedy is consistent with the remedy that EPA selected for the Berry's Creek Study Area waterway sediment, which was based on extensive technical data and analyses and incorporated an adaptive approach consistent with EPA's sediment remediation guidance and sediment management principles. At a minimum, consistency among the remedial approaches for the BCSA and the UOP Project Area will create opportunities for future efficiencies in remedial design and EPA oversight, and will promote EPA's overall objectives for both sites consistent with EPA guidance and principles.

Thank you for consideration of this letter.

Sincerely,

Peter P. Brussock, Ph.D.
Project Coordinator for the BCSA Cooperating Parties Group

[1] The Group's support of the proposed sediment remedy should not be interpreted to indicate Group support for every statement in the Proposed Plan.