Final

Remedial Action Work Plan for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky

Prepared for

Goodrich Corporation
Four Coliseum Centre
2730 West Tyvola Road
Charlotte, North Carolina

PolyOne Corporation
33587 Walker Road
Avon Lake, Ohio

Westlake Vinyls, Inc.
2468 Industrial Parkway
Calvert City, Kentucky

Prepared by

505 King Avenue
Columbus, Ohio 43201

February 20, 2020

TABLE OF CONTENTS

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,1,2-TCA	1,1,2-trichloroethane
1,1,2,2-PCA	1,1,2,2-tetrachloroethane
AIRCO	Air Reduction Company
ALTA	American Land Title Association
amsl	above mean sea level
AOC	Administrative Settlement Agreement and Order on Consent
ARAR	applicable or relevant and appropriate requirement
AWQC	ambient water quality criteria
bgs	below ground surface
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CI	community involvement
CIC	community involvement coordinator
CIP	Community Involvement Plan
COC	chemical of concern
COPC	chemical of potential concern
CQAP	Construction Quality Assurance Plan
CQCP	Construction Quality Control Plan
CRH	clay-rich heterolith
DCPD	dicyclopentadiene
EDC	ethylene dichloride
EDD	Electronic Data Deliverable
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-know Act
ERP	Emergency Response Plan
ESCP	Erosion and Control Plan
ESD	Explanation of Significant Differences
FGDC	Federal Geographic Data Committee
FS	Feasibility Study
FSP	Field Sampling Plan
FY	Fiscal Year
GIS	geographic information system
gpm	gallons per minute
GPS	global positioning system
HASP	Health and Safety Plan
HI	hazard index

IC	Institutional control
ICIAP	Institutional Controls Implementation and Assurance Plan
IDW	investigation derived waste
IQAT	Independent Quality Assurance Team
KDEP	Kentucky Department of Environmental Protection
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statutes
MCB	Mercury Cell Building
MCL	maximum contaminant level
MNA	monitored natural attenuation
NAD83	North American Datum of 1983
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NPL	National Priorities List
OM&M	operation, maintenance and monitoring
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PCAP	Plant-wide Corrective Action Program
PCE	perchloroethylene
PCS	Project Control Specialist
PDI	pre-design investigation
PM	project manager
PRSP	Periodic Review Support Plan
PS	performance standard
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
RA	Remedial Action
RACR	Remedial Action Completion Report
RACCR	Remedial Action Construction Completion Report
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RDD	Remedial Design Document
RDWP	Remedial Design Work Plan
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SC(s)	Supervising Contractor(s)
SOW	Statement of Work
SVOC	semi-volatile organic compound

TAP	Technical Assistance Plan
TCE	trichloroethylene
TI	technical impracticability
TODP	Transportation and Off-Site Disposal Plan
TS	treatability study
TSWP	TS Work Plan
USACE	United States Army Corps of Engineers
VC	vinyl chloride
VCM	vinyl chloride monomer
VOC	volatile organic compound
WGS84	World Geodetic System 1984
yd^3	cubic yards

1.0 INTRODUCTION

On October 9, 2019, the United States Environmental Protection Agency (EPA) Region 4 issued a draft Model Remedial Action (RA) Consent Decree (CD) to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the B.F. Goodrich Superfund Site in Calvert City, Kentucky (Site). The CD requires performance of a RA at the Site by Goodrich Corporation, PolyOne Corporation, and Westlake Vinyls, Inc. (collectively, "Respondents").

This Remedial Action Work Plan (RAWP) has been prepared by Battelle Memorial Institute (Battelle) on behalf of the Respondents and is being submitted to the EPA. EPA and the Kentucky Department of Environmental Protection (KDEP) will review, and EPA will approve, prior to commencing the RA activities at the Site. This approved RAWP will be included as an attachment to the signed CD in lieu of a Statement of Work (SOW).

1.1 Purpose and Scope

This RAWP has been prepared to address the RA procedures and requirements necessary to implement the selected remedy as documented in the Record of Decision (ROD) for the Site (EPA, 2018). It summarizes pertinent Site-related background information and the remedy components that comprise the planned RA, identifies and describes the scopes and procedures for the RA components as defined in the ROD, and presents the RA-related reporting requirements, deliverables, and schedule. Additional details for the RA for each remedy component will be included in individual Remedial Design Documents (RDDs) and supporting documents.

The information presented herein was developed to be consistent with the Model Statement of Work (SOW) included with the CD and Section 12 of the 2018 ROD (EPA, 2018). The ROD will serve as the governing document for the RA.

1.2 Document Organization

The text of this RAWP is organized into 9 sections. The content of each section following this introduction is briefly summarized as follows:

- **Section 2: Background Information.** Section 2 contains Site history and pertinent background information, including regulatory status, setting, and nature and extent of impacts to Site media.
- **Section 3: Summary of Planned Remedial Action.** Section 3 summarizes the objectives, scope, and performance standards (PSs) associated with the selected RA.
- **Section 4: Project Management and Administration.** Section 4 describes the overall management strategy for performing the RA.
- **Section 5: Community Involvement.** Section 5 describes requirements for community involvement while completing the RA.
- **Section 6: Remedial Action Activities.** Section 6 describes general requirements and activities for each of the proposed remedial actions.
- **Section 7: Reporting and Deliverables:** Section 7 describes the content of the supporting deliverables and the general requirements regarding Respondents submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- **Section 8: Schedule.** Section 8 discusses the schedule for completion of the RA.
- **Section 9: References.** Section 9 provides the references cited within the RAWP.

2.0 BACKGROUND INFORMATION

The Site is located in Calvert City, Marshall County, Kentucky, on the southern side of the Tennessee River (see Figure 2-1) approximately 4 miles downstream from the Kentucky Dam. The Site is bordered on the north by the Tennessee River, on the south by Kentucky Highway 1523, on the west by areas owned by Air Products & Chemicals, Inc. (Air Products), Carbide Industries LLC (Carbide), and Wacker Chemical Corporation (Wacker), and on the east by areas owned by PolyOne Corporation, Messer LLC (Messer), and Westlake Vinyls, Inc., including the Air Reduction Company (AIRCO) Superfund Site owned by Messer (see Figure 2-2). The Site can be accessed from Kentucky Highway 1523 and consists of approximately 250 acres. The primary chemical manufacturing facilities and related areas are shown in Figure 2-3 and include the following:

- The ethylene dichloride (EDC)/vinyl chloride monomer (VCM) Plant, which produces VCM as well as EDC for use in the production of VCM.
- The Ethylene Plant, which produces ethylene for use in the production of VCM.
- The Chlorine Plant, which produces chlorine for use in the production of VCM.
- The Ultrene® Plant, which produces dicyclopentadiene (DCPD).
- The Carbopol® Plant, which produces Carbopol® and other cross-linked polymers.

The B.F. Goodrich Chemical Corporation (now Goodrich Corporation) acquired farmland in Calvert City, Kentucky in 1951 to construct and operate a chemical manufacturing facility. Operations at the Site commenced in 1953, with the production of VCM through a reaction of acetylene and hydrogen chloride. Also in the 1950s, the original Carbopol® and Acrylonitrile Plants were constructed. In the 1960s, the Ethylene Plant and North Synthesis Unit were constructed, and the facility switched from acetylene-based to EDC-based VCM production. The South Cracking Unit, Chlorine Plant, and East Cracking Unit also were constructed in the 1960s. In the 1970s, acrylic acid production ceased at the Carbopol® Plant, the Acrylonitrile Plant was shut down, and the Hydrocarbon Disposal Plant was replaced with the Catoxid® Reactor. In the 1980s, the South Synthesis Unit was constructed, replacing the North Synthesis Unit, and a wastewater improvement project was implemented to eliminate waste discharge to wastewater ponds. In 1990, Goodrich sold the EDC/VCM Plant to Westlake Monomers Corporation, and in 1996, the Ultrene® plant was constructed. In 1997, Goodrich sold the Chlorine Plant and Ethylene Plant to Westlake CA&O Corporation. In 2000 and 2001, Goodrich sold the Ultrene® Plant and the Carbopol® Plant, which are now owned by Cymetech LLC (Cymetech) and Lubrizol Corporation (Lubrizol), respectively. In 2007, Goodrich transferred title of its remaining property at the Site (comprised entirely of non-manufacturing areas) to PolyOne Corporation.

A complete Site history is presented in the Remedial Investigation (RI) report (Battelle, 2018a).

2.1 Regulatory Status

The Site is regulated under a Resource Conservation and Recovery Act (RCRA) Post-Closure/Corrective Action Permit and a CERCLA Consent Decree, with portions of the Site regulated under both RCRA and CERCLA. In August 1981, the Commonwealth of Kentucky (Kentucky) issued a hazardous waste management permit (KYD006370167) to Goodrich for a portion of the Site comprising what was then the B.F. Goodrich Complex (the "RCRA Facility"). The B.F. Goodrich Landfill was listed on the National Priorities List (NPL) in 1983, and the adjacent AIRCO Landfill was listed in 1984. Because of their similar histories and proximity, the NPL sites were managed as a single site during subsequent investigations, design, and remedial activities, although separate RODs were entered for each site in 1988. A single CD for the two sites was issued in 1992.

The EPA and the Respondents entered into a Settlement Agreement in December 2009, which expanded the scope of the existing B.F. Goodrich Superfund Site to include the areal extent of contamination and set forth the schedule and requirements for the RI/Feasibility Study (FS). The ROD for the B.F. Goodrich Superfund Site (EPA, 2018) was signed on September 5, 2018, and a notice of completion for the RI/FS was issued on November 6, 2018.

A complete summary of the regulatory status is presented in the RI report (Battelle, 2018a).

2.2 Remedial Actions

The major remedial actions that have occurred at the Site are summarized below:

- Voluntary closure of the wastewater ponds beginning in 1982, and construction of the RCRA closure cell for the containment of waste.
- Implementation of the Plant-wide Corrective Action Program (PCAP) system in 1992. The groundwater extraction and treatment system has expanded over the years and currently consists of 51 extraction wells pumping an average of approximately 600 gallons per minute (gpm). Through 2012, the PCAP system has pumped a total of nearly 8 billion gallons of water and recovered approximately 11 million pounds of EDC.
- Closure of the former B.F. Goodrich Landfill and burn pit area in accordance with the 1988 ROD and 1992 Consent Decree. This remedial action included installation of a 100-year flood protection dike, upgraded cap over the landfill with clay, construction of a RCRA cover system over the burn pit, operation of a soil vapor extraction system in the burn pit area (that was later converted to a dual-phase extraction system), and groundwater extraction and treatment.

A complete discussion of the removal actions is presented in the RI report (Battelle, 2018a).

2.3 Site Setting

The Site has two general landforms, known as the floodplain and terrace areas (see Figure 2-3). The floodplain is a low-lying, narrow strip adjacent to the Tennessee River. At normal pool stage, the Tennessee River has an elevation of approximately 302 feet above mean sea level (amsl). The floodplain is characterized by gently sloping topography, sandy beaches, and woodlands. A barge slip, docks, and other marine improvements associated with the Site are located in the floodplain. The terrace is a broad, flat plain situated approximately 25 feet above the floodplain. The elevation of the terrace is approximately 340 ft amsl along Kentucky Highway 1523 and rises to approximately 350 ft amsl near the terrace-floodplain contact. The main production areas at the Site are located on the terrace area.

The Site is underlain by unconsolidated sediments that generally coarsen downwards and extend from the ground surface to either a low permeability clay unit or directly to bedrock. The overall thickness of unconsolidated overburden at the Site ranges from approximately 80 to 120 feet, increasing in thickness from north to south with the dip of the underlying bedrock surface. Surficial fill has also been placed in localized areas during development of the Site. There is generally an increase in hydraulic conductivity with depth as the overburden coarsens downward until the low permeability clay unit or bedrock is encountered.

The depth to groundwater at the Site generally varies from approximately 25 to 30 feet below ground surface (bgs) on the terrace to a few feet bgs within the portions of the floodplain close to the Tennessee River. The overall groundwater flow direction is from the south to the north toward the Tennessee River, with a relatively steep hydraulic gradient within the floodplain area and a relatively shallow hydraulic

gradient within the terrace area. The water table is locally influenced by the presence of pumping wells in the PCAP system. More significant and widespread effects on groundwater level result from changes in the stage of the Tennessee River, which typically fluctuates by approximately 30 feet annually (but can fluctuate by up to as much as 40 feet annually) and can cause a reversal in groundwater flow direction in the floodplain and a portion of the terrace.

Groundwater flow at the Site can have a significant vertical component due to lithologic heterogeneity, Tennessee River stage, operation of the PCAP pumping system, and operation of other remedial systems in place at the Site. During normal pool stage, a downward vertical gradient exists southwest of the Site that diminishes to the northeast and reverses near the Tennessee River, indicating shallow and deep groundwater flows into the river during times of normal pool stage. During high river stage, a vertical gradient reversal is observed, suggesting that during flooding, the Tennessee River infiltrates into the alluvial aquifer to some distance upgradient of the shoreline.

A comprehensive description of the Site setting is presented in the RI report (Battelle, 2018a) and RI addendum report (Battelle, 2018b).

2.4 Nature and Extent of Impacts

Over 25 investigations have been conducted by the Respondents, KDEP, and EPA over the past 30 years. In addition to investigating the general nature and extent of contamination, the studies have investigated potential sources of contamination; Site-specific hydrogeology; indoor air vapor intrusion potential; bedrock composition; and potential environmental impacts in and beneath the Tennessee River. A steady-state groundwater flow model that was calibrated to the Site-specific conditions also was prepared and utilized to evaluate groundwater flow conditions and remedial alternatives. Below is a general description of the nature and extent of impacts, as described in the ROD.

Based on the data presented in RI and RI Addendum reports (Battelle, 2018a; 2018b), there is contamination at the Site affecting all media. The most prevalent contamination is the highly contaminated source material (i.e., organic non-aqueous phase liquid [NAPL]) that has been released from leaking tanks, sewers, sumps, spills, unlined ponds, and unlined burn pits and migrated into the subsurface soils. Most of the organic NAPL is present as EDC and related compounds, although elemental mercury NAPL has been found in the eastern portion of the Site near the former Mercury Cell Building (MCB). The NAPL has generally migrated through the higher permeability soils and came to rest on the intervening layers of lower permeability soils. Over time, the contaminants have diffused into the surrounding soil. It was estimated that between 1.0 and 3.5 million cubic yards (yd^3) of organic NAPL-impacted soil and less than 450 yd^3 of mercury NAPL-impacted soil is present at the Site. The majority of organic NAPL-impacted soil is present on the floodplain either in the West Floodplain Area around the historical pond system and extending westward into the floodplain or in the East Area near the former burn pits and a former landfill.

The chemicals of potential concern (COPCs) identified from the RI that were found in soil include: 1,1-dichloroethane (1,1-DCA), 1,1,2-trichloroethane (1,1,2-TCA), EDC, benzene, chloroform, naphthalene, perchloroethylene (PCE), trichloroethylene (TCE), vinyl chloride (VC), hexachlorobenzene, and mercury. Elevated concentrations of EDC were detected in all areas of the Site, with the highest found in the East and West Floodplain Areas and the EDC-VCM Plant Area. Benzene concentrations are the highest in the Ethylene Plant Area and occur at elevated concentrations in the East and West Floodplain Areas. Mercury concentrations are highest in the Chlorine Plant Area. In general, all COPCs were identified in soils in the East Area and West Floodplain Area at locations consistent with likely historical release locations and the current distribution of shallow NAPL-impacted soil. Site-wide, COPC concentrations in soil are more elevated in the deeper vadose zone (10 ft bgs to the water table) when compared to the shallow vadose

zone (0 to 10 ft bgs). Below the water table, COPC concentrations are higher than in the vadose zone due to the presence of larger volumes of NAPL-impacted soil below the water table. The highest soil concentrations below the water table are found in the shallowest saturated zone (water table to 295 feet amsl) and generally decrease in concentration with depth.

As water encounters the NAPL and NAPL-contaminated soil, either as rainfall infiltration or groundwater flow, contaminants dissolve into the groundwater. Twelve COPCs were identified in groundwater: 1,1,2-TCA, 1,1-dichloroethene (1,1-DCE), EDC, benzene, carbon tetrachloride, chlorobenzene, chloroform, PCE, TCE, VC, arsenic, and mercury. The majority of the COPCs were present in the East Area, West Floodplain Area and the EDC-VCM Plant Area, at locations consistent with the current distribution of NAPL-impacted soil within the saturated zone. Site-wide groundwater COPC concentrations were greatest and most widespread in the shallow groundwater (≥295 ft amsl) compared to the deep groundwater (<295 ft amsl), although several chlorinated volatile organic compounds (VOCs) (e.g., 1,1-DCE and TCE) showed higher concentrations in the deep groundwater.

Because groundwater flow is toward the Tennessee River, the contaminated groundwater not contained by the PCAP system enters the river either through upwelling, or during periods of low river elevation, through groundwater seeps along the riverbank. However, the massive flow volume of the Tennessee River and active hyporheic zone results in the rapid attenuation of groundwater contaminants discharging to the river. Seeps were inspected and sampled along the banks of the Tennessee River in the Northwest Area, Pond 2, and the Barge Slip. The analytes in seep samples that exceeded the ambient water quality criteria (AWQC) (human health organism only) in one or more of these areas include 1,1,2,2-tetrachloroethane (1,1,2,2-PCA), 1,1,2-TCA, benzene, 1,3-dichlorobenzene, chlorobenzene, chloroform, EDC, PCE, TCE, VC, 1,2,4,5-tetrachlorobenzene, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate, arsenic, mercury, and other metals. Surface water was sampled from the southern shoreline of the Tennessee River, from the Barge Slip, the Outfall Ditch, and at Outfall 001. The analytes in surface water samples that exceeded the AWQC (human health organism only) in one or more of these areas include 1,1,2,2-PCA, 1,1,2-TCA, benzene, EDC, PCE, TCE, VC, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate, pentachlorobenzene, arsenic, and mercury.

Bulk sediment samples were collected from the Tennessee River, from the Barge Slip and from the Outfall 004 Ditch. 1,1,2-TCA, EDC, benzene, 1,1-DCA, chlorobenzene, hexachlorobenzene, mercury and arsenic were detected in a significant number of samples at elevated concentrations. In general, the maximum exceedances occurred in the southwestern-most portion of the Barge Slip and are likely due to the discharge of NAPL-impacted groundwater from the East Area and from seeps along the Barge Slip. Sediment porewater samples were collected at 15 locations in the Barge Slip. 1,1,2,2-PCA, 1,1,2-TCA, EDC, benzene, chlorobenzene, TCE, VC, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate and mercury exceeded their respective AWQC.

Contaminated soil and groundwater underlying the Site pose a potential for the occurrence of contaminated vapors in the vadose zone and intrusion of vapors to indoor air spaces. An investigation of indoor air in buildings occupied by administrative workers not regulated under Occupational Safety and Health Administration (OSHA) indicated elevated levels of VOCs. The maximum indoor air risk estimated was 5×10^{-4} for cancer risks and a hazard index (HI) of 20 for non-cancer risk. However, a comparison of the outdoor air and sub-slab data indicates an outdoor air source for the VOCs. The elevated levels of VOCs encountered in the outdoor air may be attributable to point and non-point emissions from plant operations.

A complete description of the nature and extent of impacts at the Site is presented in the RI report (Battelle, 2018a) and RI addendum report (Battelle, 2018b).

3.0 SUMMARY OF PLANNED REMEDIAL ACTION

Remedial measures for the Site were identified and evaluated in the FS (Battelle, 2018c), which served as the basis for the remedial components described in the ROD. The selected remedy is comprehensive in that it incorporates source control and management of migration components to address all impacted areas at the Site. The EPA determined that the remedy presented in the ROD is consistent with CERCLA, is protective of human health and the environment, complies with applicable or relevant and appropriate requirements (ARARs), is cost-effective, incorporates permanent solutions and alternative treatment or resource recovery technologies to the extent possible, satisfies the preference for treatment, and includes provisions for five-year reviews.

3.1 Remedial Action Objectives

Prior to the development and screening of remedial alternatives in the FS, remedial action objectives (RAOs) were established based on types of constituents, environmental media of concern (e.g., groundwater/seeps, NAPL, soil, sediment, surface water, sediment porewater, and air) and potential exposure pathways. The RAOs were developed to guide plans to mitigate, restore, and/or prevent existing and future potential threats to human health and/or the environment, and to meet ARARs. These RAOs reduce risks to human health and the environment by restoring groundwater outside the facility to attain maximum contaminant levels (MCLs) and protect surface water quality as measured by KDEP AWQC. With respect to NAPL, a weight of evidence approach is being used to establish the NAPL extent. This approach considers a combination of factors such as direct NAPL observations; qualitative indicators (i.e., dye test); and measured chemical concentrations. To aid in the development of the RAOs, data collected from the Site were evaluated considering human health and ecological risk-based benchmarks and regulatory standards to identify the primary group of chemicals of concern (COCs). The media-specific COCs and associated cleanup criteria are provided in Section 8 of the ROD. A summary of the media-specific RAOs is included in the following subsections.

3.1.1 Groundwater/Seeps

The RAOs associated with groundwater and seeps are as follows:

- Prevent migration of contaminated groundwater to surface water that could:
  - Pose a risk to human receptors through the ingestion of contaminated organisms,
  - Pose a risk to ecological organisms, and,
  - Degrade water quality to a point no longer consistent with its intended use.
- Prevent human exposure to contaminated groundwater through ingestion, direct contact or inhalation.
- Restore contaminated groundwater beneath the Tennessee River to its beneficial use for drinking water purposes.
- Prevent expansion of groundwater plumes onshore and offshore.

During the development of the Proposed Plan, EPA concluded that it is technically impracticable to restore groundwater beneath the on-shore portion of the Site to drinking water quality in a reasonable timeframe. The large volume of NAPL, Site-specific hydrogeologic properties, and limited access because of plant infrastructure prevent the mitigation of the entire source contributing to groundwater contamination. Accordingly, a technical impracticability (TI) waiver was established for the on-shore groundwater in the vicinity of the Site (see Figure 3-1) and MCLs were waived as ARARs for that area. A detailed discussion of the basis for the TI waiver is provided in Appendix B of the ROD (EPA, 2018).

3.1.2 Organic and Mercury NAPL

The RAOs associated with organic and mercury NAPL are as follows:

- Recover organic NAPL and mercury NAPL to the extent practicable.
- Treat NAPL where practicable and necessary to mitigate unacceptable risks.
- Contain and prevent organic NAPL and mercury NAPL migration.
- Prevent human and ecological receptor exposure to NAPL to protective levels.

3.1.3 Other Media

The RAOs associated with other media, including soil, sediment, sediment porewater, surface water, and air, are as follows:

- Prevent human exposure to contaminants in soil, sediment, sediment porewater, and air that could cause an increased risk from ingestion or direct contact.
- Prevent exposure of ecological receptors to contaminants in soil, sediment, sediment porewater, or surface water that could pose an unacceptable risk.

3.2 Scope of Remedy

The selected remedy is comprehensive in that it utilizes source control and management of migration components to address Site risk in two areas (onshore and offshore) as documented in the ROD. For the on-shore area, the selected remedy will provide for the focused removal of recoverable NAPL onshore to the extent practicable and long-term containment of the remaining NAPL. For the off-shore area, the selected remedy will provide for the removal of the recoverable NAPL beneath the river to the maximum extent practicable and the enhanced monitored natural attenuation (MNA) of contaminated groundwater beneath the river. The remedy includes the actions described in Section 12 of the ROD that are summarized below. The design and application for each remedy component will be described in individual remedial design documents (RDDs).

3.2.1 On-Shore Components

The on-shore components of the selected remedy include lining the Outfall 004 Ditch, closing Ponds 1A and 2, installing a barrier wall to contain contaminated soil, NAPL, and groundwater, hydraulic control and treating groundwater within the barrier wall, and focused recovery of organic NAPL and mercury NAPL. These on-shore remedy components are described in the following subsections.

As part of the on-shore NAPL recovery efforts, the RDDs for the on-shore remedy components will include contingency plans for addressing NAPL that is known to be present or found during the PDIs at recoverable quantities as part of the RA, prior to the applicable RA construction activities.

3.2.1.1 Outfall 004 Ditch Lining

A drainage ditch, identified as Outfall 004, channels stormwater runoff from the eastern portion of the Site to the river (see Figure 3-1). Runoff from the chemical manufacturing plants is discharged in this ditch to the river through a Kentucky Pollutant Discharge Elimination System (KPDES) permit that is managed by Westlake Vinyls, Inc. The ditch is partially unlined and is eroding, exposing potentially contaminated zones within the subsurface soil. Contaminated groundwater also has the potential to drain to the unlined ditch. To address this potential release and exposure pathway, the remaining unlined portions of the 2,000-ft long Outfall 004 Ditch will be excavated and lined with pipe to prevent further erosion. Excavated soil will be characterized and disposed offsite at an EPA-approved RCRA facility. The excavated area around the new lined ditch will be backfilled with clean fill and a finished surface will be established consistent with the adjacent area. In addition, existing catch basins and stormwater

diversion structures at the land surface will be connected to the newly installed lined ditch. Stormwater runoff collected through the ditch will continue to be managed by Westlake Vinyls, Inc. through the KPDES permit.

A significant portion of the Outfall 004 Ditch Lining remedy component has been implemented to date by Westlake Vinyls, Inc. The actual design of the remaining portion of the Outfall 004 Ditch Lining remedy component, including provisions to replace existing storage capacity, will be described in the RDD for this remedial component.

3.2.1.2 Pond 1A and 2 Closure

Ponds 1A and 2 currently remain on Site and are recharged by precipitation and surface runoff (see Figure 3-1). Both ponds will be closed so that they no longer serve as a source of groundwater recharge or a potential point of exposure to ecological receptors. Two methods for pond closure have been identified. The first involves lining the pond with a low permeability layer that meets identified RCRA ARARs to prevent the infiltration of pond water into the groundwater and provide pond water level control. If this method is selected, stabilizing the river-side Pond 2 berm will be necessary due to its current configuration. The second technique involves draining the pond and re-grading and backfilling[1] it to ensure stability of the dike between the pond and the river (or other pond) and to support successful implementation of the barrier wall remedy component. For the second method, the final surface would be designed to be protective of human health and the environment through the installation of a low-permeability cap layer that meets identified RCRA ARARs to reduce the amount of contaminated groundwater to be managed as part of the Site-wide groundwater containment system. The actual technique for Pond 1A and 2 closure will be outlined in the RDD for this remedial component and will be based on pre-design investigations (PDIs) and/or treatability studies (TSs) designed to collect geotechnical information to support engineering and infiltration evaluations.

3.2.1.3 Barrier Wall

A barrier wall will be installed around the perimeter of the NAPL-contaminated soil and contaminated groundwater to prevent exposure and further migration (see Figure 3-1). The barrier wall will be constructed using a combination of materials such as sheet-piling, soil bentonite backfill, jet-grout, or other suitable material, and will extend from land surface downward, and be keyed into the clay-rich heterolithics (CRH) layer or to bedrock, or into competent layers of low permeability clay in direct contact with the CRH or bedrock. The actual barrier wall alignment, depth, composition, and construction sequence will be determined during the RD based on data collected from associated PDIs and/or TSs and in conjunction with results from numerical groundwater modeling and will be documented in the RDD for this remedial component.

3.2.1.4 Hydraulic Control

Groundwater will be collected from inside the barrier wall to maintain hydraulic control. The groundwater pumping system will be designed such that wells will be placed in locations that facilitate hydraulic control and plume stability. The extracted groundwater will be treated and discharged to the Tennessee River through the KPDES permit. Depending on the contaminant levels, the groundwater may be treated by air or steam stripping. The groundwater may also require pre-treatment to physically separate NAPL from the groundwater and remove metal precipitates and suspended solids. Extracted NAPL may be treated on Site, disposed of off Site at an EPA-approved facility, or recycled by one of the on-Site chemical plants (with EPA approval). The initial number of wells and depth, location, and

[1] Excess soil from construction of the barrier wall and from installation of other RA components will be considered for use as backfill during closure of Pond 1A and 2 if backfilling is selected as the pond closure remedy. Such soil will not be considered as "generated waste" relative to hazardous wastes regulations under RCRA (40 CFR § 261).

extraction rate of each groundwater extraction well will be determined during the RD based on groundwater modeling evaluations performed as part of a PDI. Modification/optimization of these parameters will be performed once the initial system is operational. The method of groundwater treatment will be determined during the RD based on data collected from associated PDIs and/or TSs and will be documented in the RDD for this remedial component, while allowing for refinement of the treatment method based on actual flowrates and contaminant concentrations from the operating hydraulic control system.

3.2.1.5 NAPL Recovery

An effort will be made to collect recoverable NAPL from within the barrier wall to the extent practicable. Extracted NAPL may be treated on Site, disposed offsite at an EPA-approved facility, or recycled on Site (with EPA approval). At locations where NAPL has been observed to accumulate in monitoring wells or was observed in soil borings in sufficient quantity that it seeped out of the soil cores (see Figure 32 of the ROD [EPA, 2018]), NAPL may be potentially recoverable through conventional vertical and/or horizontal well technology. However, practicability of NAPL recovery may be limited by plant infrastructure, hydrogeologic features, chemical parameters, or other factors. The methods by which NAPL will be recovered to the extent practicable will be determined during the RD based on data collected from associated PDIs and/or TSs and will be documented in the RDD for this remedial component.

3.2.2 Off-Shore Components

The off-shore remedy components of the selected remedy include Barge Slip dredging, focused River NAPL recovery, and remediation of off-shore groundwater through natural attenuation. These remedy components are described in the following subsections.

3.2.2.1 Barge Slip Dredging

Contaminated sediment will be removed from the bottom of the Barge Slip (see Figure 3-1) and a layer of clean imported backfill will be placed after dredging to create a riverbed surface that is protective of ecological receptors and allows for the development of a benthic habitat. The imported backfill will be placed, after the required depth of contaminated sediment is removed, to achieve the desired thickness and maintain a navigation channel (bottom elevation of 288 ft amsl). The actual thickness of the excavation and clean layer will be verified during the RD. Although not mandated by the ROD, the design may determine that a liner is needed in combination with the clean material to achieve the desired protectiveness for ecological receptors and long-term permanence of the remedy. To compensate for potential uplift and/or to ease constructability, the liner may be constructed using a permeable treatment material placed between residual contaminated sediment and the clean backfill layer, or may be incorporated within the clean backfill layer. Treatment and disposal of the dredge spoils and water generated from the dewatering of the spoils will be determined based on the characterization of the material and applicable regulatory requirements. The Barge Slip dredging method will be described in the RDD for this remedial component and will be based on PDIs and/or TSs designed to evaluate ecological habitat, the nature and extent of sediment concentrations, rip rap slope and mooring dolphin stability, and the liner design (if a liner proves necessary). The approach for treatment and disposal of sediment and dewatered sediment porewater will also be included in the RDD.

3.2.2.2 River NAPL

Interim recovery of off-shore NAPL to the maximum extent practicable from the source zone beneath the Tennessee River in the vicinity of the Propane Dock (see Figure 3-1) will be conducted through focused pumping/extraction. Potential NAPL extraction well configurations include temporary vertical or permanent vertical or horizontal wells (or a combination thereof) to recover the NAPL. Prior to or during the off-shore NAPL extraction process, it may be possible to enhance the recovery of off-shore NAPL

through the injection of surfactants, which can increase the mobility of NAPL. However, because surfactant injection will significantly increase NAPL solubility, the magnitude and spatial extent of dissolved contaminant concentrations in the vicinity of the NAPL likely will increase, thus negatively impacting the proposed remedy for River Groundwater. Therefore, a thorough evaluation of the potential negative implications of enhanced NAPL recovery needs to be performed prior to considering implementation of this approach. An evaluation of the effectiveness of the River NAPL remedy will be performed five years after the aforementioned on-shore remedies have been completed. If after five years EPA determines that natural attenuation of the groundwater contaminants beneath the river is not effective in reducing contaminant levels toward achieving MCLs (e.g., absence of statistically significant decreasing trends or little reduction in contaminant mass), installation of a containment wall and/or a cap may be beneficial to supplement the effectiveness of the off-shore NAPL recovery. If an off-shore containment wall is deemed necessary to support the NAPL source area remedy implementation, the public will be notified of the change through an Explanation of Significant Differences (ESD). The actual off-shore NAPL recovery method will be detailed in the RDD for this remedial component and will be based on PDIs and/or TSs designed to evaluate the vertical and horizontal distribution of off-shore NAPL, sediment physical properties, and NAPL treatment and disposal requirements.

After it is demonstrated that off-shore NAPL has been recovered to the maximum extent practicable and that no additional NAPL can be recovered from the off-shore NAPL source zone, post-recovery sampling will be conducted to assess the nature and extent of the remaining contamination in the sediment, sediment porewater, and groundwater. These data will then be used to develop and evaluate a range of alternatives to further address the remaining contamination, with the goal of attainment of MCLs in groundwater within the River NAPL portion of the Site. These data also will be evaluated to assess whether it is technically practicable to remediate any remaining off-shore NAPL and contaminant mass in order to restore the groundwater to drinking water quality. The results from the evaluation will be documented in a final cleanup decision for this remedial component.

3.2.2.3 River Groundwater

Elevated chemical concentrations in groundwater present beneath the Tennessee River (see Figure 3-1) will be reduced to drinking water standards (i.e., MCLs) via natural attenuation. Once the influx of contaminants to off-shore groundwater ceases with the containment of the on-shore sources with a barrier wall (see Section 3.2.1.3) and recovery of the off-shore NAPL (see Section 3.2.2.2), natural biological processes and interaction of groundwater with the Tennessee River will rapidly attenuate (i.e., dispersion, dilution, and/or biodegradation) contaminants in groundwater beneath the river. An evaluation of the effectiveness of natural attenuation will be performed five years after the aforementioned on-shore and off-shore remedies have been completed. If after five years EPA determines that natural attenuation of the groundwater contaminants beneath the river is not effective in reducing contaminant levels toward achieving MCLs (e.g., absence of statistically significant decreasing trends or little reduction in contaminant mass), the attenuation may be supplemented by extraction and treatment of off-shore groundwater (target capture zone greater than 1,000 µg/L of total VOCs) to shorten the timeframe to attainment of MCLs. Because of access issues, it is assumed that horizontal extraction wells beneath the river would be installed from the shore to access the target capture zone. Groundwater contamination below the 1,000 µg/L threshold would continue to attenuate naturally and be monitored to ensure that MCLs can be achieved. Details for actively remediating River Groundwater, if required, are deferred at this time until the effectiveness of natural attenuation is assessed as described above. However, a RDD (including a monitoring plan) for this remedial component will be developed.

3.2.3 Institutional Controls

Institutional controls (ICs) will be used to support the long-term permanence and protectiveness of the remedy by limiting and/or preventing exposure to contamination and residual waste at the Site. ICs and

the use of existing facility security procedures will prevent unauthorized intrusive activities or groundwater use. Uniform Environmental Covenants established by Kentucky Revised Statutes (KRS) 224.80 will be drafted and recorded to memorialize the land and activity use restrictions. The environmental covenants will include, at a minimum:

- Prohibit the use of groundwater beneath the Site, including for potable, agricultural, industrial, and commercial purposes.
- Prohibit the use of the property within the Site area for purposes other than industrial uses.
- Notify the EPA, KDEP, and other owners/operators within the boundary of the Site of any construction activities that may result in the disturbance of contaminated media.
- Prohibit the dredging of the Tennessee River bottom within the Barge Slip or Propane Dock area of the Site below an elevation of 288 ft amsl or installation of structures that may result in the exposure of contaminated media beneath the Tennessee River without EPA notification and approval.

3.2.4 Vapor Intrusion

Based on the results from the RI indoor air investigation, all new buildings and building expansions within the Site area will be constructed using VOC and mercury vapor intrusion-resistant construction. Existing administrative buildings will be retrofitted, as necessary, to prevent any unacceptable risk from potential vapor intrusion.

3.2.5 Long-Term Operation, Maintenance, and Monitoring

Long-term operation, maintenance, and performance monitoring will be conducted on a regular basis to evaluate the effectiveness and protectiveness of the on-shore and off-shore components of the remedy. In general, performance monitoring will address:

- On-shore groundwater gradients, pond and monitoring well water levels, and groundwater contaminant levels to verify plume stability beneath the chemical manufacturing plant complexes and hydraulic control.
- Groundwater contaminant levels beneath the river to evaluate plume reduction and stability.
- NAPL and groundwater contaminant levels in monitoring wells and other monitoring points.
- Sediment porewater and surface water contaminant levels at the groundwater/river interface.
- Potential seep occurrence along the shoreline.
- Indoor air VOCs in administrative buildings (including mercury for administrative buildings near the former MCB) that are constructed without vapor intrusion barriers.
- Sediment and sediment porewater contaminant levels in the Barge Slip.

Details regarding the long-term performance operation, maintenance, and monitoring criteria for each remedial component will be developed during the respective RDDs, and in the Operation and Maintenance Plan.

3.3 Performance Standards

The overall performance objective for the remedy is to restore groundwater to beneficial use outside of the TI zone including beneath the Tennessee River, prevent continued contaminant migration, and ensure protection of human health and the environment. An additional objective is the recovery of NAPL to the extent practicable. The specification of individual PSs will be developed during the RDs and will be

implemented as part of the RA. Remedies will be operated until PSs are met. Appendix F of the ROD (EPA, 2018) includes the chemical-, location- and action-specific ARARs that will be evaluated and selected during the RD and included in the RDDs for each remedy component, as appropriate performance criteria and objectives.

4.0 PROJECT MANAGEMENT AND ADMINISTRATION

This section describes the project management and administration for the RA activities, including project organization and project communication. The objective of this section is to describe the overall project organization and responsibility of various parties to aid in the exchange of information and to ensure efficient project operation. The key personnel involved with the RA process and a narrative of roles and responsibilities are presented below. A Project Organizational Chart is provided in Figure 4-1.

4.1 Project Team

The project team for the RA is described below.

4.1.1 United States Environmental Protection Agency

The EPA is the lead agency for the Site. As appropriate, EPA will review deliverables for approval or for comment. Mr. Brad Jackson is EPA's remedial project manager (RPM). Mr. Jackson will have the authority to halt the work and/or to conduct or direct any necessary response action if he determines that conditions at the Site constitute an emergency or may present an immediate threat to public health or welfare or the environment due to a release or threatened release of waste material.

EPA may choose to maintain an on-Site presence to provide oversight and inspections during the RA construction phase. If requested by the RPM, Respondents will provide on-Site office space for EPA personnel to perform these oversight duties.

4.1.2 State Participation

EPA has the sole authority to approve the RA activities and associated documents. However, the State (KDEP) will have reasonable opportunity to review and comment on all deliverables provided to EPA for approval. KDEP will be provided sufficient time to review and comment prior to any EPA approval or disapproval of any deliverables that are submitted during the RA, including the construction phase, certification of RA completion, and certification of work completion. Ms. Sheri Uhlenbruch is KDEP's Project Coordinator for the Site.

4.1.3 Respondents

The Respondents (PolyOne Corporation, Goodrich Corporation, and Westlake Vinyls, Inc.) shall perform the RA in accordance with the CD and associated deliverables developed by the Respondents and approved or modified by EPA pursuant to the CD.

4.1.4 Supervising Contractor

At least one Supervising Contractor (SC) will be retained by the Respondents for implementation of the RA as specified in the CD. Respondents anticipate, however, that more than one SC will be required due to the specialized nature of the remedy components. EPA will review credentials of and approve the SC(s). The SC(s) will be responsible for supervising and directing the implementation of all RA activities. The SC(s) will identify company personnel to fill the key roles required to effectively implement the RA, including:

- **Project Manager (PM).** The PM is directly responsible for managing the RA to ensure that the project objectives and project schedules are met. The PM shall meet or participate in conference calls with the EPA's and the State's Project Coordinators at least monthly. The PM also will perform the functions listed below:
    - Provide overall direction and management for all RA activities.

  - Perform administrative and decision-making activities, as well as provide the necessary authorizations related to the project.
  - Facilitate RA coordination between the SC(s) and external organizations.
  - Review all reports in the draft version prior to their final edition.
  - Communicate with EPA and KDEP and other agencies on an ongoing basis regarding technical issues and project status.
- **Remedial Action Technical Director.** The Remedial Action Technical Director is responsible for the consistency and quality of the RA and associated documents.
- **Quality Assurance Officer (QAO).** The QAO is responsible for ensuring a high standard of quality throughout the RA. The QAO will perform the following functions:
  - Provide quality assurance technical assistance to the project staff.
  - Direct the preparation and review of quality assurance plans for analytical work, as necessary.
  - Review and validate analytical data in accordance with approved quality assurance plans.
  - Ensure compliance with regulatory guidelines.
- **Project Control Specialist (PCS).** The PCS is responsible to maintain a working project schedule, including assessing project status against target milestones. The PCS will maintain a liaison with the PM so that all relevant project control issues are managed effectively.
- **Health and Safety Manager.** The Health and Safety Manager will review the Health and Safety Plan (HASP) and maintain all safety and training certifications for all personnel involved in fieldwork-related activities. The Health and Safety Manager may perform periodic Site audits to ensure all activities are being performed in a safe manner and in accordance with the HASP.

4.1.5 Construction Subcontractors and Procurement Methods

A variety of construction subcontractors will be hired as needed to complete the wide range of activities required to implement the RA components. Subcontractors may be hired directly by Respondents, or hiring authority may be delegated to the SC(s). Respondents (or their designee) will provide all contractors with written notice and copy of the CD and this RAWP. Respondents will be responsible for ensuring that all contractors perform work in accordance with the terms of the CD and the individual RDDs. Contract methods may vary depending on the specific nature of the work associated with each RA component.

4.1.6 Independent Quality Assurance Team

If requested by EPA's RPM, Respondents will designate and contract an Independent Quality Assurance Team (IQAT) that will be independent of the SC(s). Respondents will provide notification to EPA with the names, titles, contact information and qualifications of each member of the IQAT. The IQAT will have the responsibility to determine whether work is of expected quality and conforms to applicable plans and specifications. The IQAT will have the responsibilities as described in Section 2.1.3 of the *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties* (EPA/540/G-90/001) (EPA, 1990).

4.1.7 Teaming Partners and Technical Experts

The SC(s) will partner with professional consultants and independent subject matter experts to provide technical direction and support for the RA. These firms or affiliations as well as their area of expertise will be identified during preparation of the RA documents for each remedial component as identified in

Section 3.2. The use of such specialized and local expertise, including State-licensed engineers and geologists, will enhance the overall efficiency and effectiveness of the RA.

4.2 Meetings and Inspections

Meetings and inspections will be conducted at various times during the RA to facilitate communication between Site stakeholders and ensure component-specific RAs are being implemented according to design and are progressing toward achieving RAOs. For any meetings and inspections in which EPA's RPM participates, the State's Project Coordinator also may participate. Respondents will notify both EPA and the State reasonably in advance of any such planned meetings or inspections.

4.2.1 Pre-construction Conference

Respondents will hold a pre-construction conference with EPA and others as directed or approved by EPA and as described in the Remedial Design/Remedial Action Handbook (EPA, 1995). Separate pre-construction conferences will be held prior to implementation of each of the component-specific RAs unless two or more RAs will occur in a similar timeframe, and EPA approves a single meeting to jointly discuss them. Respondents will prepare and distribute meeting minutes to all parties.

4.2.2 Remedial Action Progress Meetings

During the construction portion of the RA, Respondents will meet regularly with EPA and others as directed or determined by EPA, to discuss construction issues. Respondents will distribute an agenda and list of attendees to all parties prior to each meeting. Respondents also will prepare and distribute meeting minutes to all parties.

4.2.3 Site Inspections

EPA or its representative will conduct periodic inspections or have an on-Site presence during RA activities. At EPA's request, the SC(s) (or designee((s)) will accompany EPA or its representative during inspections. If requested by EPA, Respondents will provide on-Site office space for EPA personnel to perform oversight duties. In addition, the Respondents will provide on-shore and off-shore operational access and accommodations to support EPA and their representatives in their oversight of on-shore RA work, and off-shore drilling and other river-based RA work. Also, if requested by EPA, Respondents will provide personal protective equipment needed for EPA personnel and any oversight officials.

Upon notification by EPA of any deficiencies in the RA construction as determined during Site inspections and related activities, Respondents will take the necessary steps to correct the deficiencies and/or bring the RA construction into compliance with the approved final RD, any approved design changes, and/or this approved RAWP.

5.0 COMMUNITY INVOLVEMENT

EPA has the lead responsibility for developing and implementing community involvement activities at the Site. During the RI/FS phase, EPA developed a Community Involvement Plan (CIP) for the Site. EPA will review the existing CIP and determine whether it should be revised to describe further public involvement activities during the RA that are not already addressed or provided for in the existing CIP.

If requested by EPA, Respondents shall participate in community involvement activities, including participation in: (1) the preparation of information regarding the RA for dissemination to the public, with consideration given to including mass media and/or internet notification, and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site. Respondents' support of EPA's community involvement activities may include providing online access to initial submissions and updates of deliverables to (1) any Community Advisory Groups, (2) any Technical Assistance Grant recipients and their advisors, and (3) other entities to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP Respondents' responsibilities for community involvement activities. All community involvement activities conducted by Respondents at EPA's request are subject to EPA's oversight. Upon EPA's request, Respondents shall establish a community information repository at or near the Site to house one copy of the administrative record.

If requested by EPA, Respondents shall, within 15 days, designate a CI Coordinator (CIC), and provide notice of name, title, and qualifications to the EPA. Respondents may hire a contractor for this purpose. The Respondents' CIC will be responsible for providing support pertaining to EPA's community involvement activities, including coordinating with EPA's CIC regarding responses to the public's inquiries about the site.

The CIC will perform all activities under EPA oversight. Respondents and their contractors will not publicly share information about the Site and the RA unless otherwise authorized by the EPA. All public inquires will be referred to the EPA's public affairs representative.

If requested by EPA, the Respondents will prepare and submit a Technical Assistance Plan (TAP). The TAP will describe the Respondents' plans for a qualified community group to receive independent technical assistance from one or more technical advisors (not affiliated with the Respondents or their consultants) to help the group members understand Site cleanup issues and share the information with others in the community. Appendix A further describes requirements for the TAP and Respondents' obligations to implement it.

6.0 REMEDIAL ACTION ACTIVITIES

This section outlines the RA approach to implement the selected remedy as described in the Final ROD (EPA, 2018) and RDWP (Battelle, 2018). A general description of activities is provided. Detailed specifications will be provided in the component-specific RDDs that will be prepared prior to conducting each RA component.

6.1 Pre-Remedial Action Activities

Several activities, which are described in this section, must be performed prior to mobilizing equipment and personnel to the Site to initiate remedial action.

6.1.1 Permitting and Notifications

As provided in CERCLA and the National Contingency Plan, no Federal, State, or local permit is required for any part of response actions for work conducted entirely on the Site, which is considered the areal extent of contamination and those areas in close proximity to the contamination necessary for implementation of the work. However, activities associated with implementing the RAs must satisfy the substantive requirements that would be contained in a permit. The ARARs are outlined in Appendix F of the ROD (EPA, 2018) and will comply with the substantive requirements of the cited regulations.

Some portions of the work may be performed in an area that is not on Site or in proximity to the contamination, such as transportation and disposal of waste or possibly construction of equipment or infrastructure that may be required for one or more RA components. In these instances, Respondents will submit timely and complete applications to the appropriate authorities, notify property owners, and take all necessary actions to secure any required approvals.

6.1.2 Obtain Access and Easements

Respondents will use best efforts to secure from Non-Settling Owners, an agreement (enforceable by Respondents, by the United States on behalf of EPA, and by the State of Kentucky) requiring that Non-Settling Owner provide the United States on behalf of EPA, the State of Kentucky, the Respondents (and their representatives, contractors, and subcontractors) with access at all reasonable times to the affected property to conduct any activity regarding the CD, including those listed below. Respondents will provide a copy of each access agreement to EPA and the State. The affected properties are shown on Figure 2-2.

The following is a non-exclusive list of activities for which access is required regarding an affected property:

- Implementing the work.
- Monitoring the work.
- Conducting investigations regarding contamination at or near the affected property.
- Obtaining samples.
- Implementing the work pursuant to the conditions set forth in Paragraph 62 (Work Takeover) of the CD.
- Assessing Respondents' compliance with the CD.
- Determining whether the affected property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the CD.
- Implementing, monitoring, maintaining, reporting on, and enforcing any land, water, or other resource use restrictions and ICs.

To obtain access, the Respondents will prepare a letter requesting access for each affected property. Each letter will be sent via mail or email to the respective property owner and will inform the property owner of the planned investigation and remedial activities, describe the nature and anticipated duration of the planned work, describe known potential impacts of the work on the affected property, provide assurance that such impacts will be mitigated to the extent practicable, and describe restoration plans, if appropriate.

In the event that a property owner does not grant access following the Respondents "Best Efforts", including the payment of reasonable sums of money for granting access, the Respondents will promptly notify the EPA and the State of Kentucky in writing. The notification will include a summary of the steps taken by the Respondents in an attempt to obtain access. It is possible that the EPA would need to intervene to obtain access.

The Respondents also may need to obtain easements to install the barrier wall, construct groundwater extraction wells as part of hydraulic containment, or to complete other remedy components. The Respondents will use "Best Efforts" to secure the required easement, however, in the event the property owner will not grant the easement, the Respondents will promptly notify the EPA and the State of Kentucky in writing. The notification will include a summary of the steps taken by the Respondents to obtain the easement. It is possible that the EPA would need to intervene to obtain the easement.

6.1.3 Obtain Approval and Certification for Disposal of Remediation Waste

Waste material will be generated during implementation of the RA components identified in the ROD and summarized in Section 3.2. Contaminated soil potentially will be generated for those remedies that require excavation of soil such as the Outfall 004 Ditch Lining, Pond 1A and 2 Closure, and installation of the Barrier Wall. Contaminated sediment will be generated during Barge Slip Dredging; and NAPL could be generated during implementation of Hydraulic Control, River NAPL, or other RAs. Specific disposal procedures and requirements will be provided in the component-specific RDDs. All waste will be characterized and disposed of at an appropriate regulated treatment, storage, and disposal facility. An estimate of the volume of waste to be generated and its characteristics will be determined as part of component-specific RDDs and disposal management facilities and specific disposal requirements will be included in component-specific RDDs.

Respondents will ship any materials determined to be hazardous from the Site to an off-Site facility in compliance with Section 12l(d)(3) of CERCLA, 42 U.S.C. § 962l(d)(3), and 40 C.F.R. § 300.440. In order to comply with CERCLA § 12 l (d)(3) and 40 C.F.R. § 300.440, Respondents will obtain documentation from EPA that the proposed receiving facility for shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b). If Respondents ship waste material from the Site to an out-of-state waste management facility, notice will be provided to the appropriate state environmental official in the receiving facility's state and to the EPA RPM. This notice will not be required if the total quantity of all such shipments does not exceed 10 cubic yards. Notification will occur after the award of the RA construction contract and before the waste material is shipped. Notification will include the following information:

- The name and location of the receiving facility.
- The type and quantity of waste material to be shipped.
- The schedule for the shipment.
- The method of transportation.

Respondents will notify the state environmental official and the EPA RPM of any major changes in the shipment plan, such as a decision to ship the waste material to a different out-of-state facility.

Investigation-derived waste (IDW), consisting of groundwater, surface water, decontamination water, soil, and/or sediment also will be generated during the RA. It will be characterized in accordance with requirements specified by the proposed waste disposal facility and shipped from the Site to an off-Site facility in accordance with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, and *EPA 's Guide to Management of Investigation Derived Waste* (EPA, 1992). However, IDW shipped off -Site to a laboratory for characterization and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 Code of Federal Regulations (CFR) § 261.4(e) shipped off Site for TSs are not subject to 40 CFR § 300.440.

6.1.4 Perform Utility Clearance

A utility clearance will be performed for any RA component that requires penetrations into the subsurface or construction of permanent facilities that could interfere with operation and maintenance of any subsurface utilities. All areas where excavations will be performed will be demarcated with paint, stakes and/or other visual aids. Utility clearance on Westlake property will be performed by air knifing. At locations other than Westlake, Cymetech, and Lubrizol, Kentucky 811 will be contacted a minimum of 2 days prior to performing any excavation in accordance with KRS Chapter 367.4901 to 367.4917. Each property or easement owner will be requested to provide their utility clearance requirements.

In addition, each location where ground surface penetrations will occur may be cleared by an independent utility locating or geophysical survey subcontractor using surface geophysical methods to identify possible subsurface obstructions. Geophysical methods may include electromagnetic induction, geomagnetics, ground penetrating radar or a combination of these methods. Suspected underground utilities will be marked on the ground with color-coded marking paint in accordance with American Public Works Association standards (red = electrical line, blue = water line, green = sanitary/storm sewer line, orange = telecommunications, yellow = gas line, etc.). Component-specific RDDs will include maps superimposed over aerial photos that depict all locations of surface penetrations and the areas that will be cleared for utilities prior to performing any digging activities.

6.1.5 Perform Pre-Construction Survey

Pre-construction surveys will be performed prior to implementing each RA component to establish the layout of the work area and baseline conditions. Surveys will be performed by one or more independent land surveyors licensed in the State of Kentucky. For any off-shore work, the surveyor will have demonstrated experience in performing hydrographic and/or bathymetric surveys. The surveyor will demarcate all areas that will be impacted by the RA (e.g., areal extent and surface elevations prior to excavations). Survey plans will be included as part of the component-specific RDDs and/or associated documents (e.g., Construction Quality Assurance Plan [CQAP]) and will include required surveyor qualifications and the equipment and methods that will be used. All surveys will be performed in accordance with U.S. Army Corps of Engineers (USACE) Engineering and Design Manual 1110-1-1005 for topographic surveys (USACE, 2007) and USACE Engineering and Design Manual 1110-2-1003 for hydrographic surveys (USACE, 2013).

6.1.6 Perform Initial Property Inspection

Prior to construction of each RA component, a property inspection will be conducted. All areas that will be impacted in any way by the RA will be inspected. All items, which may include trees, shrubs, and other plants; fences and other structures; and private utilities, will be inventoried. Photographs will be taken to document the objects and their conditions. Any items that are disturbed will be repaired or replaced at the conclusion of RA construction. The property owner will be consulted prior to and during the RA regarding any disturbances, and any concerns of the owner will be noted.

6.2 Remedial Action Activity Requirements and Criteria

General requirements for performing the RA are presented below. More detailed requirements for each of the component-specific RAs will be included in the component-specific RDDs.

6.2.1 Mobilization and Site Preparation

Staff and equipment will be mobilized to the Site after submittal and approval of the component-specific RDD and associated documents (see Section 7), any required approvals are obtained, and written notification from the EPA to proceed with RA construction is received. Based on the property inspection, protective measures will be installed around vegetation and aboveground structures (e.g., poles, electrical transformers, hydrants, plants) that are not to be disturbed per owner's request, are required for operation of existing facilities, or where local laws or ordinances prohibit tampering. If possible, excavation and associated activities will be conducted at a reasonable distance from these structures.

Temporary facilities will be placed on the Site, including portable toilets, refuse containers, mobile office trailers, and any necessary utilities required to support operation and maintenance of these facilities, such as electric, water, and waste disposal. An exclusion zone, contaminant reduction zone, and support zone will be identified and established for each RA component. Decontamination areas within the contaminant reduction zones and laydown areas and temporary equipment and containment pads will be constructed for this purpose. Areas and facilities will be constructed to contain waste material and IDW that will be generated during the RA. Temporary fencing will be erected around sensitive areas (e.g., the exclusion zone and contaminant reduction zones) to secure equipment and materials from theft and to prevent public access into sensitive areas of the Site where they could be exposed to hazardous conditions. Secured storage containers will be mobilized to the Site as needed to store materials, small tools, and equipment.

Photographic surveillance and perimeter inspections during non-working hours by a contracted security firm will be performed if determined necessary to ensure security of the Site and safety of the surrounding neighborhood. The local police department also may be notified to alert them of RA activities and request periodic patrols to facilitate Site safety and security.

Clearing and grubbing will be performed in any upland areas where RA components will require excavation work such as lining of the Outfall Ditch or installation of the Barrier Wall. Surface and near surface objects such as tree trunks, logs, stumps, and debris will be removed. Any aboveground structures that would interfere with application of an RA component will be removed after securing permission from the property owner and inventorying and documenting it with photos as described in Section 6.1.6.

Traffic control devices (barricades, cones, and delineators) and signage will be used, as necessary, to manage pedestrian and vehicular traffic, inform the public that the area is restricted, provide relevant contact information, and provide other pertinent information as necessary. A minimum of two points of access will be secured in each area where a RA component is implemented to facilitate entry and egress and to provide multiple exits in the event of an emergency.

Specific Site preparation requirements will be determined as part of the final design and will be specified in the component-specific RDDs. The specific remedy requirements will dictate the location and size of the exclusion zone, contaminant reduction zone, decontamination areas, size of equipment storage areas, and temporary waste storage (and possible treatment) areas.

6.2.2 Drilling and Well Installation

Drilling will be required to construct and/or monitor several of the RA components. Vertical wells will be installed at most locations; however, horizontal wells will be considered in areas where existing infrastructure (e.g., operating chemical plants and Tennessee River) preclude the use of vertical wells. Final requirements and specifications for drilling will be provided in the RA component RDDs. An overview of on-shore and off-shore drilling methods likely to be used is provided below.

6.2.2.1 On-shore Drilling

Drilling procedures for on-shore borings will be generally consistent with those established in the Barge Slip PDI field sampling plan (FSP) (Battelle, 2019a, b) for on-Site boring installation and sampling. Unless otherwise noted in final remedy component RDDs, boreholes will be advanced using a sonic drilling method such as described in American Society for Testing and Materials Method D6914/6914M (ASTM, 2016). Sonic drilling allows for intermittent or continuous core sampling and performing blow-count standard penetration tests by using tools within the drill pipe. As the drill pipe advances it partially blocks off fluid flow between depths and avoids smearing of soils that would occur with the hollow-stem auger method. Drilling will be performed by advancing outer temporary casings along with the smaller diameter drill rods and core barrels to minimize the likelihood of cross-contaminating deeper zones with pooled NAPL present in shallow zones.

If soil samples are required from the boreholes for monitoring or other purposes, samples will be collected using the sonic rig core barrel, a split-spoon sampler, and/or Shelby tube sampler at a frequency and depth as specified in final RDDs. Standard penetration test (ASTM Method D1586-18) hammer blow counts will be recorded as the sampler is advanced into the formation. If Shelby tubes are used for sample collection, the presence of NAPL will be based on visual observations of samples obtained from between the tubes and on the exterior of the sample casing and drilling equipment. Visual observations will be noted from the Shelby tube samples in the analytical laboratory after the soil is extracted from the tubes.

After sampling is completed, the borehole will either be converted into a monitoring or recovery well, or it will be abandoned in accordance with local regulations and best practices. Wells will be constructed of either 2- or 4-inch-diameter polyvinyl chloride or steel casing depending on the purpose of the well, its depth, and other remedy specific factors. Specific design and installation requirements will be presented in component RDDs. Abandonment will consist of plugging the borehole with sealing material by the tremie-pipe grouting method or by pressure injection from the bottom of the boring to the top of the borehole. All soil cuttings from upland geotechnical borings will be considered IDW and placed in approved containers for shipment and off-Site disposal, as described in the Transportation and Off-Site Disposal Plan (TODP) (see Section 7.6.7).

All borings and wells will be completed by a licensed drilling subcontractor, and drilling will be conducted under the supervision of a licensed geologist. Soils will be screened using an organic vapor analyzer (OVA) and a mercury vapor analyzer. The cores will also be assessed for non-calculated NAPL indicator parameters consistent with Appendix 5-3 of the RI, including visual NAPL, dye test, staining, OVA detections or note of odor, and sheens. Soil boring logs describing the materials encountered, NAPL assessment logs, OVA and mercury vapor readings, geotechnical and laboratory sample depths, hammer blow counts and other observations will be prepared. Best management practices (BMPs) will be implemented to contain and recover any NAPL that is inadvertently released during boring installation.

6.2.2.2 Off-shore Drilling

Drilling at off-shore locations either will be performed using a barge-mounted vibracore for shallow sediments or a sonic drill rig for deeper drilling, or will be performed from an upland location using a

directional drill rig. Due to the highly specialized nature of directional drilling, should this method be used, requirements and procedures will be included in component RDDs and are not discussed here.

Off-shore drilling using a vibracore or sonic rig will be performed by mounting the rig to a mobile spud or jackup barge equipped with a moon pool and designed as a stable overwater drilling platform. The barge will be stabilized at each drilling location using anchors and spuds. Barge movement will be conducted using a support boat. Temporary outer casing will be utilized to isolate any pooled NAPL that may be encountered as well as isolating the borehole from the river. A vessel-mounted global positioning system (GPS) will be used to establish the location and elevation of each drilling location. One additional surveying method (tide board or total station[2]) will be available for use in case the facility infrastructure causes GPS interference. The depth from the barge to the sediment surface will be measured using a tool specifically designed to detect the surface of soft sediments, such as a 12-in. diameter perforated plate. In addition to the location coordinates, the field crew will record the time of collection, the water depth, core recovery, and the penetration depth when collecting samples.

All borings and wells will be completed by a licensed drilling subcontractor, and drilling will be conducted under the supervision of a licensed geologist. Soils will be screened using an OVA and mercury vapor analyzer. The cores will also be assessed for non-calculated NAPL indicator parameters consistent with Appendix 5-3 of the RI, including visual NAPL, dye test, staining, OVA detections or note of odor, and sheens. Soil boring logs describing the materials encountered, NAPL assessment logs, OVA and mercury vapor readings, geotechnical and laboratory sample depths, hammer blow counts and other observations will be prepared. BMPs will be implemented to contain and recover any NAPL that is inadvertently released during boring installation. Abandonment will consist of plugging the borehole with sealing material by the tremie-pipe grouting method or by pressure injection from the bottom of the boring to the top of the borehole.

6.2.3 Excavations and Confirmatory Sampling

Soil will be excavated as part of several RA components. Excavation locations, soil volume, and other details will be provided in component-specific RDDs.

Excavated soil will be consolidated/staged in designated areas, preferably adjacent to the location where excavation is being performed. Soil will be segregated based on suspected levels of contamination (i.e., non- and/or low-level contaminated soil will be separated from suspected highly contaminated material). In addition, saturated soil will be segregated and stockpiled separately from unsaturated soil. As noted in Section 3.2, excess soil from construction RA components will be considered for use as backfill during closure of Pond 1A and 2 if backfilling is selected as the pond closure remedy. Saturated soil will be stockpiled in a lined, bermed area to prevent runoff of contaminated water. Water spray, tarps, and soil additives may be used as described in Section 6.2.9 to control the production and spread of dust and to control erosion and surface water runoff (Section 6.2.6). Concrete blocks, hay bales, or other devices may be used to secure tarps to prevent the loss of any covers.

Pumps will be used as needed to dewater areas if excavation is required beneath the water table and to control infiltration of rainwater during inclement weather. Accumulated water will be pumped into temporary tanks or temporary bermed and lined storage ponds, allowing suspended solids to separate. The water will then be disposed of at the on-Site treatment plant or, if necessary, will be transported off Site to a treatment facility after it has been adequately characterized.

Soil will be sampled and characterized prior to disposal. Soils with low or non-detectable levels of contamination may be used as backfill assuming its properties (e.g., grain size, water content, bulk

[2] A total station instrument would be placed on land, with a reflector placed on the barge.

density) meet requisite specifications for its intended use. The remaining soil may be disposed of at a non-hazardous solid waste landfill or possibly as a RCRA hazardous waste based on characterization results. Additional details and procedures pertaining to soil excavation and handling activities will be provided in component-specific RDDs.

6.2.4 Dredging and Habitat Restoration

The Barge Slip Dredging remedy component includes sediment removal, processing and disposal of dredged material, and treatment of dredge water. The Barge Slip Barrier Wall remedy will be implemented in conjunction with the Barge Slip Dredging remedy component to address potential side slope stability issues and possible re-contamination of backfill placed in the Barge Slip.

Implementation of the Barge Slip Dredging remedial component will require removal and disposal of contaminated sediment from the bottom of the Barge Slip. Sediment will be removed using either mechanical or hydraulic dredging methods. The specific method will be determined as part of the RDD. Dredging will be performed from floating barges. Contaminated sediment will be removed from the bottom of the Barge Slip (see Figure 3-1) and imported backfill material will be placed after dredging to create a riverbed surface that is protective of ecological receptors and allows for the development of a benthic habitat. The imported backfill material will be placed to achieve the desired thickness and maintain a navigation channel (bottom elevation of 288 ft amsl). The actual depth of the excavation, thickness of the clean layer, and requirements, if any, for a liner will be verified during the RD.

Treatment and disposal requirements for the dredge material and dredge return water generated from the dewatering of the dredged material will be determined based on the characterization of the material, applicable regulatory requirements, and results of the TS (Battelle, 2019b). However, based on prior investigations, sediment can likely be classified as non-hazardous in the northern portion of the Barge Slip and potentially hazardous in the southern portion of the Barge Slip where NAPL previously has been observed.

BMPs will be used to minimize short-term impact to surface water quality during dredging. The specific BMPs that will be used will be determined during the RD. Examples of BMPs include:

- Use of closed environmental buckets to reduce sediment re-suspension during dredging.
- Collection and treatment of water that separates from dredged material prior to discharge to the River.
- Use of a dredge method that lifts all material and does not allow sloughing or lateral grading on sediment under water.
- Use of silt curtains, oil containment booms, and/or turbidity curtains to contain re-suspended sediment.

6.2.5 Cover Systems

Cover systems will be installed as part of the Outfall 004 Ditch Lining, Pond 1A and 2 Closure, and Barge Slip Dredging remedy components. Clean backfill, having the necessary properties as determined by PDIs, TSs, and final RDDs, will be identified and used to fill excavated areas. Procedures for backfilling and compacting the backfilled material will be included in component-specific RDDs. Although the restoration method for the Pond 1A and 2 Closure has not been finalized, an impermeable liner or cap may be used to prevent infiltration of surface water into any contaminated soil beneath it. The type, thickness, and other specifications for the liner or cap will be described in final RDDs and installation procedures will be described in the component-specific RDD. Surfaces will be graded in a

manner that promotes surface water runoff and minimizes infiltration into contaminated areas. Surface cover will be designed and emplaced to match the surrounding area.

In addition to the RA components described above, surface soil may be disrupted as part, or in support of, other remedy components. Upon completion of RA construction as applicable, or RA completion, the ground surface will be returned to a condition equivalent or better than its original condition, and could consist of asphalt, concrete, grasses, and/or various plants and other vegetation. Ground surface will be graded to prevent pooling and ensure adequate surface water runoff. A topsoil layer will be placed in areas requiring flora to ensure vegetation becomes well established and permanent. Any deviations from baseline conditions as established during the pre-construction survey and initial property inspection will be discussed with the respective property owner prior to implementation.

6.2.6 Erosion, Surface Water Runoff, and Sediment Control

Design of each remedy component will include an Erosion and Control Plan (ESCP), which will be developed to specify soil erosion controls that will be installed and maintained to control soil erosion to prevent erosion of soil onto adjacent property, prevent dust generation, protect the storm water collection system, protect air quality, and protect water quality. The ESCP will require use of BMPs and compliance with local and state regulations for erosion control on earthwork projects.

Surface water runoff will be controlled by minimizing contact of excavated material with rainwater by covering the material with tarps in areas where small quantities of material are temporarily stored. Larger and/or longer-term storage areas or storage of material with an expected high water content (e.g., hydraulically dredged sediment) may be constructed with a berm and one or more sumps, equipped with pumps to remove accumulated water and discharge it to a treatment plant or temporary holding tanks, and may be covered with tarps or temporary structures as necessary to minimize runoff and erosion.

Where consistent with the final remedial design, excavation surfaces will be finished similar to pre-existing conditions and will use materials such as asphalt, concrete, and vegetation to minimize the potential for erosion. In addition, surfaces will be graded to promote surface water runoff and minimize potential for erosion.

6.2.7 Stockpiling, Transportation, and Treatment of Soil and Sediment

Excavated soil and dredged sediment will be stockpiled in designated areas, as near as possible to where excavation and dredging is performed. Excavated soil will be segregated based on suspected levels of contamination and degree of saturation as follows:

- Soil suitable for reuse at the Site.
- Soil containing low levels of contamination that presumably can be disposed of in a non-hazardous landfill. Saturated soil will be stockpiled separately from unsaturated soil.
- Soils with high levels of contamination and/or RCRA characteristics likely will require disposal at a facility permitted to receive such waste. Saturated soil will be stockpiled separately from unsaturated soil.

Stockpiled soil will be covered as described in Section 6.2.3. Excess soil from construction of RA components will be considered for use as backfill during closure of Pond 1A and 2 if backfilling is selected as the pond closure remedy.

Dredged sediment will be consolidated in designated areas to allow consolidation, allowing pore water to be expressed and separated. Specific requirements will be based on the anticipated volume of material dredged and type of dredging performed (i.e., hydraulic versus mechanical). Mechanically dredged

sediment could be placed in windrows, whereas hydraulically dredged material could be directly transferred into Geotubes™ or comparable to facilitate dewatering. However, it is noted that there are substantial space restrictions at the Site, which may limit the ability to adequately stockpile dredged sediments and associated water; these limitations will be evaluated during remedy design and documented in the RDD. Specific treatment requirements will be determined based on results of planned PDIs and TSs (Battelle, 2019b) and will be documented in the component-specific RDD for the Barge Slip Dredging RA component.

All excavated material will be adequately characterized to determine an appropriate disposal facility or potential for reuse at the site. Specific requirements and procedures will be described in final RDDs and TODPs.

6.2.8 Groundwater and NAPL Recovery, Treatment and Disposal

Groundwater and/or NAPL will be recovered as part of the Hydraulic Control, On-Shore NAPL Recovery, and/or River NAPL remedy components. Vertical wells, horizontal wells, or a combination thereof will be installed within the containment area as defined by the barrier wall that will be installed around it, with the objective to extract groundwater to maintain hydraulic control within it. The initial number, depth, location, and extraction rates of each groundwater extraction well will be determined during the RD based on groundwater modeling evaluations performed as part of a PDI; modification/optimization of these parameters will be performed once the initial system is operational.

It is expected that some NAPL may be recovered from these wells. In addition, where practical, wells may be installed with the specific intent of NAPL recovery in the containment area where NAPL is known or suspected to be present and existing wells also may be utilized to perform on-shore recovery of NAPL to the extent practical. Horizontal and/or vertical wells also may be installed beneath the Tennessee River in the vicinity of the Propane Dock. The number, locations and design specifications for the wells will be determined as part of the RDDs that will be developed for the Hydraulic Control, On-Shore NAPL Recovery, and River NAPL remedy components.

Focused pumping and extraction will be performed to remove groundwater and NAPL from the newly installed wells. However, passive NAPL recovery techniques, such as bailing, absorbent socks, and others, may be used in wells within the containment area expressly installed for the purpose of recovering NAPL. These techniques will be evaluated during the NAPL Recovery remedy component PDIs. The addition of surfactants also will be evaluated and may be used to enhance NAPL recovery from beneath the Tennessee River in the Propane Dock area. However, because surfactant injection could significantly increase NAPL solubility, the magnitude and spatial extent of dissolved contaminant concentrations in the vicinity of the NAPL likely will increase, thus potentially negatively impacting the proposed remedy for River Groundwater. Therefore, a thorough evaluation of the potential negative implications of enhanced NAPL recovery needs to be performed prior to considering implementation of this approach.

The groundwater treatment method for the Hydraulic Control remedy component will be determined during the RD based on data collected from associated PDIs and/or TSs and will be documented in the RDD. The treatment approach may be refined after installation based on actual flowrates and contaminant concentrations from the operating hydraulic control system. However, it is anticipated that pumped fluids will be conveyed through subsurface and/or aboveground piping to one or more treatment facilities constructed for this purpose. The design of any such treatment systems, including unit operations, capacity, and flowrates will be determined and presented in final RDDs for the component remedies. Treatment systems will have the capacity to separate NAPL from water using a coalescing separator or equivalent and will have the capability to sufficiently treat water (e.g., air/steam strippers, activated carbon, filtration, etc.) to meet applicable discharge criteria, prior to pumping it into the Tennessee River through the KPDES permit. The recovered NAPL will be characterized and either will

be recycled on Site (with EPA approval) or will be treated and/or disposed of off-Site at an appropriate facility based on characterization results.

6.2.9 Dust Control and Monitoring

Dust abatement measures and particulate monitoring will be implemented as necessary to reduce the quantity of dust created during RA activities. In particular, dust abatement will be performed during transportation operations. Dust abatement measures include:

- Laying tarps and liners around trucks when loading them with sediment and soil to facilitate collection of any spilled materials.
- Routine cleaning of loading pads and facilities.
- Inspection and cleaning of trucks prior to them leaving the Site.
- Covering soil and sediment in trucks to prevent fugitive dust emissions during transport.
- Periodically spraying with water areas of excavation and roads to maintain a damp surface.
- Adding a stabilizer to dredged river sediments to retain moisture if a mechanical dredging method is used.
- Periodically spraying with water stockpiled soil and sediment.

Air monitoring will be performed as needed during activities associated with RA components expected to generate dust. Monitoring will be performed downwind of work areas during RA activities involving excavation and backfilling operations. Field instruments will be used as necessary to monitor particulates in breathing air. Additional dust suppression measures, which could include additional irrigation or stop work, will be implemented should particulate levels in the breathing zone exceed predetermined values.

Specific dust abatement procedures and monitoring requirements, including location of monitoring stations and appropriate action levels, will be based on the final RDDs developed for each of the RA components, and will be presented in component-specific RDDs and associated HASPs.

6.2.10 Institutional Controls

ICs will be implemented as described in Section 3.2.3. An Institutional Controls Implementation and Assurance Plan (ICIAP) will be developed and implemented until RAOs are achieved and Site closure is achieved. Additional details pertaining to the ICIAP are presented in Section 7.6.10. In accordance with the ICIAP, Respondents will, with respect to any Non-Settling Owner's Affected Property, use "Best Efforts" to secure non-settling owner's cooperation in executing and recording use restrictions that grant a right of access to conduct activity to implement and monitor the RAs and the environmental covenants listed in Section 3.2.3 and, if necessary, to enforce such use restrictions.

6.2.11 Operation, Maintenance, and Monitoring

Operation, maintenance, and monitoring (OM&M) will be performed for those remedy components which will require long-term operation to achieve PSs. These include the recovery and treatment system(s) that will be constructed and operated continuously as part of the Hydraulic Control and River NAPL remedy components. OM&M will be performed to ensure that the systems are operating according to design and are optimized to achieve performance objectives. Monitoring and evaluation of system performance will be performed throughout the duration of operation, and corrective and preventative maintenance will be performed as needed. The types of process monitoring that will be performed include, but are not necessarily limited, to the following:

- Routine inspection of process components to ensure they are operating according to design and there are no visible defects or mechanical issues.
- Process water flowrates, temperatures, and pressures associated with process equipment.
- Fluid flowrates from individual wells.
- Total system influent and effluent flowrate.
- Total NAPL recovery rate. These data can be used to perform a decline curve analysis to assess when recovery has been achieved to the extent practical, and what system modifications (e.g., introduction of surfactants) are needed to enhance recovery (if warranted).
- System influent and effluent contaminant concentrations and other pertinent parameters as needed such as total suspended solids, total dissolved solids, pH, oxidation-reduction potential, etc.
- Groundwater elevations in the well field to help assess hydraulic containment and optimize well field performance.

Design and operation of the recovery system will be flexible, allowing for changes as dictated by monitoring data and as restoration progresses. For instance, recovery wells could be added or removed and flowrates may be adjusted to optimize NAPL recovery or hydraulic control. Similarly, treatment operations may be discontinued (upon concurrence of EPA) should contaminant concentrations or other relevant parameters (e.g., total suspended solids) decrease below pre-determined levels. Specific process monitoring requirements for each remedial component will be presented in an Operation and Maintenance Plan as described in Section 7.6.8.

Routine inspections and maintenance will be performed on all process equipment in accordance with manufacturer's literature. In some instances, it may be necessary to contract specialists to perform such maintenance. The requirements for inspecting, operating, and maintaining equipment associated with each RA component (as applicable) also will be included in the Operation and Maintenance Plan. The purpose and function of equipment and associated systems and controls along with manufacturer's literature will be presented in RA component-specific Operation and Maintenance Manuals (see Section 7.6.9).

6.2.12 Vapor Intrusion Mitigation and Monitoring

Based on the results from the RI indoor air investigation, all new buildings and building expansions within the Site area will be constructed using VOC and mercury vapor intrusion-resistant construction. Existing administrative buildings will be retrofitted, as necessary, to prevent any unacceptable risk from potential vapor intrusion. Monitoring of indoor air VOCs and mercury levels (as needed) will be performed in administrative buildings constructed without vapor intrusion barriers.

6.2.13 Post-Construction Survey

A post-construction survey will be performed for each remedy component at the completion of the RA construction phase to document Site conditions after the remedy has been constructed. Elevations and coordinates of all excavated areas, and locations of monitoring and/or recovery wells will be documented. Surveys will be performed by one or more independent land surveyors licensed in the State of Kentucky. For any off-shore work, the surveyor will have demonstrated experience in performing hydrographic and bathymetric surveys. The surveyor will demarcate all areas impacted by the RA. All surveys will be performed in accordance with USACE Engineering and Design Manual 1110-1-1005 for topographic surveys (USACE, 2007) and USACE Engineering and Design Manual 1110-2-1003 for hydrographic

surveys (USACE, 2013). Similar techniques and coordinate systems will be used as for the pre-construction survey.

6.2.14 Site Restoration and Demobilization

Upon completion of RA construction activities, all temporary facilities including staging and laydown areas, fencing, and temporary utilities will be removed from the project site. The immediate work area will be inspected by the SC(s) to verify that all project-related equipment, trash, and debris have been collected and disposed of properly. Permanent electrical utility terminations, if any, will be performed by a local licensed electrician, and will comply with local and Site-specific utility requirements.

Temporary fencing, traffic control devices, signs, storage containers, portable toilets, and refuse containers will be removed from the Site. Surplus materials, waste materials, and debris will be removed and disposed of, and work areas will be cleaned and returned to their original condition. Final demobilization will include removal of all Site fencing, decontamination pads, and temporary water storage tanks.

Where consistent with the final remedial design, surface features will be returned to their previous condition or better prior to demobilizing from the Site. Surface cover including asphalt and concrete will be replaced as necessary. Any damaged grass or removed plants or trees will be replaced. Items previously removed from the Site will be returned and reinstalled, as appropriate.

6.2.15 Performance Monitoring

In addition to the process monitoring that will be performed as described in Section 6.2.11, performance monitoring will be performed to ensure remedy components are operating as designed and to measure progress toward achieving RAOs. Long-term monitoring requirements for the Site include monitoring of:

- Groundwater and surface water levels inside and outside of the barrier wall for evaluation of hydraulic control.
- Groundwater quality inside the barrier wall to evaluate long-term changes in contaminant mass removal and changes in groundwater quality.
- Groundwater quality beyond the TI zone to ensure attainment of ARARs for drinking water (i.e., MCLs).
- Porewater quality in the river and the Barge Slip to ensure the effectiveness of the barrier wall and the hydraulic control system.
- Indoor air quality in buildings located inside the barrier wall that are occupied by non-OSHA-regulated workers (i.e., administrative workers).
- Treated effluent from treatment systems for compliance with discharge standards.

Sampling and analysis of soil, sediment, groundwater, and/or surface water will be performed until data and applicable inspections have demonstrated that PSs have been achieved for those remedies which PSs are not immediately achieved (e.g., hydraulic control) after construction. For the River NAPL component, after it is demonstrated that off-shore NAPL has been recovered to the maximum extent practicable and that no additional NAPL can be recovered from the off-shore NAPL source zone, post-recovery sampling will be conducted to assess the nature and extent of the remaining contamination in the sediment, sediment porewater, and groundwater. These data will then be used to develop and evaluate a range of alternatives to further address the remaining contamination, with the goal of attainment of MCLs in groundwater within the River NAPL portion of the Site. These data also will be evaluated to assess whether it is technically practicable to remediate any remaining off-shore NAPL and contaminant mass in

order to restore the groundwater to drinking water quality. The benefit of installing a containment wall and/or a cap to supplement the effectiveness of the off-shore NAPL Recovery remedy component will be evaluated.

7.0 REPORTING AND DELIVERABLES

Respondents will submit all deliverables for EPA approval and comment. Any deliverable submitted to EPA will concurrently be submitted to the State, and the State will have a reasonable opportunity for review and comment. The following sections provide additional reporting requirements and technical specifications for deliverables.

7.1 Field Documentation

Field notebooks will be maintained to document each RA, daily activities performed, Site and weather conditions, receipt of equipment and materials, data and samples collected and other pertinent information associated with the RA. A photographic log of activities and Site conditions also will be maintained during RA activities. Field documentation will remain on Site during restoration activities and will be provided to the EPA at its request at the completion of RA construction. All access and easement agreements, pre-construction survey maps, and initial property inspection inventories and photos also will remain on Site through the RA construction phase of the remedy.

7.2 Progress Reports

Progress reports will be submitted to EPA on a quarterly basis, or as otherwise requested by EPA, from the date of receipt of EPA's approval of this RAWP. Reports will be prepared until RA construction completion for those remedies that achieve PSs upon construction completion, or until RA completion for those remedies that require time and monitoring to achieve and demonstrate compliance with PSs after construction is complete. The reports will summarize all activities that took place during the prior reporting period, including:

- The actions that have been taken toward achieving compliance with the Settlement;
- A summary of all results of construction and implementation activities, any monitoring and performance data, and all other data received or generated by Respondents;
- A description of all deliverables that Respondents have submitted to EPA;
- A description of all activities scheduled for the six weeks following report submittal;
- An updated RA construction schedule, together with information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the work, and a description of efforts made to mitigate those delays or anticipated delays;
- A description of any modifications to the component-specific work plans and associated documents or other schedules that have proposed or that have been proposed or been approved by EPA; and
- A description of all activities undertaken in support of the EPA's CIP during the reporting period and those to be undertaken in the six weeks following report submittal.

If the schedule for any activity described in the progress reports changes, Respondents will notify EPA of such change at least seven days before performance of the activity.

7.3 Remedial Action Construction Completion Report

A Remedial Action Construction Completion Report (RACCR) will be prepared for those remedies for which construction and operation of a system is required to achieve PSs (e.g., Hydraulic Control remedy

component). The RACCR will be prepared to document the construction of the system and that the RA is functioning properly and as designed. One year of operation, maintenance, and monitoring (shakedown period) will be performed to ensure that the system is functioning as designed prior to drafting the RACCR. In addition, an inspection of the RA will be performed by the Respondents and EPA to review the construction and operation of the system and confirm that the system is functioning properly and as designed. The RACCR will include statements and supporting documentation that construction of the system is complete and that the system is functioning properly and as designed and will include as-built drawings. The RACCR will be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's Close Out Procedures for NPL Sites guidance (EPA, 2011) and supplemented by *Guidance for Management of Superfund Remedies in Post Construction* (EPA, 2017). The report will be signed and certified by the Respondents' PM in accordance with requirements as described in Section 7.8. Acceptance of the RACCR by the EPA will document that RA construction complete has been achieved.

7.4 Remedial Action Completion Report/Monitoring Report and Certificate of Work Completion

A Remedial Action Completion Report (RACR) will be prepared for all RA components. Acceptance of the RACR by the EPA is required for all remedy components to obtain a certificate of RA completion. For those remedies for which PSs are achieved upon RA construction completion, RA construction completion also signifies RA completion, and the RACR may be prepared immediately. For those remedies for which PSs are not immediately prepared after construction, the RACR will be prepared after sufficient time has elapsed to demonstrate that PSs have been achieved. In this instance, the RACR may be referred to as a monitoring report.

Prior to finalizing the RACR (or monitoring report), Respondents will schedule an inspection for the purpose of obtaining EPA's Certification of Work Completion. The inspection will be attended by Respondents and EPA and/or their representatives.

The RACR (or monitoring report) will include certifications that the RA is complete, will include as-built drawings, and will contain monitoring data to demonstrate that PSs have been achieved. It will be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's Close Out Procedures for NPL Sites guidance (EPA, 2011), as supplemented by *Guidance for Management of Superfund Remedies in Post Construction* (EPA, 2017). The report will be signed and certified by the Respondents' PM in accordance with requirements as described in Section 7.8.

If EPA concludes that the work is not complete, EPA will notify Respondents. EPA's notice will include a description of the activities that Respondents must perform to complete the work. EPA's notice also will include specifications and a schedule for such activities or will require Respondents to submit specifications and a schedule for EPA approval. Respondents will perform all activities described in the notice or in the EPA-approved specifications and schedule. If EPA concludes, based on the initial or any subsequent report requesting Certification of Work Completion, that the work is complete, EPA will so certify in writing to Respondents.

7.5 Periodic Review Support Plan (Five-Year Reviews)

Respondents will support EPA in the development of a Periodic Review Support Plan (PRSP), also referred to as a Five-Year Review. This report will document studies, investigations, and other remedial activities to support EPA's review of the Site to evaluate whether the RA is protective of human health and the environment in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c). However, remedy performance will not necessarily be dictated by the evaluation performed on a five-year review

schedule, and remedy component specific interim performance milestones may be developed. Respondents will engage with EPA to discuss the schedule of future five-year reviews.

EPA (or Respondents if requested by EPA) will develop the plan in accordance with *Comprehensive Five-year Review Guidance* (EPA, 2001), and any other relevant five-year review guidance available at the time the report is prepared. Respondents will submit a summary report to EPA that will support the PRSP. The PRSP will include a review of documents and data, Site inspections, and interviews with Site stakeholders. The results of these activities will be used to assess if the remedy is performing as intended and remain protective of human health and the environment.

7.6 Supporting Deliverables

Several deliverables are required to support the RA and will be submitted to EPA for approval. These overarching deliverables will be developed as part of the RD (Battelle, 2019c) in accordance with all applicable regulations, guidelines, and policies as noted below and will be developed to encompass all RAs to the extent possible (with the exception of the FSP, Operation and Maintenance Plan, and Operation and Maintenance Manuals, which are remedy component-specific). If necessary, these documents will be updated to reflect additional information gained during RA construction. Should additional information be required for a specific remedy component, attachments to the affected documents will be prepared. These deliverables will be submitted for EPA approval prior to performing any RA component and will be updated as necessary or appropriate to support remedy components as needed and/or as requested by EPA. A summary of each of these deliverables is provided below.

7.6.1 Health and Safety Plan

The HASP will describe all activities to be performed to protect on-Site personnel and area residents from physical, chemical, and all other hazards posed by the work. It will be developed in accordance with EPA's Emergency Responder Health and Safety and OSHA requirements under 29 CFR §§ 1910 and 1926 and will be compliant with all Respondent safety requirements for work on Site. It will cover all RA activities and will be prepared by the SC(s). Contractors for each RA as described in Section 3 will be required to prepare a HASP specific to that RA that will be included as an attachment to the overarching HASP prepared by the SC(s).

7.6.2 Emergency Response and Reporting Plan

The Emergency Response Plan (ERP) will describe procedures to be used in the event of an accident or emergency at the Site. The ERP will also be compliant with all Respondent safety requirements for work on Site. The ERP will cover all RA activities and will include:

- The name(s) of the persons or entities responsible for responding in the event of an emergency incident, including the "authorized EPA officer" (e.g., EPA RPM/alternate RPM or EPA Region 4 Emergency Response Unit) for purposes of immediate oral notifications and consultations.
- A plan and potential date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the RA, as well as contact information and directions to local emergency squads and hospitals.
- Notification activities (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. § 11004.
- A description of all necessary actions to ensure compliance in the event of an occurrence during the performance of the work that causes or threatens a release of waste material from

the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment (Emergency Response and Reporting). For any such event, a report will be submitted to EPA within 14 days describing the actions or events that occurred and the response measures taken and/or to be taken, and within 30 days a report will be submitted to EPA describing all actions taken in response to such event.

7.6.3 Field Sampling Plan

The FSPs will address all sample collection activities. A FSP will be prepared for each remedy component as necessary. The FSP will be written so that a field sampling team unfamiliar with the project will be able to gather the samples and field information required. The FSP will be developed in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies* (EPA, 1988).

7.6.4 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) augments the FSP and addresses sample analysis and data handling regarding the work. The QAPP will include a detailed explanation of the quality assurance (QA), quality control (QC), and chain of custody procedures for all treatability, design, compliance, and monitoring samples. The QAPP will cover all RA activities and will be developed in accordance with *EPA Requirements for Quality Assurance Project Plans* (EPA, 2006a); *Guidance for Quality Assurance Project Plans* (EPA, 2002); and *Uniform Federal Policy for Quality Assurance Project Plans* (EPA, 2005). The QAPP will include procedures:

- To ensure that EPA and the State and their authorized representative have reasonable access to laboratories used by the Respondents in implementing the Settlement (Respondents' Labs).
- To ensure that Respondents' Labs analyze all samples submitted by EPA pursuant to the QAPP for QA monitoring.
- To ensure that Respondents' Labs perform all analyses using EPA-accepted methods (i.e., the methods documented in *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*, ILM05.4 (EPA, 2006b); *USEPA Contract Laboratory Program Statement of Work for Organic Analysis*, SOM01.2 (EPA, 2007); and *USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration)*, ISM01.2 (EPA, 2010) or other methods acceptable to EPA.
- To ensure that Respondents' Labs participate in an EPA-accepted QA/QC program or other QA/QC program acceptable to EPA.
- For Respondents to provide EPA and the State with notice at least 14 days prior to any sample collection activity.
- For Respondents to provide split samples and/or duplicate samples to EPA and the State upon request.
- For EPA and the State to take any additional samples that they deem necessary.
- For EPA and the State to provide to Respondents, upon request, split samples and/or duplicate samples in connection with EPA's and the State's oversight sampling.
- For Respondents to submit to EPA and the State all sampling and tests results and other data in connection with the implementation of the Settlement.

7.6.5 Site-Wide Monitoring Plan

A Site-wide monitoring plan will be developed. The plan will be amended as necessary or appropriate to support remedy components as needed and/or as requested by EPA. The objectives of the monitoring plan include the following: gather baseline information regarding the extent of contamination in affected media at the Site; obtain information, through short- and long-term monitoring, about the movement of and changes in contamination throughout the Site, before and during implementation of the RA; gather contamination level data to determine whether PSs are achieved; and obtain information to determine whether to perform additional actions, including further Site monitoring. It is noted that for the River Groundwater remedial component, the monitoring plan will include the clarifying requirement that five years of data following completion of the River NAPL RA and on-shore Barrier Wall RA construction must be collected prior to making a determination whether active off-shore groundwater actions are necessary in addition to natural attenuation.

The monitoring plan will include:

- A description of the environmental media to be monitored.
- A description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, parameters to be monitored and analyzed, and analytical and testing methods employed.
- A description of how performance data will be analyzed, interpreted, and reported, and/or other Site-related requirements.
- A description of verification sampling procedures.
- A description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, and quarterly and annual reports to EPA and State agencies.
- A description of proposed additional monitoring and data collection actions (such as increases in frequency of monitoring, and/or installation of additional monitoring devices in the affected areas) in the event that results from monitoring devices indicate changed conditions (such as higher than expected concentrations of the contaminants of concern or groundwater contaminant plume movement).

7.6.6 Construction Quality Assurance/Quality Control Plan

The purpose of the CQAP is to describe planned and systematic activities that provide confidence that the RA construction will satisfy all plans, specifications, and related requirements, including quality objectives. The purpose of the Construction Quality Control Plan (CQCP) is to describe the activities to verify that RA construction has satisfied all plans, specifications, and related requirements, including quality objectives. Individual CQAP/CQCPs will be developed for the specific remedy components listed in Section 3.2, as appropriate. The individual CQAP/CQCP must:

- Identify, and describe the responsibilities of, the organizations and personnel implementing the CQAP/CQCP.
- Describe the Construction PS required to be met to achieve completion of the RA.
- Describe the activities to be performed: (i) to provide confidence that construction PS will be met; and (ii) to determine whether construction PS have been met.
- Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQAP/CQCP.

- Describe industry standards and technical specifications used in implementing the CQAP/CQCP.
- Describe procedures for tracking construction deficiencies from identification through corrective action.
- Describe procedures for documenting all CQAP/CQCP activities.
- Describe procedures for retention of documents and for final storage of documents.

7.6.7 Transportation and Off-Site Disposal Plan

The TODP describes plans to ensure compliance associated with off-Site shipments. The TODP will include:

- Proposed routes for off-Site shipment of waste material.
- Identification of communities affected by shipment of waste material.
- Description of plans to minimize impacts on affected communities.

Hazardous substances, pollutants, and contaminants and IDW may be shipped from the Site to an off-Site facility for treatment and/or disposal only if the wastes comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, EPA's *Guide to Management of Investigation Derived Waste* (EPA, 1992), and any IDW-specific requirements contained in the ROD (EPA, 2018). Wastes shipped off -Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 CFR § 261.4(e) shipped off Site for TSs are not subject to 40 CFR § 300.440.

It should be noted that during Barrier Wall construction, soil that is removed when constructing the trench for the Barrier Wall may be mixed on Site to form backfill and placed as backfill soil back in the trench or potentially be used to backfill Ponds 1A and/or 2 if backfilling is selected as the pond closure remedy. In addition, extra soil/backfill from Barrier Wall construction and other RA activities, including, but not limited to Pond 1A and 2 Closure, may be placed on Site in an approved staging area(s) identified in the RD. Such soil will not be considered as "generated waste" relative to hazardous wastes regulations under RCRA (40 CFR § 261).

7.6.8 Operation and Maintenance Plan

The Operation and Maintenance Plans describe the requirements for inspecting, operating, and maintaining components of the RA. Draft Operation and Maintenance Plans will be developed in accordance with *Guidance for Management of Superfund Remedies in Post Construction* (EPA, 2017). Separate Operation and Maintenance Plans will be developed for the specific remedy components listed in Section 3.2, as appropriate. The Operation and Maintenance Plan must include the following additional requirements:

- Description of the PSs required to be met to implement the ROD.
- Description of activities to be performed to: (i) provide confidence that PSs will be met; and (ii) determine whether PSs have been met.
- Description of records and reports that will be generated during operation and maintenance, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and quarterly and annual reports to EPA and State agencies.

- Description of corrective action in case of systems failure, including: (i) alternative procedures to prevent the release or threatened release of waste material which may endanger public health and the environment or may cause a failure to achieve PS; (ii) analysis of vulnerability and additional resource requirements should a failure occur; (iii) notification and reporting requirements should operation and maintenance systems fail or be in danger of imminent failure; and (iv) community notification requirements.
- Description of corrective action to be implemented if PSs are not achieved; and a schedule for implementing these corrective actions.

7.6.9 Operation and Maintenance Manual

The Operation and Maintenance Manuals serve as a guide to the purpose and function of the equipment and systems that make up the overall remedy. Draft Operation and Maintenance Manuals will be developed for the specific remedy components listed in Section 3.2, as appropriate, in accordance with *Guidance for Management of Superfund Remedies in Post Construction* (EPA, 2017).

7.6.10 Institutional Controls and Implementation Plan

The ICIAP describes plans to implement, maintain, and enforce the ICs at the Site. The ICIAP will be developed in accordance with *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites* (EPA, 2012a), and *Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites* (EPA, 2012b). The ICIAP will include plans to implement, maintain, and enforce the ICs discussed in Section 3.2.3 and will include the following additional requirements:

- Locations of recorded real property interests (e.g., easements, liens) and resource interests in the property that may affect ICs (e.g., surface, mineral, and water rights) including accurate mapping and GIS coordinates of such interests.
- Legal descriptions and survey maps that are prepared according to current American Land Title Association (ALTA) Survey guidelines and certified by a licensed surveyor.

7.7 Deliverable Specifications

Respondents will submit all deliverables in accordance with the RA schedule (Section 8), as applicable. Specifications for deliverable submittal include the following:

- All deliverables will be submitted to EPA in electronic form. Respondents will provide EPA with paper copies of any maps, drawings, or other exhibits that are larger than 8.5 inches by 11 inches.
- Sampling and monitoring data will be submitted in the EPA Region 4 Electronic Data Deliverable (EDD) format.
- Spatial data, including spatially-referenced data and geospatial data, will be submitted: (1) in the ESRI File Geodatabase format; and (2) as un-projected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions will include the collection method(s). Projected coordinates will be included and documented. Spatial data will be accompanied by metadata, and the metadata will be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification.
- Each file will include an attribute name for each Site unit or sub-unit submitted.

7.8 Approval of Deliverables

After review of any initial deliverable that is required to be submitted for EPA approval under the CD, EPA shall: (i) approve the deliverable in whole or in part; (ii) approve the deliverable based on specified conditions; (iii) disapprove the deliverable in whole or in part; or (iv) approve and/or disapprove the deliverable any combination of the aforementioned options. EPA may modify the initial deliverable to cure deficiencies in the submittal if: (i) EPA determines that disapproving the deliverable and awaiting a resubmission would cause substantial disruption of the RA work; or (ii) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial deliverable under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

Upon receipt of a notice of deliverable disapproval, or if required by a notice of approval upon specified conditions, Respondents shall, within 14 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may: (i) approve the resubmitted deliverable in whole or in part; (ii) approve the resubmitted deliverable upon specified conditions; (iii) modify the resubmitted deliverable; (iv) disapprove the resubmitted deliverable in whole or in part, requiring Respondents to correct the deficiencies; or (v) approve and/or disapprove the deliverable any combination of the aforementioned options.

Upon approval, approval upon conditions, or modification by EPA of any deliverable or any portion thereof: (i) such deliverable, or portion thereof, will be incorporated into and enforceable under the CD; and (ii) Respondents shall take any action required by such deliverable or portion thereof. The implementation of any non-deficient portion of a deliverable submitted or resubmitted does not relieve Respondents of any liability under the CD.

All deliverables that require certification, including RACCRs and RACRs, will be signed by the SC(s)'s PM or other responsible official of the Respondents and will contain the following statement:

> *"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*"

8.0 SCHEDULE

The integrated milestone schedule for the RA will be developed as part of the final RDDs, and will be updated at the beginning of each fiscal year (FY) and submitted to EPA, showing the applicable RA milestones for that FY and projecting out the applicable RA milestones through the following FY. When possible, the construction of remedy components will be performed concurrently to expedite the remedial program schedule. Consideration also will be given to sequencing components, when necessary, so that each RA component is compatible to adjacent or interrelated components and that decisions are made in a logical order.

The RA submittals may vary depending on the preferred contracting method (e.g., design/build) for different components of the RA, as well as key decisions made during the RD. These decisions will consider critical path components and key factors that influence the design and implementation of the remedy components.

9.0 REFERENCES

American Society for Testing and Materials (ASTM). 2016. Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices. D6914/D6914M-16. November.

Battelle. 2019a. Revised Section 4.1, Final Barge Slip Remedy Component Preliminary Design Investigation Work Plan for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. December.

Battelle. 2019b. Final Barge Slip Remedy Component Preliminary Design Investigation Work Plan for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. October.

Battelle. 2019c. Final Remedial Design Work Plan for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. March.

Battelle. 2018a. Revised Final Remedial Investigation Report for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. September.

Battelle. 2018b. Revised Final Remedial Investigation Addendum Report for the B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. September.

Battelle. 2018c. Revised Final Feasibility Study for the B.F, Goodrich Superfund Site, Calvert City, Marshall County, Kentucky. September.

EPA. 2018. Record of Decision, B.F. Goodrich Superfund Site, Calvert City, Marshall County, Kentucky, EPA ID KYD006370167. September.

EPA. 2017. Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105. February.

EPA. 2012a. Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001. December.

EPA. 2012b. Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02. December.

EPA. 2011. Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22. May.

EPA. 2010. USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM01.2. January.

EPA. 2007. USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2. April.

EPA. 2006a. EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003. May.

EPA. 2006b. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4. December.

EPA. 2005. Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A through 900C. March.

EPA. 2002. Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009. December.

EPA. 2001. Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, 540-R-01-007. June.

EPA. 1995. Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059. June.

EPA. 1992. Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS. January.

EPA. 1990. Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001. April.

EPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, EPA/540/G-89/004. October.

USACE. 2013. USACE Engineering and Design Manual 1110-1-1003 for Hydrographic Surveys. November.

USACE. 2007. USACE Engineering and Design Manual 1110-1-1005 for Topographic Surveys. January.

FIGURES

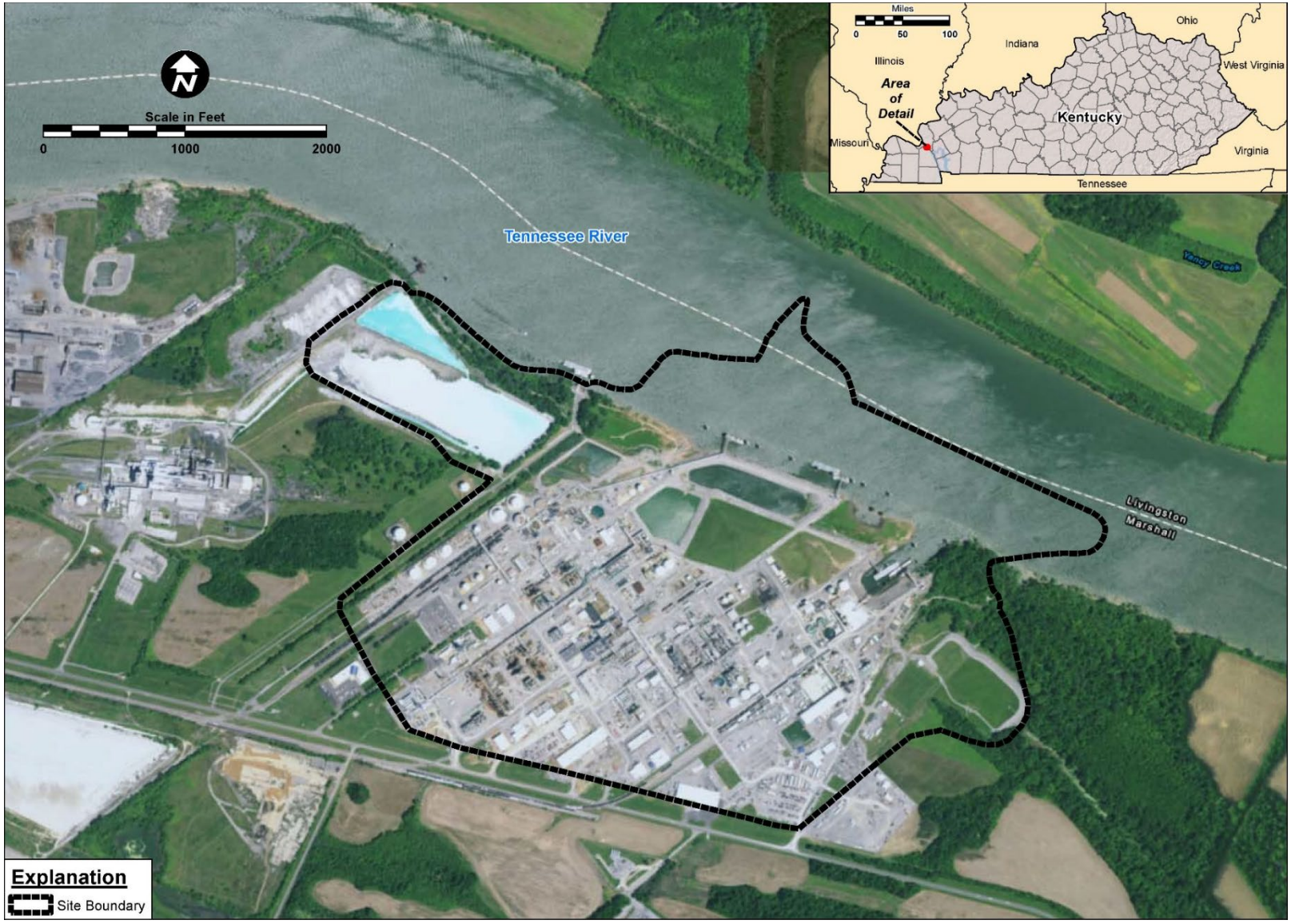

Figure 2-1. Site Location

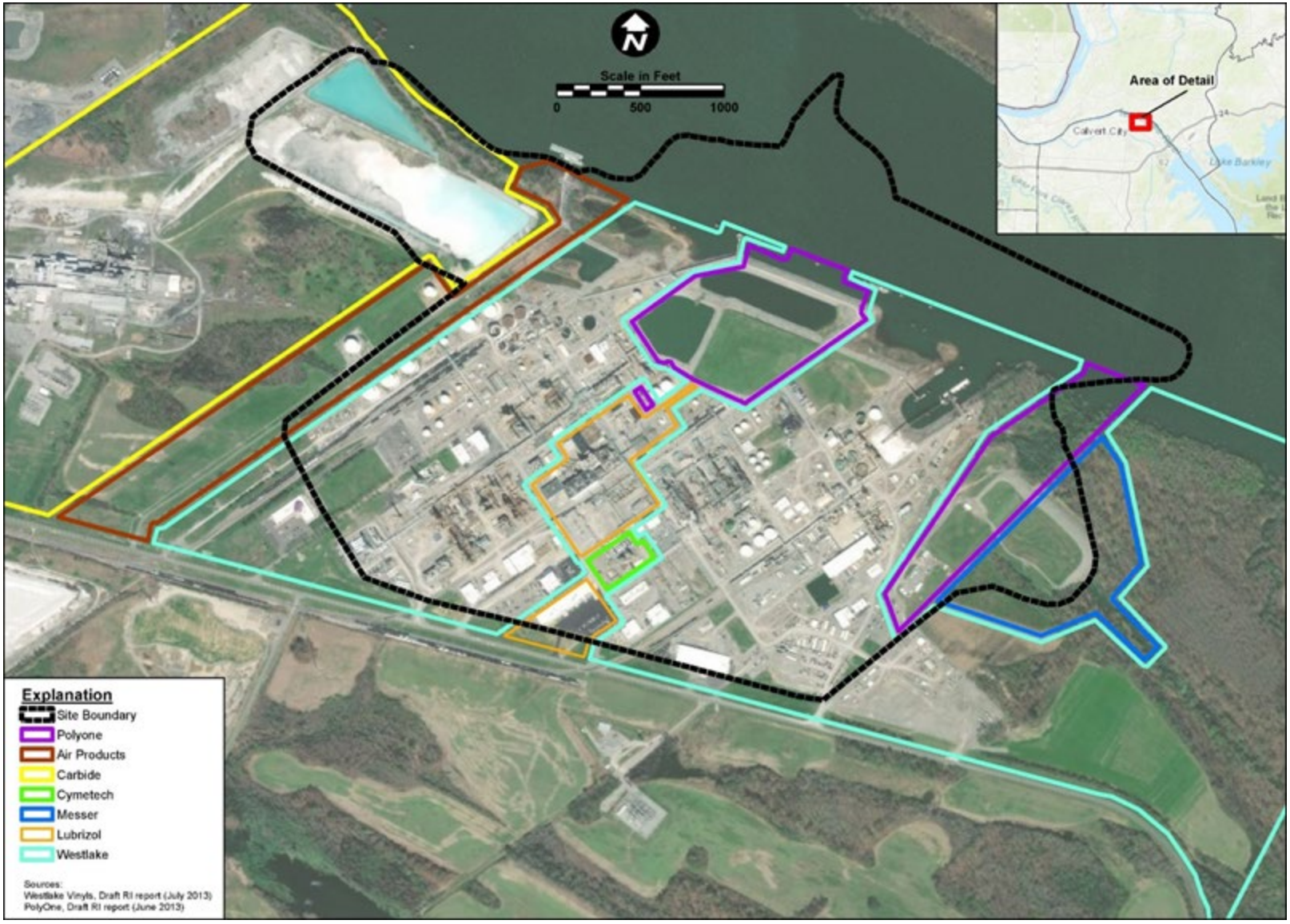

Figure 2-2. Site Map Showing Property Ownership

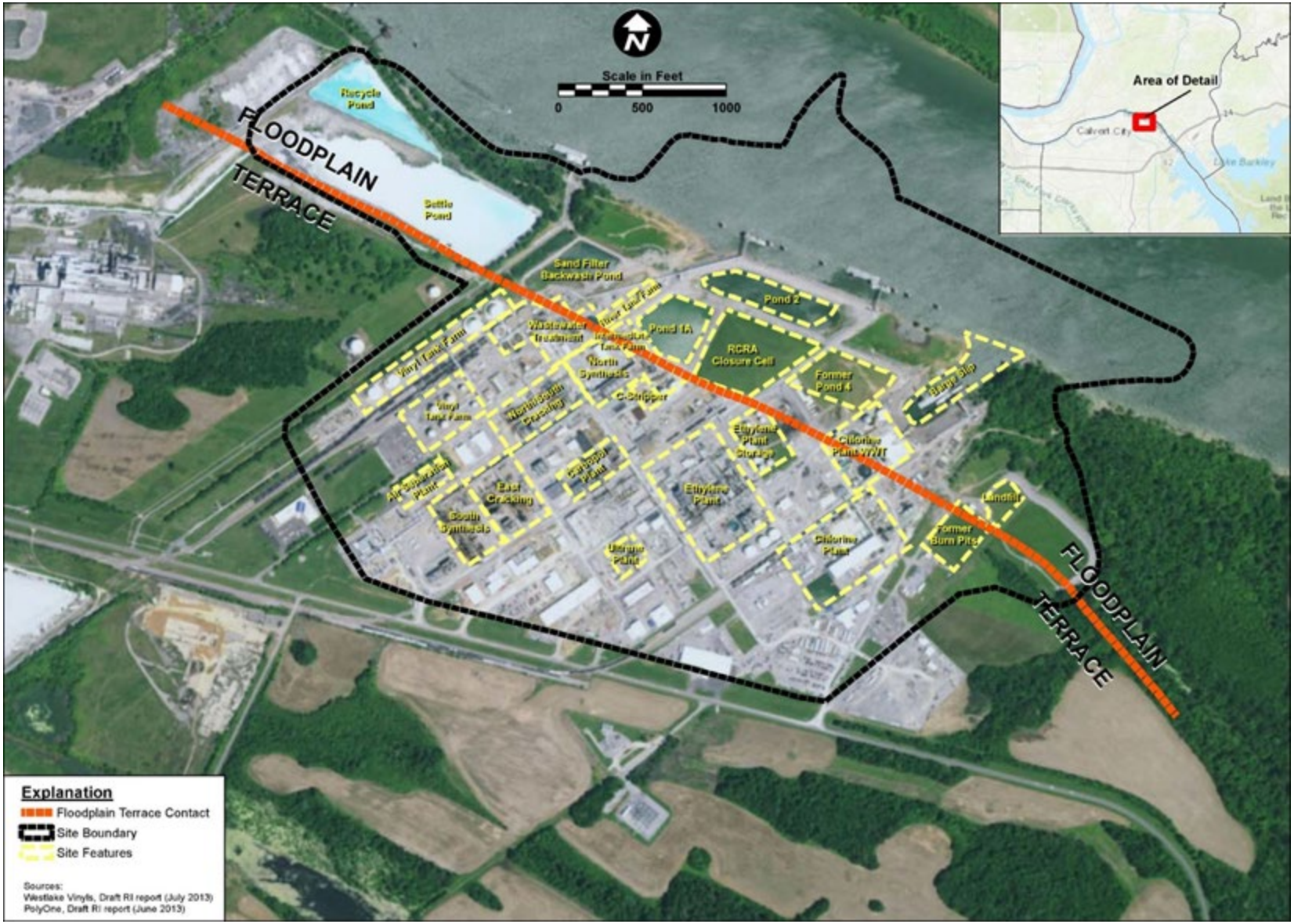

Figure 2-3. Site Map Showing Site Features and Floodplain-Terrace Boundary

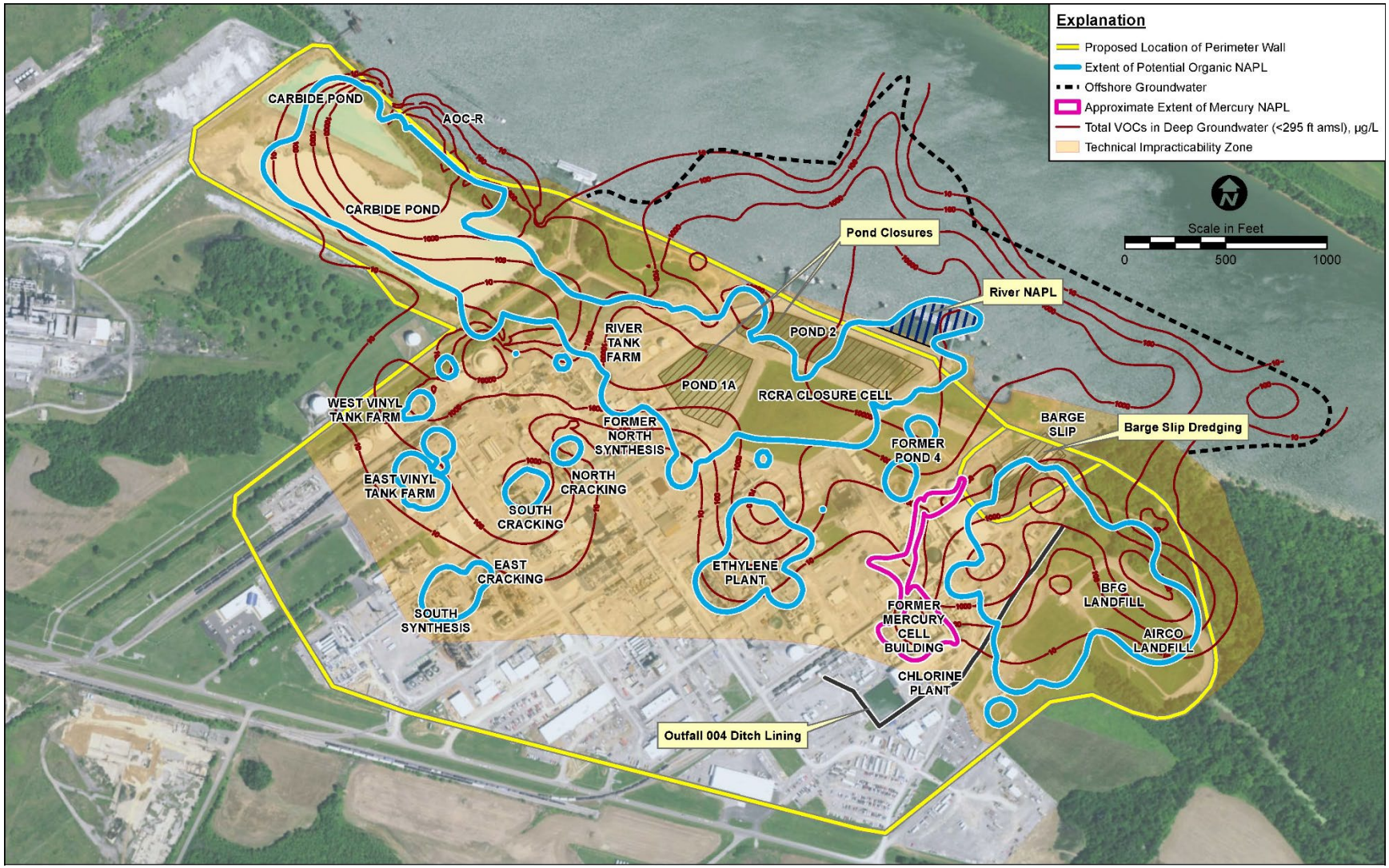

Figure 3-1. Selected Remedy for the B.F. Goodrich Site

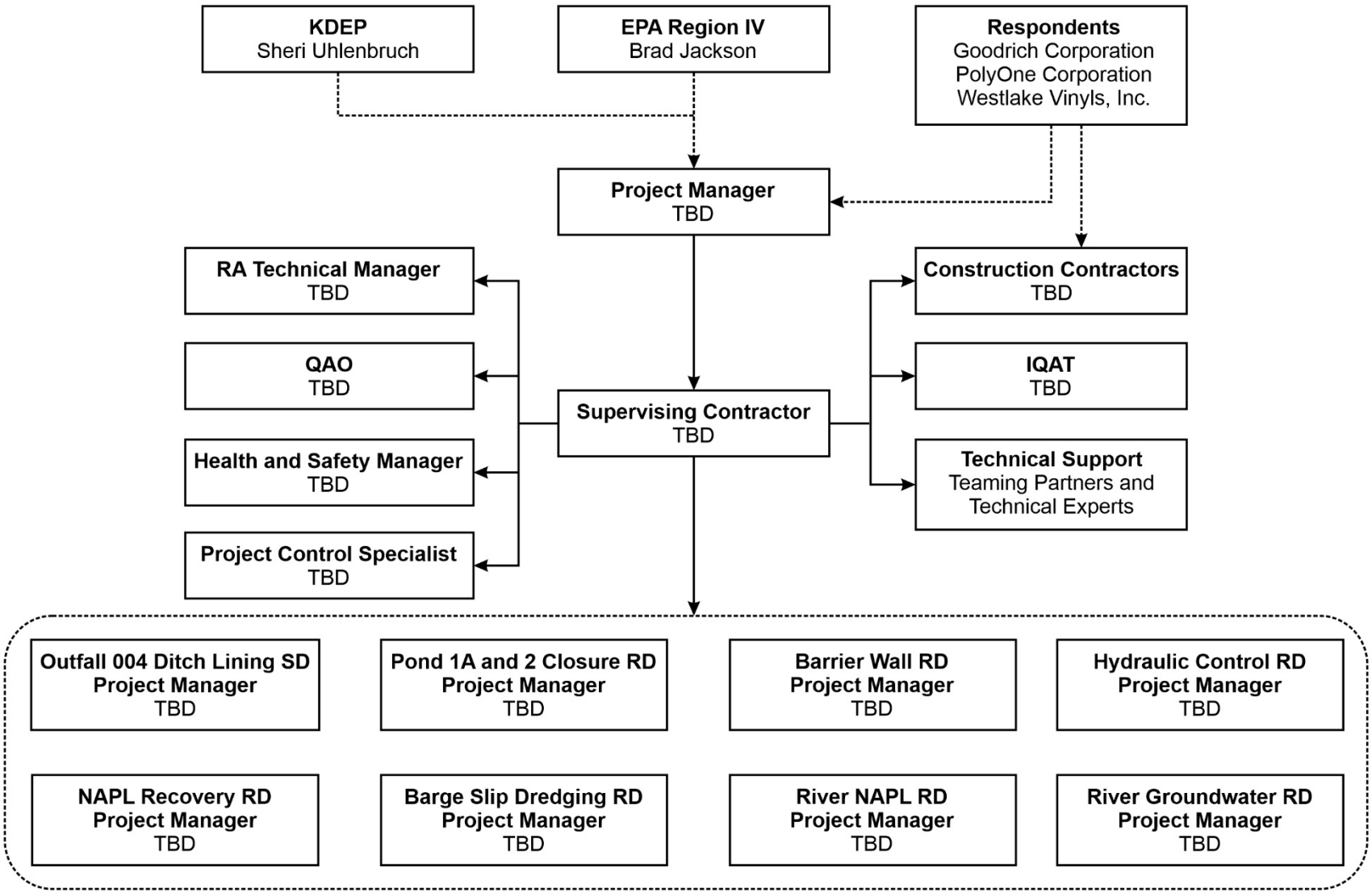

Figure 4-1. Project Organizational Chart

APPENDIX A

TECHNICAL ASSISTANCE PLAN INFORMATION

Respondents Responsibilities for Technical Assistance

If EPA requests, Respondents shall arrange for a qualified community group to receive the services of a technical advisor(s) who can: (i) help group members understand Site cleanup issues (specifically, to interpret and comment on Site related documents developed under this SOW); and (ii) share this information with others in the community. The technical advisor(s) will be independent from the Respondents. Respondents' Technical Assistance Plan (TAP) assistance will be limited to $50,000, unless additional TAP assistance is approved as described below, and will end when EPA issues the Certification of Work Completion. Respondents will implement this requirement under a TAP.

If EPA requests, Respondents shall cooperate with EPA in soliciting interest from community groups regarding a TAP at the Site. If more than one community group expresses an interest in a TAP, Respondents shall cooperate with EPA in encouraging the groups to submit a single, joint application for a TAP.

If EPA requests, Respondents shall, within 30 days, submit a proposed TAP for EPA approval. The TAP will describe the Respondents' plans for the qualified community group to receive independent technical assistance. The TAP will include the following elements:

- For Respondents to arrange for publication of a notice in local media that they have received a Letter of Intent (LOI) to submit an application for a TAP. The notice will explain how other interested groups may also try to combine efforts with the LOI group or submit their own applications, by a reasonable specified deadline;
- For Respondents to review the application(s) received and determine the eligibility of the community group(s). The proposed TAP must include eligibility criteria as follows:
    - A community group is eligible if it is: (a) comprised of people who are affected by the release or threatened release at the Site, and (b) able to demonstrate its ability to adequately and responsibly manage TAP-related responsibilities.
    - A community group is ineligible if it is: (a) a potentially responsible party (PRP) at the Site, represents such a PRP, or receives money or services from a PRP (other than through the TAP); (b) affiliated with a national organization; (c) an academic institution; (d) a political subdivision; (e) a tribal government; or (f) a group established or presently sustained by any of the above ineligible entities; or (g) a group in which any of the above Ineligible entities is represented.
- For Respondents to notify EPA of their determination on eligibility of the applicant group(s) to ensure that the determination is consistent with the Remedial Action Work Plan before notifying the group(s);
- If more than one community group submits a timely application, for Respondents to review each application and evaluate each application based on the following elements:
    - The extent to which the group is representative of those persons affected by the Site; and
    - The effectiveness of the group' s proposed system for managing TAP-related responsibilities, including its plans for working with its technical advisor and for sharing Site-related information with other members of the community.
- For Respondents to document their evaluation of, and their selection of, a qualified community group1 and to brief EPA regarding their evaluation process and choice. EPA may review Respondents' evaluation process to determine whether the process satisfactorily follows the criteria as outlined above. TAP assistance may be awarded to only one qualified group at a time;

- For Respondents to notify applicants about Respondents' decision;
- For Respondents to designate a person (TAP Coordinator) to be the primary contact with the selected community group
- A description of Respondents' plans to implement the requirements of the Agreement with Selected Community Group (see below); and
- For Respondents to submit quarterly progress reports regarding the implementation of the TAP.

Agreement with Selected Community Group

Respondents shall negotiate an agreement with the selected community group that specifies the duties of Respondents and the community group. The agreement will specify the activities that maybe reimbursed under the TAP and the activities that may not be reimbursed under the TAP. The list of allowable activities must be consistent with 40 C.F. R. § 35.40 70 (e .g., obtaining the services of an advisor to help the group understand the nature of the environmental and public health hazards at the Site and the various stages of the response action, and communicating site information to others in the community). The list of non-allowable activities must be consistent with 40 C.F.R. § 35.40 75 (e.g., activities related to litigation or political lobbying).

The agreement will provide that Respondents' review of the Community Group' s recommended choice for Technical Advisor will be limited, consistent with 40 C.F.R. §§ 35.4190 and 35.4195, to criteria such as whether the advisor has relevant knowledge, academic training, and relevant experience as well as the ability to translate technical information in to terms the community can understand.

The agreement will provide that the Community Group is eligible for additional TAP assistance, if it can demonstrate that it has effectively managed its TAP responsibilities to date, and that at least three of the following 10 factors are satisfied:

(i) EPA expects that more than eight years (beginning with the initiation of the RI/FS will pass before construction completion will be achieved;

(ii) EPA requires treatability studies or evaluation of new and innovative technologies;

(iii) EPA reopens the ROD;

(iv) The public health assessment (or related activities) for the Site indicates the need for further health investigations and/or health related activities;

(v) After Respondents' selection of the Community Group for the TAP, EPA designates additional operable units at the Site;

(vi) EPA issues an Explanation of Significant Differences for the ROD;

(vii) After Respondents' selection of the Community Group, a legislative or regulatory change results in significant new Site information;

(viii) Significant public concern about the Site exists, as evidenced, e.g., by relatively large turnout at meetings, the need for multiple meetings, the need for numerous copies of documents to inform community members, etc.

(ix) Any other factor that, in EPA' s judgment, indicates that the Site is unusually complex; or

(x) A RI/FS costing at least $2 million was performed at the Site.

Respondents are entitled to retain any unobligated TAP funds upon EPA's Certification of Work Completion Order. Respondents will submit a draft of the proposed agreement to EPA for its comments.