Proposed Plan
Kerr-McGee Chemical Corp. – Columbus Superfund Site
Lowndes County, Columbus, Mississippi

October 2023

This Proposed Plan is not a technical document. It presents the EPA's preferred alternative for site cleanup.

You Are Invited to Comment on this Proposed Plan for the Kerr-McGee Chemical Corp. – Columbus Superfund Site, Operable Unit 3 (OU3) and Operable Unit 5 (OU5) in Columbus, Mississippi

INTRODUCTION

The U.S. Environmental Protection Agency invites comments on the Preferred Alternative presented in this Proposed Plan for addressing potential unacceptable risks to human health and the environment from the Kerr-McGee Chemical Corp. – Columbus Superfund Site (Site), Operable Unit 3 (OU3) and Operable Unit 5 (OU5) (Figure 1).

To manage the cleanup, the EPA divided the Site into multiple areas, or OUs (Figure 1). This Proposed Plan addresses contamination in OU3 and OU5.

- OU1 is defined as the parts of the Pine Yard with unsaturated contaminated soils with no dense non-aqueous phase liquid (DNAPL). The Pine Yard was used as a wood storage area. The EPA finalized the OU1 ROD in May 2019.
- OU2 is defined as the surface soils contaminated with dioxins/furans at residential and commercial properties surrounding the former facility. The EPA finalized the OU2 ROD in September 2020.
- OU3 addresses soil, DNAPL and groundwater at the Southern Former Main Plant Area and a 3.7-acre parcel south of the main plant area that was purchased by the Greenfield Environmental Multistate Trust, LLC (Multistate Trust) in 2019 (hereafter referred to as the "3.7-Acre Parcel". The Southern Former Main Plant Area was used for the primary wood treatment process operations ("former process area"), for treated wood storage, and includes former surface impoundments. Surface soil and subsurface soil up to 8 feet below ground surface are contaminated and DNAPL groundwater contamination is present in the aquifer up to 25 feet below ground surface. The 3.7-Acre Parcel includes DNAPL recovery trenches, sumps, and conveyance infrastructure of the DNAPL recovery system. OU3 is the subject of this proposed plan.
- OU4 is defined as the parts of the Pine Yard with subsurface contamination or "Pine Yard deep zone" (Figure 2). An access road through OU1 will also be addressed as part of OU4. OU4 will be the subject of a future decision document.

- OU5 addresses soil at the Northern Former Main Plant Area, which was primarily used for wood storage and other operations not directly associated with the wood treatment process. Surface soil is contaminated. OU5 is defined as areas not containing DNAPL.

The EPA also tentatively identifies two operable units to address the remaining areas of the Site that are still under investigation and will be subject of future decision documents.

- OU6 will address remaining groundwater contamination, including in OU3 and OU5, and the restoration of groundwater to beneficial use.
- OU7 will address ecological risks in the wetlands in the northeast portion of the Pine Yard.

The EPA's Preferred Alternative for OU3 and OU5 is Alternative 4: barrier wall isolation of source areas, treatment via phytoremediation, an engineered soil cover, and institutional controls. The EPA expects that this preferred alternative will protect the health of future users, transition from the ongoing groundwater extraction source control to the proposed barrier wall and phytoremediation source control and will enable community-support reuse. This Proposed Plan summarizes and identifies key information from the Remedial Investigation (RI) Report, the Feasibility Study (FS) Report, and other documents in the Site's Administrative Record file. Administrative records for the Site are available at: https://semspub.epa.gov/src/collections/04/AR/MSD990866329.

The EPA, in consultation with the Mississippi Department of Environmental Quality (MDEQ), may modify the proposed remedy presented in this Proposed Plan based on new information or public comments received during the public comment period. Therefore, the public is encouraged to review and comment on the proposed remedy in this Proposed Plan.

The EPA is the lead agency at the Site. The Mississippi Department of Environmental Quality is the support agency. The EPA is issuing this Proposed Plan as part of the EPA's public participation requirements under Section 117 (a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 United States Code Section 9617, known as Superfund, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as set forth in 40 Code of Federal Regulations Section 300.430(f)(2). The EPA will issue its final decision on the selected remedial action in a decision document called a Record of Decision (ROD). The public will be notified of the issuance of the ROD in a local newspaper notice and via the EPA's webpage for the Site: www.epa.gov/superfund/kerr-mcgee-chemical-columbus. The ROD will include a responsiveness summary that summarizes the EPA's responses to any public comments provided on this Proposed Plan.

The EPA will hold a public meeting on October 26, 2023, starting at 6:00 p.m. Central Time / 7:00 p.m. Eastern Time at Genesis Dream Center, 1820 23rd Street North Columbus, MS 39701. At the meeting, EPA will present the Proposed Plan for the OU3 remedy. This meeting will provide an opportunity for the community to ask questions of EPA staff. EPA staff will record questions and answers to assist in the final selection of the remedy and in preparation of a ROD.

The public comment period for the Proposed Plan starts on October 16, 2023 and ends on November 16, 2023. During this 30-day period, the EPA encourages the community to review the Final OU3 and OU5 RI and the Final OU3 and OU5 FS Report. These materials and other site documents are available at the Site's information repository:

Columbus-Lowndes Public Library
314 North Seventh Street
Columbus, Mississippi 39701

The materials are also available online at the EPA's Site Profile Page: www.epa.gov/superfund/kerr-mcgee-chemical-columbus.

The community is encouraged to submit written or emailed comments to the EPA at the following addresses:

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After the public comment period, the EPA will carefully consider all public comments before selecting a final remedy for OU3 and OU5. All comments submitted or postmarked by November 16, 2023 will be addressed in the Responsiveness Summary section of a forthcoming ROD, as will the questions and answers discussed at the public meeting.

SITE BACKGROUND

Site Description and Background

The Site is located at 2300 14th Avenue North in Columbus, Lowndes County, Mississippi (Figure 1). It covers about 90 acres and is generally bounded by U.S. Highway 82 to the north, Moss Street and a railroad right of way to the east, Tuffy Lane to the south, and 21st Street North and 22nd Street North to the west. The Kerr-McGee Chemical Corporation (KMCC) facility is closed. All structures on the former KMCC facility property have been demolished or dismantled, with the exception of the former office and a building that houses the groundwater treatment system. A fence restricts access to the Site. The fence encloses the former KMCC facility property. The former KMCC facility property is owned by the Multistate Trust.

History of Site Operations

The T.J. Moss Tie Company built the wood-treating facility and operated it until 1963. Construction of the facility began in August 1928 and finished in February 1929. KMCC acquired the property in 1963 and continued wood-treating operations until the facility closed in 2003. Manufactured products included railroad wooden cross ties, switch ties and preserved timbers. Preservatives used in the operation included creosote, creosote coal tar solutions and pentachlorophenol (PCP).

During wood-treating operations, untreated lumber was received and sorted at the facility. It was later seasoned, either by natural air drying, which required the wood to be stacked in a drying yard for up to 12 months, or by artificial seasoning using the Boulton process. Wood allowed to dry naturally was stored in the Northern Former Main Plant Area's (OU5) green tie storage areas and in the Pine Yard (OU1). The Boulton drying process involved subjecting green lumber to heated creosote under a vacuum, which boiled the sap water out of the wood. After seasoning, the wood was then pressure-treated in a cylinder, or retort, in the Southern Former Main Plant Area (OU3). The pressure-treating process involved filling a cylinder with a treating solution (e.g., creosote or PCP) and applying pressure to force the treating solution into the wood. Treated wood was taken out of the retort chamber by rail for drying. Prior to construction of a concrete drip track in 1988, excess preservative was allowed to drip onto bare soil before the treated wood was moved to other locations at the former KMCC facility for storage prior to shipment off site. The concrete drip track was constructed in 1988 to capture the excess wood treating chemicals.

Historically, the primary wood-treating process operations, primary treated wood storage areas and surface impoundments were all in OU3. These wood treating processes resulted in the release of RCRA listed hazardous wastes F032 (PCP-based) and F034 (creosote-based) which includes wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote and PCP formulations. Soil and DNAPL in certain areas within OU3 contaminated with the RCRA constituents from F032 and/or F034 would be viewed as containing RCRA wastes F032/F034 unless determined by EPA to "no longer contain" per its policy.

The Northern Former Main Plant Area, addressed as part of OU5, was used for wood storage and operations not directly associated with the wood-treating process and thus contaminated soil is not expected to contain these RCRA listed hazardous wastes.

In 2003, the volume of wood storage was reduced significantly. By 2004, no wood storage or manufacturing activities were on site, as indicated by aerial photographs. Structures were visible on site through at least 2007. All above-grade structures, other than the current office and operation and maintenance buildings, appeared to have been demolished by 2010.

Previous Investigations and Response Actions

Previous Response Actions

Since 1986, remedial and removal actions have been completed at the Site. A brief summary of these actions is below:

- 1986: Surface Impoundment Closure – surface impoundments, identified as "Aeration Impoundment" and "Sedimentation Impoundment" – were operated under Resource Conservation and Recovery Act (RCRA) Interim Status Standards until closure finished in 1986. The bottom sediment sludge associated with the impoundments was a K001 RCRA-listed hazardous waste.

- 1990 to Present: A groundwater extraction and treatment and DNAPL recovery system operates at the Former Main Plant Area.
- 2005: Ditch Sediment Removal – interim measures removed sediment impacted by polycyclic aromatic hydrocarbons (PAHs) in the ditch system along the eastern site boundary.
- 2006 to 2007: Ditch Sediment Removal – impacted soil was found during a municipal drainage improvement project that began at Propst Park, about 2,200 feet southeast of the Site, at the eastern end of 7th Avenue North.
- 2010 to 2011: Hunt School Removal Action – removal evaluations and actions were conducted by Tetra Tech on behalf of the EPA from October 2010 to May 2011. Removal actions were conducted to address PAHs at Hunt Intermediate School, at a residential property and at Maranatha Faith Center.
- The EPA finalized the Site's listing on the Superfund National Priorities List in September 2011. All operations and maintenance (O&M) activities, compliance monitoring, and inspections of the closed surface impoundments and the groundwater extraction and treatment system are now subject to applicable CERCLA requirements.
- 2014 to 2015: 14th Avenue Ditch Improvement Project – the Multistate Trust performed the excavation necessary to construct the new 14th Avenue North ditch and provide a clean work area for the City of Columbus to construct a new concrete-lined drainageway.
- 2016: Residential Yard Removal – soil was removed from the backyard of the residential property at 2614 17th Avenue North where benzo(a)pyrene concentrations exceeded regional residential removal management levels.
- 2016: 7th Avenue North Storm Drainage Ditch Removal Action – this removal action to address PAH-contaminated ditch sediments and soils was implemented along the north side of 7th Avenue North, between the Maranatha Faith Center and North 28th Street.
- 2018 to 2022: The OU1 remedial action to make a portion of the Pine Yard available for community-supported redevelopment in as timely a manner as possible was completed in 2021. The EPA issued the ROD for OU1 in May 2019, selecting a soil excavation and institutional controls remedy, and approved the Operable Unit 1 remedial action completion report and addendum in April 2022.
- 2020 to 2021: Stormwater Ditch Removal Action – this removal action to address PAH-contaminated ditch sediments in the Southeastern Ditch was implemented between Moss Street and Waterworks Street. The EPA issued the Time Critical Removal Action Memorandum in December 2019 and approved the removal action completion report in 2022.
- 2020 to present: The OU2 remedial action to address privately-and State-owned residential and commercial properties in the vicinity of the former KMCC facility with surface soils (up to 2 feet below ground surface (ft bgs)) that exceed cleanup levels for dioxins and furans is substantially complete. The EPA issued the ROD for OU2 in September 2020.

History of Site Investigations and Enforcement Activity

This section summarizes the Site's regulatory history:

- KMCC submitted a RCRA Part A permit application in 1981 that notified the EPA of the presence of solid waste management units (SWMUs), including two hazardous waste surface impoundments containing RCRA-listed hazardous waste (K001).

- In 1989, KMCC entered into a Consent Order with the Mississippi Commission on Environmental Quality that required completion of a groundwater assessment and submittal of an addendum to the previously submitted RCRA Part B permit application.
- A State of Mississippi Hazardous Waste Management Permit (permit HW-90-329-01) was issued to KMCC in September 1990. The permit identified 15 SWMUs and areas of concern that required a RCRA facility investigation. The permit expired in September 2000. The permit was renewed effective June 2001, for a term of 10 years. The permit expired again in May 2011 and was not reissued.
- The EPA issued the hazardous and solid waste amendments (HSWA) part of the RCRA permit to KMCC in August 1995. The HSWA part required that the facility investigate releases of hazardous waste or hazardous constituents and take appropriate corrective action for such releases. The HSWA part of the permit expired in August 2005. KMCC submitted a letter to the EPA in April 2005 requesting renewal of the HSWA part of the RCRA permit. In June 2019, the EPA approved a request to terminate the permit as a Class 1 modification given the active and long-term oversight of the investigation and associated cleanup by the Superfund Program.
- Permit HW-90-329-01 transferred to Tronox in 2005 and then to Greenfield Environmental Multistate Trust, LLC, not individually but solely in its representative capacity as Trustee of the Multistate Environmental Response Trust, in February 2011. As noted previously, this permit expired in May 2011 and was not reissued.

Public Participation Activities Prior to Issuance of the Proposed Plan

The EPA has updated the public on the Sitewide RI Reports, the OU3 and OU5 FS Report, and other Superfund actions through community notification flyers, presentations and updates in accordance with the EPA's Community Involvement Plan for the Site, available at: https://semspub.epa.gov/work/04/11114976.pdf.

The EPA has also updated the Site's profile page to provide information to the community (www.epa.gov/superfund/kerr-mcgee-chemical-columbus).

To ensure the community's concerns are being addressed, a public comment period for the OU3 and OU5 Proposed Plan will be held from October 16, 2023 to November 16, 2023. The EPA will sponsor a public meeting where you will be able to share your opinions and ask questions about the proposed cleanup.

SITE CHARACTERISTICS

Physical Characteristics

The former KMCC facility property is owned by the Multistate Trust. It is zoned for mixed industrial/commercial use. Upon completion of remedial actions, the Multistate Trust intends to make the Pine Yard and Former Main Plant Area available for community-supported redevelopment.

The Site is relatively flat. As a result, much of stormwater associated with the Site infiltrates into the ground surface. The surface water drainage patterns at the former KMCC facility changed when structures were demolished, and the area was regraded. Today, some stormwater may drain from localized areas of the Former Main Plant Area to ditches along the northern, southern and eastern boundaries of the Former Main Plant Area.

Site Hydrogeology

The Site is underlain by two Class IIB primary water-bearing units, the alluvial aquifer and the Eutaw Formation (Figure 3). The shallowest water-bearing unit is the alluvial aquifer, with depth to groundwater typically between about 3 feet and 8 feet below ground surface in wells in OU3 and OU5. The groundwater flow direction in the alluvial aquifer is southeasterly. Pumping of recovery trenches in the Southern Former Main Plant Area (OU3) locally affects groundwater flow direction in the alluvial aquifer, as discussed below.

The alluvial aquifer is underlain by the Upper Eutaw Formation, which consists primarily of fine silty sand that is less permeable than the alluvial aquifer. A lower relative hydraulic conductivity of the Upper Eutaw Formation limits vertical migration of site contaminants (DNAPL and dissolved-phase contaminants) from the alluvial aquifer to the Upper Eutaw Formation. The groundwater flow direction of the Upper Eutaw Formation is to the southeast.

Potable water is supplied by Columbus Light & Water via four public water supply wells. The wells are located about 200 feet to 750 feet east of the Pine Yard. These wells are completed within the Coker Formation, more than 800 feet below ground surface. Site-related groundwater contamination is limited to the shallow aquifer. KMCC facility operations did not affect the water supply wells.

A groundwater and DNAPL recovery system is present in the Southern Former Main Plant Area (OU3) (Figure 4). The recovery system, installed by KMCC, involves:

- Removal of groundwater via level-activated pumps installed in recovery wells and in sumps connected to recovery trenches.
- Treatment of groundwater through physical separation of DNAPL.
- Discharge of the separated groundwater stream to the Columbus Light & Water sanitary sewer system for secondary treatment at the wastewater treatment plant.
- Storage and disposal of recovered DNAPL.

The recovery system, as originally constructed in 1990, included 12 recovery wells (RW1–RW7 and RW9–RW13) and three recovery trenches (Trench 1a, Trench 1b and Trench 2). Groundwater and DNAPL is pumped to a pipeline that conveys the stream to the groundwater treatment building. Treated groundwater is then discharged to the sanitary sewer system, pursuant to Mississippi Wastewater Discharge Permit #MSP090021. The separated DNAPL is stored in a tank before being taken to an off-site facility for disposal.

The full recovery system (i.e., all 12 wells and three recovery trenches and sumps) operated until 2003, when it was modified to include pumping from 10 of the recovery wells. Based on a system evaluation, the recovery system operation was further modified to pumping from wells RW11 and RW12 to provide hydraulic control at the southeast end of the former KMCC facility and pumping of Trenches 1a and 1b via sumps MH1 and MH2 to provide DNAPL recovery and hydraulic control in the vicinity of the former process area where the largest DNAPL impacts are located.

The system was temporarily shut down in June and July 2020 due to leaks and the poor condition of aging conveyance piping. In order to prevent future leaks, an interim, above-ground conveyance system was constructed that conveys extracted groundwater from MH1 and MH2 (Trenches 1a and 1b) to the groundwater treatment building. Extraction from wells RW-11 and RW-12 was discontinued at this time in accordance with the approved work plan. The groundwater extraction system was reactivated in August 2021. Through October 2022, pumping from sumps MH1 and MH2 produced about 23 gallons per minute (compared to an estimated 36 gallons per minute when all 12 recovery wells were in use).

From December 2003 to August 2009, available records from KMCC suggest the system extracted 92.6 million gallons of groundwater and recovered 19,000 gallons of DNAPL. From October 2018 to October 2019, the system generated 2,500 gallons of DNAPL per 11.8 million gallons of water. These data indicate a very low DNAPL recovery efficiency – 0.0002 gallon of DNAPL per gallon of groundwater.

Nature and Extent of OU3 and OU5 Contamination

The historical operations and waste management activities that were potential sources of contamination to site media include:

- The wood-treating-related processes in the Southern Former Main Plant Area (OU3) that included, but were not limited to, retorts, sumps, drip collection tanks, work tanks and a drip track/pad.
- The tank farm in the Southern Former Main Plant Area (OU3) that included storage tanks, sap tank, vapor tank and sump, and sumps associated with chemical unloading.
- The creosote recovery and wastewater treatment systems, including the primary and secondary oil-water separators.
- The surface impoundments (which have been remediated) in the western part of the Former Main Plant Area.
- Based on anecdotal reports from former plant employees, a fire prior to the shutdown in KMCC operations, reportedly destroyed a building in the Former Main Plant Area known to have stored PCP. Smoke and debris from the fire may have contributed to a release of dioxins and furans to the air.

Multiple investigations and groundwater monitoring events have been completed at the Site since 1988. The distribution of contaminants of concern (COCs) in soils and groundwater across the Former Main Plant Area reflect the history of wood-treating operations and waste management activities, which is summarized below:

- In 2017, a backhoe dug trenches (or “potholes”) to a depth of 4 feet to 8 feet below ground surface on transects throughout the Former Main Plant Area. Visibly impacted soils (e.g., dried creosote, stained soils, debris) were present in potholes across much of the Southern Former Main Plant Area (OU3), but largely absent in the Northern Former Main Plant Area (OU5).
- COC concentrations more frequently exceed risk-based thresholds in surface and subsurface soil samples (1996 to 2019) collected from the Southern Former Main Plant Area (OU3) than from

the Northern Former Main Plant Area (OU5).

- Soil borings (2015 to 2019), TarGOST borings (2016) and monitoring well observations indicate that DNAPL and related contamination is present in subsurface soils in the Southern Former Main Plant Area (OU3), but is largely absent in the Northern Former Main Plant Area (OU5). The DNAPL-related contamination in OU3 is concentrated in the vicinity of the former process area. Observations of DNAPL-related contamination east and south of the former process area are more scattered and less frequent.
- Groundwater contamination exceeds maximum contaminant levels, Region 4 tap water regional screening levels and/or vapor intrusion screening levels in the shallow alluvial aquifer groundwater. Naphthalene is the groundwater contaminant that poses the most potential risk. Groundwater exceedances are more widespread in the Southern Former Main Plant Area (OU3), and less common in the Northern Former Plant Area (OU5).

Soils (OU3 and OU5)

Consistent with the location of former operations at the Site, visible evidence of creosote-related impacts was recorded during the 2017 trenching investigation across much of the Southern Former Main Plant Area (OU3) but was largely absent in the Northern Former Main Plant Area (OU5). The creosote-related impacts and stained soils in OU3 were observed where wood-treating operations, drip tracks, and treatment solution storage tanks were located. Creosote was observed in unsaturated soil typically as dried, asphalt-like materials. Debris (e.g., treated wood timbers) is frequently present at shallow depths.

Soil samples were collected from OU3 and OU5 during sampling investigations performed by KMCC and the Multistate Trust between August 1996 and April 2019. The data show a distribution of COCs in the Former Main Plant Area that is consistent with the observations from the 2017 trenching study, with higher COC concentrations in OU3 soils than in OU5 soils.

The EPA considers the remaining mobile DNAPL and residual DNAPL in the OU3 primary source area and the OU3 secondary source area to pose a principal threat. The EPA considers the OU3 contaminated soils outside of the source areas and the OU5 DNAPL-related impacts to be a relatively low-level threat.

DNAPL (OU3 only)

RI soil boring and TarGOST investigations in 2017 found DNAPL and related contamination (e.g., stained soils, isolated observations of residualized DNAPL) below the groundwater table beneath much of OU3. Two general DNAPL source areas were identified in OU3 based on the observed distribution of DNAPL-related impacts – the primary source area and the secondary source area:

- Primary Source Area: The majority of the DNAPL-related impacts are on the southwest side of OU3 in the alluvial aquifer beneath the former process area and the 3.7-acre parcel. DNAPL-related impacts are most frequently observed beneath the former process area and occur discontinuously across the full thickness of the alluvial aquifer. The groundwater extraction system wells and trenches are in the primary source area. At present, there is no evidence of a significant contiguous pool of DNAPL. The 3.7-acre parcel was not used for site operations, and there is no evidence of DNAPL-related impacts in overlying soils. DNAPL-related impacts beneath the 3.7-acre parcel are observed primarily at depth in the alluvium aquifer. As a result, the DNAPL-related impacts at depth in the 3.7-acre parcel are likely the result of historical southerly migration of DNAPL at depth from the former process area. Collectively, discontinuous DNAPL-related impacts were observed across an estimated 269,400 cubic yards of soil in the primary source area.

- Secondary Source Area: DNAPL-related contamination was also observed in soil and TarGOST borings east of the former process area and the primary source area. These DNAPL-related impacts are more limited than the impacts observed in the primary source area, occurring as isolated pockets of stained soils and residualized DNAPL. The secondary source area spans an estimated area of 5.5 acres and encompasses a total volume of 221,800 cubic yards of alluvial soils.

Groundwater

Groundwater contamination in OU3 and OU5 is present mostly in the immediate vicinity of the subsurface DNAPL impacts. Figure 5 shows the groundwater plume levels in the shallow alluvial aquifer. The influence of the groundwater recovery system both in removing DNAPL source material and extracting groundwater is responsible for the current distribution of contamination in the aquifer. The mobility of COCs in groundwater is also limited due to the chemical characteristics of the COCs (e.g., low solubility, high partitioning coefficients). Groundwater contamination under OU3 and OU5 will be addressed by a future decision document for OU6 with the goal of restoration of groundwater to beneficial use.

Scope and Role of Proposed OU3 and OU5 Remedies

Due to its size and complexity, the EPA divided the Site into OUs.

- OU1: Pine Yard unsaturated contaminated soils. The OU1 cleanup was conducted pursuant to the Site's 2019 OU1 ROD. The remedial action was substantially completed in 2022, with the exception of the contamination underneath an access road that leads to OU4. The EPA has decided to address this area as a part of OU4 cleanup.
- OU2: Residential/commercial properties with site-related contamination above cleanup levels. The remedial action is ongoing pursuant to the Site's 2020 ROD.
- OU3: Soil, DNAPL and groundwater at the Southern Former Main Plant Area and a 3.7-acre parcel that contain soil contamination and DNAPL in the aquifer. This proposed plan addresses OU3.
- OU4: The area of the Pine Yard where deeper contamination is present and where the access road through OU1 is present.
- OU5: Soil at the Northern Former Main Plant Area, outside of the process area, which does not contain DNAPL contamination. This proposed plan addresses OU5.
- OU6: Groundwater contamination and the restoration of groundwater to beneficial use (including vapor intrusion from groundwater).
- OU7: Wetlands in the northeast portion of the Pine Yard.

The EPA's Site strategy has been to address immediate cleanup needs by reducing exposure pathways to nearby residents with removal or remedial actions and to use an operable unit strategy to work from the simplest to the most complex challenges at the site. The OU3 and OU5 cleanup follows actions to address exposure in residential yards (OU2) and addressing the soil-only contamination in OU1. After the OU3 and OU5 cleanup, most of the acreage impacted by the Site will be addressed and suitable for productive reuse. The overall cleanup strategy for OU3 and OU5 is to control the source of groundwater contamination (DNAPL below the water table) and to prevent human exposure to contaminated soils. The OU5 remedy is an interim remedy. The source control will support the eventual restoration of groundwater to its beneficial use as a potential source of drinking water, which will be the subject of a future OU6 cleanup decision.

The OU3 and OU5 cleanup strategy supports the overall Site enforcement strategy and will likely be one of the final actions taken by the Multistate Trust before the remainder of the Site becomes "Fund-lead," with investigation and cleanup of OU4, OU6, and OU7 performed using government funds.

Principal Threats

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)), to use engineering controls for waste that poses a relatively low long-term threat (NCP Section 300.430(a)(1)(iii)(B)), and in appropriate site situations, treatment of the principal threats will be combined with engineering controls (such as containment) and institutional controls, as appropriate, for treatment residuals and untreated waste (NCP Section 300.430(a)(1)(iii)(C)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds and highly mobile materials. Containment remedies may be considered for principal threat waste that is relatively immobile and where containment has been demonstrated to be successful in isolating the principal threat waste and preventing releases of COCs into media. Source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Under the EPA's 1991 guidance, "A Guide to Principal Threat and Low-Level Threat Wastes," DNAPL floating on or under groundwater is generally considered to constitute a principal threat.

The EPA considers the remaining mobile DNAPL and residual DNAPL in the OU3 primary source area and the OU3 secondary source area to pose a principal threat. The DNAPL in the OU3 primary source area and the OU3 secondary source is a continuing source of groundwater contamination and is highly toxic should human exposure occur. The EPA considers the OU3 contaminated soils outside of the source areas and the OU5 DNAPL-related impacts to pose a relatively low level threat.

At this Site, more than 46,000 gallons of DNAPL and more than 92.6 million gallons of groundwater were removed from the aquifer by the groundwater extraction system since 1991. The operation of the extraction system constituted treatment to permanently and significantly reduce the volume and mobility of DNAPL at the Site. This proposed remedy complements the previous removal of DNAPL because the reduction in volume and mobility makes source control easier to implement.

While the proposed remedy does not include treatment of remaining principal threats as a major component, the Feasibility Study did evaluate a range of alternatives, including alternatives that rely on treatment to address remaining principal threats, alternatives that combine treatment and engineering controls, and alternatives that rely mostly on engineering controls. Mobile and residual DNAPL occurs discontinuously across the full thickness of the alluvial aquifer in the primary source area. Residual DNAPL also occurs in isolated pockets within the secondary source area. Containment rather than treatment is the preferred alternative for this principal threat waste because the large volume of soil (490,000 cubic yards) and the discontinuous nature of DNAPL contamination.

SUMMARY OF OU3 AND OU5 RISKS

The Multistate Trust conducted risk assessments to evaluate the potential human health and ecological risks from exposure to chemicals detected at OU3 and OU5. The August 2018 Human Health Risk Assessment (2018 HHRA) evaluated current exposure to trespassers and potential exposure to residents, indoor workers, outdoor workers, and construction workers. The 2018 HHRA considered all soil data collected at the Site through 2017. Additional soils data were collected in 2019 to refine the 2018 HHRA. The OU3 and OU5 FS Report presents the 2019 results and incorporates them with the results of the 2018 HHRA. Figure 6 presents a conceptual site exposure model summarizing potential exposure pathways to soils for these receptors. The 2018 HHRA evaluated exposures to surface (0 feet to 2 feet below ground surface) and subsurface soils (2 feet to 8 feet below ground surface) separately to inform site management decisions for soils from these two depth intervals more clearly. No ecological habitat was identified in OU3 or OU5.

Contaminants of Concern for OU3 and OU5 (Based on Industrial/Commercial Land Use)

Soil COCs for OU3 include:

- arsenic
- benzo(a)anthracene
- benzo(a)pyrene
- benzo(b)fluoranthene
- naphthalene
- carbazole
- pentachlorophenol
- dibenzofuran
- dioxin

Soil COCs for OU5 include:

- benzo(a)pyrene

Reasonably Anticipated Future Land Use in OU3 and OU5

The land uses around OU3 and OU5 are residential to the north and west, industrial to the south, and to the east is a railroad with residential neighborhood further east. Based on the Site's current redevelopment plan, input from the community, and input from local government, the EPA has determined that industrial/commercial land use and recreational uses such as walking trails are the reasonably anticipated future uses for OU3 and OU5. The risk assessment evaluates industrial/commercial exposure assumptions and does not evaluate specific recreational use scenarios because the anticipated recreational use scenarios, such as walking trails, result in less exposure than an industrial/commercial scenario.

Human Health Risk Assessment

The human health risk assessment process evaluates both cancer risk and noncancer risk for the soil COCs for residential, industrial/commercial, and construction exposure pathways. The likelihood of cancer resulting from a Superfund site exposure is generally expressed as an upper bound probability, for example, a "1 in 10,000 chance," also expressed as 1×10^{-4}. For noncancer health effects, a hazard index (HI) – a ratio of estimated exposure to an exposure unlikely to cause harm – is calculated. Under CERCLA, potential risk to human health is considered unacceptable if the excess lifetime cancer risk (ELCR) is greater than 1×10^{-4} or if the noncancer HI is greater than 1.0.

OU3 (Southern Former Main Plant Area) Soils

The OU3 and OU5 FS Report summarizes the results from the 2018 HHRA, updated with data from 2019 sampling. In OU3, there are unacceptable risks for residents, outdoor workers, and construction workers from exposure to OU3 surface soils contaminated with the OU3 COCs (arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, naphthalene, carbazole, pentachlorophenol, dibenzofuran, and dioxin). Risk levels and hazard indexes are summarized below.

Risk Levels and Hazard Indexes for OU3 (Southern Former Main Plant Area) Soils (from OU3 and OU5 FS Report)

Receptor	Excess Lifetime Cancer Risk	Noncancer HI
Resident	2×10^{-3}	50
Outdoor Worker	2×10^{-4}	4
Indoor Worker	1×10^{-4}	1
Construction Worker (Surface)	3×10^{-5}	10
Construction Worker (Subsurface)	4×10^{-5}	10
Trespasser	4×10^{-5}	1

Note: For the resident, the noncancer HI for the child, which is higher than that for the adult, is shown.

OU5 Soils

The OU3 and OU5 FS Report summarizes the results from the 2018 HHRA, updated with data from 2019 sampling. In OU5, there is unacceptable risk to future residents and to construction workers from exposure to OU5 surface soils. There is no unacceptable risk to indoor workers, outdoor workers, or trespassers due to exposure to surface soils and no unacceptable risk to construction workers from exposure to subsurface soils. Based on the EPA's assumption of industrial/commercial land use, the only COC is benzo(a)pyrene in OU5. Risk levels and hazard indexes from the OU3 and OU5 FS Report are summarized below.

There is some uncertainty in the risk assessment for OU5. The distribution of contamination in OU5 is sporadic, and there are a small number of locations that create the potential unacceptable risk to construction workers. Figure 7 shows where benzo(a)pyrene exceeds the proposed cleanup level of 24 mg/kg in OU5. Because contamination in OU5 is spread across the 18-acre operable unit, it is possible that specific site reuse plans may not pose an unacceptable risk, depending on the location and nature of construction activities. Once a future landowner proposes specific reuse plans, the EPA will revisit the OU5 risk assessment to reduce the uncertainty in the human health risk assessment for OU5.

Risk Levels and Hazard Indexes for OU5 (Northern Former Main Plant Area) Soils (from OU3 and OU5 FS Report)

Exposure Medium and Receptor	Excess Lifetime Cancer Risk	Noncancer HI
Surface Soil		
Resident	7×10^{-4}	6
Indoor Worker	2×10^{-5}	0.2
Outdoor Worker	4×10^{-5}	0.5
Construction Worker	6×10^{-6}	3
Trespasser	1×10^{-5}	0.1
Subsurface Soil		
Construction Worker	2×10^{-6}	1

Note: For the resident, the noncancer HI for the child, which is higher than that for the adult, is shown.

Basis for Taking Action

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAOs) describe what the proposed cleanup is expected to accomplish in order to be protective of human health and the environment. RAOs specify the contaminated media, exposure pathways, receptors to be protected, and cleanup levels to be achieved. Cleanup levels are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific, risk-based levels. RAOs serve as the design basis for the remedial alternatives summarized in the next section.

The following RAOs were developed for the evaluation of a range of alternatives in the OU3 and OU5 FS Report. More detailed RAOs specific to the preferred alternative are discussed in the preferred alternative section.

- RAO 1: Reduce or eliminate exposure of potential future construction workers to OU5 surface soils with COC concentrations above the benzo[a]pyrene proposed cleanup level via inhalation, incidental ingestion, and/or dermal adsorption pathways.
- RAO 2: Reduce or eliminate exposure of potential future industrial, commercial, or construction workers to OU3 soils with COC concentrations above the OU3 proposed cleanup levels via inhalation, incidental ingestion, and/or dermal adsorption pathways.
- RAO 3: Prevent/minimize the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust.
- RAO 4: Minimize the migration of COCs from source material through removal, treatment, and/or containment to improve groundwater quality outside of OU3 and OU5 over time.

Groundwater restoration is not an objective for this OU3 and OU5 proposed remedy, but this proposed source control remedial action will improve groundwater quality and will contribute to the eventual restoration of groundwater contaminated by the Site, which will be the subject of a future remedy and provided in a separate proposed plan.

Proposed Cleanup Levels

Preliminary Remediation Goals (PRGs) are developed during the RI/FS and are based on chemical-specific ARARs and other readily available information, or risk-based concentrations associated with 10^{-6} cancer risk or a hazard quotient equal to one for non-carcinogens calculated from the EPA toxicity information. Initial PRGs may also be modified based on exposure, uncertainty, and technical feasibility factors. As data are gathered during the RI/ FS, PRGs are refined into final contaminant-specific cleanup levels.

The anticipated future land use for OU3 and OU5 is industrial/commercial or recreational/open area. The FS assumed that recreational uses would only include those that that result in less exposure than an industrial/commercial land use, so the PRGs are not protective for all recreational uses, such as playgrounds.

The EPA is proposing the cleanup levels in Table 1 for OU3 surface soils and seeks public comment on them as well as other aspects of the Preferred Alternative. The EPA is proposing an interim remedy of institutional controls for OU5 and is proposing the cleanup levels in Table 3 for OU5 for decision making under the institutional controls. The EPA will select the site-specific cleanup levels in the ROD. The basis for each proposed cleanup level is noted in the table and are consistent with the residual contamination in the “no action” OU1 areas. The EPA is proposing cleanup levels for commercial/industrial exposure to surface soil, construction worker exposure to subsurface soils, and a cleanup level for surface soil used as fill dirt or cover soil.

- The proposed cleanup levels for TEQ_{df} are based on an HI of 1, which corresponds to cancer risk level of approximately 1×10^{-5}, which is withing EPA’s range of acceptable cancer risk. For commercial/industrial exposure to surface soil, the TEQ_{df} cleanup level is 0.00072 mg/kg. At this Site, there is also a site-specific proposed cleanup level for construction worker exposure to subsurface soils of 0.00023 mg/kg that was developed based on a target non-cancer risk at an HI of 1.
- The proposed cleanup level for arsenic is 30 mg/kg and corresponds to a cancer risk level of 1×10^{-5}. The site-specific background for arsenic is 8 mg/kg. A cleanup level for arsenic based on a 10^{-6} cancer risk level would be 3 mg/kg, which is below background concentrations and would not be a reasonable or practicable clean-up level at this site.
- The proposed cleanup levels for carcinogenic PAHs and pentachlorophenol are site-specific risk-based calculations using the exposure pathways and for outdoor and construction workers. Consistent with the cleanup levels selected in OU1, a cancer risk level of 1×10^{-5} was used to calculate the proposed cleanup levels for carcinogenic PAHs.
- Soil used as fill dirt or cover soil placed at the surface must meet the cover soil cleanup levels based on commercial/industrial/recreational exposure (Tables 2 and 3). The proposed cover soil cleanup levels are based on: an HI of 1 for TEQ_{df} to protect future construction workers; a cancer risk level of 1×10^{-5} for arsenic due to background concentrations; and a cancer risk level of 1×10^{-6} for carcinogenic PAHs.

Table 1. OU3 Proposed Cleanup Levels

OU3 Proposed Cleanup Levels[1]				
	Surface Soil		Subsurface Soil	
Soil COC	**Value (mg/kg)**	**Basis**	**Value (mg/kg)**	**Basis**
Arsenic[2]	30	ELCR = 1 x 10^{-5}	96	HI=1 Construction worker
Benzo[*a*]anthracene[1]	210	ELCR = 1 x 10^{-5}	--	--
Benzo[*a*]pyrene[1]	21	ELCR = 1 x 10^{-5}	24	HI=1 Construction worker
Benzo[*b*]fluoranthene[1]	210	ELCR = 1 x 10^{-5}	--	--
Naphthalene[1]	170	ELCR = 1 x 10^{-5}	540	HI=1 Construction worker
Carbazole[3]	960	see note	--	--
Pentachlorophenol[1]	40	ELCR = 1 x 10^{-5}	200	HI=1 Construction worker
Dibenzofuran	1,000	HI=1 Outdoor worker	250	HI=1 Construction worker
TEQ_{df}[4]	0.00072	EPA policy	0.00023	Site Specific HI=1 Construction worker

Notes:
ELCR = excess lifetime cancer risk
HI = hazard index
mg/kg = milligrams per kilogram
TEQdf = toxicity equivalent concentrations of dioxins and furans

1. The proposed cleanup levels for carcinogenic PAHs and PCP are site-specific risk-based calculations using the exposure pathways and for outdoor and construction workers. Consistent with the cleanup levels selected in OU-1, a cancer risk level of 1 x 10^{-5} was used to calculate the proposed cleanup levels for carcinogenic PAHs.
2. The site-specific background for arsenic is 8 mg/kg. A cleanup level for arsenic based on a 10^{-6} cancer risk level would be 3 mg/kg, which is below background concentrations and would not be a reasonable or practicable clean-up goal at this site.
3. Carbazole has not been classified by the EPA for carcinogenicity and there is no cancer slope factor for carbazole in the EPA's Integrated Risk Information System (IRIS). The evaluation of carbazole as a potential carcinogen in the risk assessment was developed using a Tier 3 toxicity value, and as such is uncertain, and not typically considered in PRG development. The development of the PRG for carbazole at this site errs on the side of caution for the protection of human health.
4. The proposed cleanup levels for TEQdf are based on an HI of 1, which corresponds to cancer risk level of approximately 1 x 10^{-5}, which is withing EPA's range of acceptable cancer risk. For commercial/industrial exposure to surface soil, the TEQdf cleanup level is 0.00072 mg/kg. At this Site, there is also a site-specific proposed cleanup level for construction worker exposure to subsurface soils of 0.00023 mg/kg that was developed based on a target non-cancer risk at an HI of 1.

Table 2. OU3 Proposed Soil Cover Cleanup Levels

OU3 Proposed Soil Cover Cleanup Levels		
	Soil Cover	
Soil COC	Value (mg/kg)	Basis
Arsenic[1]	30	ELCR = 1×10^{-5}
Benzo[*a*]anthracene	21	ELCR = 1×10^{-6}
Benzo[*a*]pyrene	2.1	ELCR = 1×10^{-6}
Benzo[*b*]fluoranthene	21	ELCR = 1×10^{-6}
Dibenzo[a,h]anthracene	2.1	ELCR = 1×10^{-6}
Naphthalene	17	ELCR = 1×10^{-6}
Pentachlorophenol	4	ELCR = 1×10^{-6}
Dibenzofuran	250	HI=1 Construction worker
TEQ_{df}[3]	0.00023	Site Specific HI=1 Construction worker

Notes:
ELCR = excess lifetime cancer risk
HI = hazard index
mg/kg = milligrams per kilogram
TEQdf = toxicity equivalent concentrations of dioxins and furans

1. The proposed cover soil cleanup levels are based on a cancer risk level of 1×10^{-5} for arsenic due to background concentrations.
2. The proposed cover soil cleanup levels are based on a cancer risk level of 1×10^{-6} for carcinogenic PAHs and Pentachlorophenol.
3. The proposed cleanup levels for TEQdf are based on an HI of 1, which corresponds to cancer risk level of approximately 1×10^{-5}, which is withing EPA's range of acceptable cancer risk. For commercial/industrial exposure to surface soil, the TEQdf cleanup level is 0.00072 mg/kg. At this Site, there is also a site-specific proposed cleanup level for construction worker exposure to subsurface soils of 0.00023 mg/kg that was developed based on a target non-cancer risk at an HI of 1.

Table 3. OU5 Proposed Cleanup Levels

OU5 Proposed Cleanup Levels						
	Surface Soil		Subsurface Soil		Soil Cover	
Soil COC	**Value (mg/kg)**	**Basis**	**Value (mg/kg)**	**Basis**	**Value (mg/kg)**	**Basis**
Benzo[*a*]pyrene	24	HI=1 Construction worker	24	HI=1 Construction worker	2.1	ELCR = 1 x 10^{-6}

Notes:
ELCR = excess lifetime cancer risk
HI = hazard index
mg/kg = milligrams per kilogram
TEQdf = toxicity equivalent concentrations of dioxins and furans

Applicable or Relevant and Appropriate Requirements

Per CERCLA section 121(d)(2) remedial actions must comply with substantive requirements and standards under federal or more stringent state environmental laws and regulations that are identified as ARARs or justify a waiver under CERCLA section 121(d)(4). Potential chemical-, location- and action-specific ARARs and TBC criteria identified for OU3/OU5 remedial alternatives are identified in the FS and categories are summarized below.

Chemical-specific ARARs

Chemical-specific ARARs usually are either health- or risk-based numerical values or methodologies that establish the acceptable amount or concentration of a chemical that may remain in or be discharged to the environment. There are no chemical-specific ARARs for OU3 or OU5 contaminated surface soil.

Action-specific ARARs

Action-specific ARARs usually are restrictions on the conduct of certain activities due to waste type or the operation of certain technologies at a particular site for addressing contaminated media. Regulations that dictate the design, construction and operating characteristics of incinerators, air stripping units or landfill construction are examples of action-specific ARARs.

Location-specific ARARs

Location-specific ARARs generally restrict certain activities or limit concentrations of hazardous substances solely because of geographical or land use concerns. Requirements addressing wetlands, historic places, floodplains, or sensitive ecosystems and habitats are potential location-specific ARARs.

TBC Criteria

Per 40 CFR 300.400(g)(3), in addition to ARARs, the lead and support agencies may as appropriate identify other advisories, criteria, or guidance to be considered for a particular release. The "to be considered" (TBC) category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

SUMMARY OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1) mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARs, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) of CERCLA also establishes a preference for remedial actions that employ treatment as a principal element to reduce permanently and significantly the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d) further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

The FS Report for OU3 and OU5 details how possible response actions and technologies were identified, screened, and assembled into the remedial action alternatives. The first step screened remediation technologies based on technical implementability. For OU3 and OU5, nine remediation technologies were identified:

- DNAPL Recovery
- Engineered Soil Cover
- RCRA Cap
- Vertical Barrier Wall
- Phytoremediation
- In Situ Treatment
- Removal and Disposal
- Institutional Controls
- Monitoring

The OU3 and OU5 FS Report then combined and grouped the remediation technologies into 10 remedial alternatives, including the "No Action" alternative (Alternative 1). These alternatives provide a range of options for achieving the RAOs and complying with ARARs.

Remedial Alternatives:

- Alternative 1: No Action
- Alternative 2: DNAPL Recovery and Engineered Soil Cover
- Alternative 3: Downgradient Barrier Wall, Phytoremediation, and Engineered Soil Cover
- Alternative 4: Barrier Wall Isolation of Source Areas, Phytoremediation, and Engineered Soil Cover
- Alternative 5: In Situ Stabilization of Source Areas and Engineered Soil Cover
- Alternative 6: In Situ Stabilization of Former Drip Track Soils, Removal and Disposal of Surface Soils and Source Area Soils
- Alternative 7: Bio-oxidation of Source Areas and Engineered Soil Cover
- Alternative 8: Steam Enhanced Extraction of Source Areas and Engineered Soil Cover
- Alternative 9: Removal of Surface Soils and Source Area Soils
- Alternative 10: RCRA Cap over Source Areas and Engineered Soil Cover.

OU3 Remedial Action Alternatives

Of the 10 remedial alternatives, the FS Report retained six remedial alternatives for detailed evaluation for OU3. This proposed plan summarizes the detailed evaluation of remedial alternatives from the FS Report and maintains their numbering to correspond with the FS Report.

OU3 Remedial Alternatives retained for detailed evaluation:

- Alternative 1: No Action
- Alternative 3: Downgradient Barrier Wall, Phytoremediation, and Engineered Soil Cover
- Alternative 4: Barrier Wall Isolation of Source Areas, Phytoremediation, and Engineered Soil Cover
- Alternative 5: In Situ Stabilization of Source Areas and Engineered Soil Cover
- Alternative 9: Removal of Surface Soils and Source Area Soils
- Alternative 10: RCRA Cap over Source Areas and Engineered Soil Cover.

OU5 Remedial Action Alternatives

The FS Report eliminated all OU5 remedial alternatives except for the no action alternative and institutional controls in the form of a soil management plan, which the EPA proposes as an interim remedy until the uncertainty in the OU5 risk assessment is resolved. When specific site reuse plans are proposed and the location and nature of construction activities are clearer, the EPA will evaluate the available data, collect additional data, and update the risk assessment as appropriate. The EPA will then issue another proposed plan and decision document selecting the final OU5 remedy.

The soil management plan would require worker personal protective equipment and other protocols to prevent unacceptable exposure of future construction workers to benzo[a]pyrene at concentrations that exceed the proposed cleanup level in soils during possible future construction activities.

Taking no action for OU5 would not meet the threshold criteria of protecting human health and meeting ARARs. The interim alternative of a OU5 soil management plan would protect human health and comply with ARARs, such as those related to disposal activities. A soil management plan as an interim action is superior to no action in terms of long-term and short-term effectiveness. A soil management plan is straightforward to implement. OU5 contains only low-level threats, so while there is no reduction of toxicity, mobility, or volume through treatment, there are no principal threats in OU5 to treat.

Common Elements of Alternatives

Institutional controls are common elements of the active remedial alternatives. Institutional controls are administrative measures that, when enforced, protect human health by preventing exposure to contamination that is impractical or unnecessary to address through active remediation. Institutional controls for each alternative include:

- A combination of deed restrictions, zoning restrictions and/or restrictive covenants, to:
    - Limit future land use in OU3 and OU5 to industrial or commercial and certain recreational uses that would protect human health and protect the engineering

components of the remedy. Institutional controls would restrict uses such as schools, daycares, and playgrounds where risk is estimated using residential exposure assumptions, unless MDEQ and the EPA approve a proposal that makes a specific use protective.
    - Prevent groundwater use for human consumption in OU3 and OU5 while the groundwater investigation continues. The future remedy for OU6 will address contaminated groundwater and will address the expectation to restore groundwater to beneficial use.
    - Require a vapor intrusion assessment and/or vapor mitigation for new building construction, or existing building renovation, expansion or change in use. The future remedy for OU6 will address the vapor intrusion pathway.
- A Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. The soil management plan will provide protocols to prevent unacceptable exposure of workers during future soil disturbing activities. These protocols may include: using worker personal protective equipment; planning for soil disturbing activities; screening soil in the field; criteria for handling, reusing, disposing or moving soil; and procedures for how to manage unexpected environmental conditions.

Alternative 1: No Further Action

Evaluation of the No Action alternative is required under the NCP as a baseline against which all other alternatives are compared. Under this alternative, no remedial actions would take place.

Alternative 3: Downgradient Barrier Wall, Phytoremediation and Engineered Soil Cover

Downgradient Vertical Barrier Wall: Alternative 3 includes a 3,500-foot-long vertical barrier wall downgradient of the primary and secondary source areas to contain the DNAPL source. For the purposes of the FS, a bentonite slurry wall was assumed. The final type of barrier wall will be determined during the remedial design if the selected remedial alternative includes a barrier wall. The barrier wall would be keyed into the underlying, lower-permeability Eutaw Formation to minimize/prevent DNAPL and groundwater migration under the wall. Soils are not expected to be disposed off-site as a result of the wall installation, but if they were, they would be characterized to determine whether constitutes RCRA hazardous waste (contains RCRA Listed hazardous waste or is considered RCRA toxicity characteristic waste) and managed in accordance with identified ARARs.

Phytoremediation: To address potential groundwater flow issues caused by the barrier wall, Alternative 3 includes planting of appropriate tree species along the inside of the vertical barrier wall. The trees would prevent mounding of groundwater behind the barrier wall and create an inward hydraulic gradient to prevent impacted groundwater from flowing around or beneath the barrier wall. In addition, phytoremediation would provide limited treatment for dissolved COCs in shallow groundwater through rhizodegradation (the breakdown of contaminants in the soil through microbial activity in the soil around plant roots [the rhizosphere]) and would enhance the effectiveness of this alternative in controlling COC migration.

Engineered Soil Cover: Alternative 3 includes placement of a clean soil cover to address RAOs 2 and 3 by 1) eliminating exposure to OU3 soils with COC concentrations above the OU3 cleanup levels and 2) preventing the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust. The soil cover will be designed to manage infiltration of rainwater, including use of fine-grained soils, surface contouring to facilitate surface runoff, and planting of vegetation to support evapotranspiration. The soil cover would have the added benefit of reducing local recharge of the shallow alluvial aquifer.

Institutional controls are detailed above but would include: 1) a combination of deed restrictions, zoning restrictions and/or restrictive covenants to limit future land use and (while the groundwater investigation continues) prevent groundwater use and require a vapor intrusion assessment and/or vapor mitigation for new or renovated buildings; and 2) a Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. Institutional controls, soil management plan, and FYRs are the only remedial component for OU5 soils.

Monitoring: Routine monitoring of groundwater quality would be conducted to evaluate the remedy performance with respect to hydraulic control of the groundwater plume, and to monitor the soil cover integrity and the health of the trees. Maintenance of the soil cover would occur as required, and the trees may require replacement on a periodic basis. Typical lifespan for hybrid poplar trees is around 50 years, and monitoring costs would include replacement of all trees over the course of 40 years.

The estimated timeframe for construction completion is six-to-seven months. It is estimated that the trees will take about five years to reach maturity. To prevent mounding of groundwater within the areas enclosed by the barrier wall as the trees grow to maturity and outside of the growing system, the groundwater extraction and treatment system will be operated as needed. Long-term the remedy will require maintaining the appropriate level of groundwater inside the barrier wall. Table 2 presents Alternative 3's estimated costs.

Alternative 4: Barrier Wall Isolation of Source Areas, Phytoremediation and Engineered Soil Cover

Barrier Wall Isolation of Source Areas: Alternative 4 would include installation of a 4,550-foot-long vertical barrier wall surrounding the primary and secondary source areas. The barrier wall, in combination with the soil cover, would isolate the source areas and prevent DNAPL migration from these areas as well as address direct contact with contaminated surface soils. The barrier wall would be keyed into the underlying, lower-permeability Eutaw Formation to minimize the potential for DNAPL and groundwater to migrate under the wall. Soils are not expected to be disposed off-site as a result of the wall installation, but if they were, they would be characterized to determine whether constitutes RCRA hazardous waste (contains RCRA Listed hazardous waste or is considered RCRA toxicity characteristic waste) and managed in accordance with identified ARARs.

Phytoremediation: To address potential groundwater flow issues caused by the barrier wall, Alternative 4 includes planting of appropriate tree species within the barrier wall enclosure. The trees would prevent mounding of groundwater behind the barrier wall and create an inward hydraulic gradient to prevent impacted groundwater from flowing through or beneath the barrier wall. In addition, phytoremediation would provide limited treatment for dissolved COCs in shallow groundwater through rhizodegradation and contaminant uptake and would enhance the effectiveness of this alternative in controlling groundwater COC migration.

Engineered Soil Cover: Alternative 4 includes placement of a clean soil cover to address RAOs 2 and 3 by: 1) eliminating exposure to OU3 soils with COC concentrations above the OU3 cleanup levels and; 2) preventing the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust. The soil cover would be designed to manage infiltration of rainwater, including use of fine-grained soils, surface contouring to facilitate surface runoff, and planting of vegetation to support evapotranspiration. The soil cover would have the added benefit of reducing local recharge of the shallow alluvial aquifer. The footprint of the soil cover would include, at a minimum, the entirety of the primary and secondary source areas to manage infiltration to the area enclosed by the vertical barrier wall.

Institutional controls are detailed above but would include: 1) a combination of deed restrictions, zoning restrictions and/or restrictive covenants to limit future land use and (while the groundwater investigation continues) prevent groundwater use and require a vapor intrusion assessment and/or vapor mitigation for new or renovated buildings; and 2) a Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. Institutional controls, soil management plan, and FYRs are the only remedial components for OU5 soils.

Monitoring: Routine monitoring of groundwater quality would be conducted to evaluate the remedy performance with respect to hydraulic control of the groundwater plume, and to monitor the soil cover integrity and the health of the trees. Maintenance of the soil cover would occur as required, and the trees may require replacement on a periodic basis. Typical lifespan for hybrid poplar trees is around 50 years, and monitoring costs would include replacement of all trees over the course of 40 years.

The estimated timeframe for construction completion is six-to-seven months. It is estimated that the trees will take about five years to reach maturity. To prevent mounding of groundwater within the areas enclosed by the barrier wall as the trees grow to maturity and outside of the growing system, the groundwater extraction and treatment system will be operated as needed. Long-term the remedy will require maintaining the appropriate level of groundwater inside the barrier wall. Table 2 presents Alternative 4's estimated costs.

Alternative 5: In-situ Stabilization of Source Areas and Engineered Soil Cover

In-situ Stabilization (ISS) of Source Areas: Alternative 5 includes ISS treatment to bind the contamination in place within the primary and secondary source areas. ISS would create a solid monolith and/or induce a chemical reaction that limits the potential for contamination to be released to groundwater. ISS treatment would involve mixing reagents (e.g., cement and water) and injecting the reagents into the soil through drilled holes and using cranes with large mixers or augers to mix the binding agent throughout the soils in the primary and secondary source areas to the base of the shallow aquifer (i.e., to approximately 25 ft bgs).

Engineered Soil Cover: Alternative 5 includes placement of a clean soil cover to address RAOs 2 and 3 by 1) eliminating exposure to OU3 soils with COC concentrations above the OU3 cleanup levels and 2) preventing the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust. The soil cover would have the added benefit of reducing local recharge of the shallow alluvial aquifer.

Institutional controls are detailed above but would include: 1. A combination of deed restrictions, zoning restrictions and/or restrictive covenants to limit future land use and (while the groundwater investigation continues) prevent groundwater use and require a vapor intrusion assessment and/or vapor mitigation for new or renovated buildings; and 2. A Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. Land use controls, soil management plan, and FYRs are the only remedial component for OU5 soils.

Monitoring: Routine monitoring of the cover integrity and maintenance would be completed as required. In addition, groundwater monitoring would be required to evaluate whether the remedy has been effective at treating sufficient source mass to facilitate restoration of groundwater.

The estimated timeframe for construction completion is 13 to 15 months. The estimated costs for this alternative far exceed the funds originally provided in the environmental cost account (ECA) for the Site. Alternative 5 cannot be implemented with remaining funds in the ECA and would require funding from an alternative funding source. As a result, the overall timeframe for implementation of Alternative 5 is uncertain and would depend on the availability of sufficient funds. Table 2 presents Alternative 5's estimated costs.

Alternative 9: Removal of Surface Soils and Source Area Soils

Excavation: Alternative 9 includes excavation and disposal of OU3 surface soils exceeding cleanup levels and surface and subsurface soils in the primary and secondary source areas. All concrete and asphalt pads would be removed prior to excavation. Contaminated soils (including DNAPL) to the base of the shallow alluvial aquifer (~25 ft bgs) within the primary and secondary source areas would be excavated. A groundwater extraction and treatment system would be constructed to dewater the excavation below the groundwater table. In addition, surface soils (0–2 ft bgs) outside of the primary and secondary source areas that exceed cleanup levels would be excavated. This area is assumed to exclude the surface impoundments, which were previously remediated and covered and are not considered to require additional remediation; it would also exclude the area of the Community Resource Building, where soils are covered by the building and parking lot.

Disposal: It is estimated that 35,500 CY of the soils excavated from the area of the former drip track and 20-ft buffer, will be designated as an F032/F034 listed hazardous waste and will require treatment to meet RCRA land disposal restriction treatment standards and then disposal at an EPA-approved, RCRA Subtitle C landfill. It is estimated that 520,000 CY of the soils will be non-hazardous and would require disposal at an EPA-approved, RCRA Subtitle D landfill.

Backfill: Backfill would include placement and final grading of 555,400 CY of imported backfill material suitable for industrial/commercial land use. The alternative includes possible stockpiling and beneficial reuse of OU2 soils as backfill provided the soil meets criteria that EPA will establish, and the soil is not considered to contain RCRA hazardous waste.

Institutional controls are detailed above but would include: 1. A combination of deed restrictions, zoning restrictions and/or restrictive covenants to limit future land use and (while the groundwater investigation continues) prevent groundwater use and require a vapor intrusion assessment and/or vapor mitigation for new or renovated buildings; and 2. A Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. Land use controls, soil management plan, and FYRs are the only remedial component for OU5 soils.

Monitoring: Groundwater monitoring would be required to evaluate whether excavation has been effective at removing sufficient source mass to facilitate restoration of groundwater. No other long-term O&M or post-remedy monitoring would be required.

The estimated timeframe for construction completion is 20 to 25 months. The estimated cost for this alternative far exceeds the funds originally provided in the ECA, and it cannot be implemented with the remaining funds. Therefore, implementation of Alternative 9 would require funding from an alternative funding source (e.g., EPA's Superfund program remedial action budget). The overall timeframe for implementation of Alternative 9 is uncertain and will depend on the availability of funds. Table 2 presents Alternative 9's estimated costs.

Alternative 10: RCRA Cap Over Source Areas and Engineered Soil Cover

RCRA Cap: Alternative 10 would involve placement, monitoring, and maintenance of a RCRA Subtitle C, multilayer cap (or equivalent) over the primary and secondary source areas. The RCRA cap would isolate any soils in this area that exceed the OU3 cleanup levels and would effectively eliminate infiltration of rainwater to DNAPL and soils in the primary and secondary source areas to prevent leaching of COCs into the groundwater.

Engineered Soil Cover: Alternative 10 includes placement of a clean soil cover to address RAOs 2 and 3 by 1) eliminating exposure to OU3 soils with COC concentrations above the OU3 cleanup levels and 2) preventing the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust. The soil cover would be designed to manage infiltration of rainwater, including use of fine-grained soils and surface contouring to facilitate surface runoff. The soil cover would have the added benefit of reducing local recharge of the shallow alluvial aquifer.

Institutional controls are detailed above but would include: 1. A combination of deed restrictions, zoning restrictions and/or restrictive covenants to limit future land use and (while the groundwater investigation continues) prevent groundwater use and require a vapor intrusion assessment and/or vapor mitigation for new or renovated buildings; and 2. A Soil Management Plan to protect engineering components of the remedy and to prevent exposure of construction and/or remediation workers to COCs above cleanup levels. Land use controls, soil management plan, and FYRs are the only remedial component for OU5 soils.

Monitoring: Routine monitoring of groundwater quality would be conducted to evaluate the remedy performance with respect to hydraulic control of the groundwater plume, and to monitor the soil cover integrity and the health of the trees. Maintenance of the soil cover would occur as required, and the trees may require replacement on a periodic basis. Typical lifespan for hybrid poplar trees is around 50 years, and monitoring costs would include replacement of all trees over the course of 40 years.

The estimated timeframe for construction completion is six to nine months. Table 2 presents Alternative 10's estimated costs.

EVALUATION OF REMEDIAL ALTERNATIVES

The EPA uses nine CERCLA criteria to evaluate the alternatives and select remedial actions. This section summarizes the relative performance of each alternative against the nine criteria and each other.

THE NINE SUPERFUND EVALUATION CRITERIA

1. Overall Protectiveness of Human Health and the Environment evaluates whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

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

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

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

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

7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50% to -30%.

8. State/Support Agency Acceptance considers whether the state agrees with the EPA's analyses and recommendations, as described in the RI/FS reports and Proposed Plan.

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

A detailed analysis of alternatives is provided in the 2023 OU3 and OU5 FS Report.

The nine criteria consist of two threshold criteria, five balancing criteria, and two modifying criteria. The threshold criteria are overall protectiveness of human health and the environment and compliance with ARARs. These two criteria must be met by any remedial alternative for it to be considered a viable remedial action. The five balancing criteria are long-term effectiveness and permanence; short-term effectiveness; reduction of toxicity, mobility, and volume through treatment; implementability; and cost. These are the primary criteria on which the detailed analysis was based. The remaining two criteria are state acceptance and community acceptance. These modifying criteria are typically evaluated following a public comment period on the Proposed Plan and will be documented in the ROD.

Comparison of Remedial Alternatives

1. Overall Protection of Human Health and the Environment

During every FS, a "no action" alternative is developed as a baseline for comparative analyses purposes. Alternative 1 ("no action") would not satisfy the RAOs or meet this threshold criterion.

For OU3, alternatives 3, 4, 5, 9 and 10 would satisfy the RAOs. Alternatives 3, 4, 5, 9 and 10 would protect human health and the environment and achieve RAOs 1 and 2 using removal, treatment, containment and/or institutional controls. These alternatives would prevent migration of DNAPL and COCs in groundwater through mass reduction, treatment and/or containment, satisfying RAO 4. RAO 3 will be achieved by standard construction best practices and per action-specific ARARs.

For OU5, institutional controls and FYRs will protect human health and the environment until the final OU5 remedy is selected.

2. Compliance with ARARs

Per CERCLA Section 121(d)(2), remedial actions undertaken at any Superfund site must meet all identified applicable or relevant and appropriate requirements under federal and state environmental laws/regulations or provide a justification for invoking a waiver of those requirements pursuant to CERCLA Section 121(d)(4).

Alternative 1 would not satisfy the RAOs or meet this threshold criterion. Alternatives 3, 4, 5, 9 and 10 would satisfy the RAOs, comply with ARARs, and be protective of human health and the environment.

3. Long-Term Effectiveness and Permanence

Alternatives 4, 5 and 9 rate excellent with respect to the criterion of long-term effectiveness and permanence; Alternative 3 rates good; and Alternative 10 has a poor rating. All alternatives would provide an effective long-term remedy to prevent unacceptable risk to future site workers due to exposure to OU3 soils and future construction workers due to exposure to OU5 soils (until the final OU5 remedy is selected). Thus, the maintenance of engineered controls and implementation of institutional controls would be required to maintain long-term effectiveness and permanence of these remedies.

4. Reduction of Toxicology, Mobility and/or Volume Through Treatment

All alternatives follow the removal of 46,000 gallons of DNAPL, which is a principal threat, from the Site by the extraction system. These alternatives address the residual source material and the remaining principal threats through varying levels of treatment.

Alternatives 3 and 4 would result in some treatment of COCs in soils and groundwater through phytoremediation, rhizodegradation and contaminant uptake. However, the amount of treatment is not clear, and the reduction in COC mass would likely be low relative to the remaining OU3 DNAPL and residual source material. As a result, Alternatives 3 and 4 were assigned a poor rating.

Alternative 5 would further reduce the toxicity and mobility of contamination in the primary and secondary source areas through ISS treatment. However, ISS treatment would result in an increase in the volume of contaminated media. Alternative 5 was assigned an excellent rating.

Alternatives 9 and 10 do not involve treatment of impacted soils or DNAPL. Thus, they were assigned a very poor rating with respect to this criterion.

5. Short-Term Effectiveness

The short-term effectiveness balancing criterion considers short-term risks to the community and site workers and the potential for negative environmental impacts during the implementation of the remedial alternative. Short-term effectiveness also considers the time required for the remedy to achieve protection of human health and the environment.

Alternatives 3, 4 and 10 can be readily implemented using conventional construction techniques and involve the use of well-established, minimally invasive technologies that require a low level of heavy machinery and truck traffic relative to Alternative 5 and Alternative 9. Alternatives 3, 4 and 10 have little potential for negative impacts on the environment, can be constructed in about 1 year, and rate excellent in terms of short-term effectiveness.

Alternatives 5 rates fair and 9 rates very poor with respect to the short-term effectiveness criteria. These alternatives would require a longer timeframe to construct than Alternatives 3, 4 and 10, and would involve considerably more use of heavy machinery. Further, completion of the remedy will require more time because the costs of Alternative 5 and Alternative 9 significantly exceed the amount of the remaining funding provided in the ECA for the Site. As a result, Alternative 5 and Alternative 9 would take longer to achieve RAOs.

6. Implementability

Alternatives 3, 4 and 10 can be readily implemented and were assigned an excellent rating. These alternatives involve the use of readily available and highly reliable technologies and equipment and would not require a high degree of specialized expertise. Further, existing site infrastructure does not pose a significant hindrance to implementation of either of these alternatives.

Alternative 9 would be highly challenging to implement due to the large volume and depth of excavation. Excavation in DNAPL source areas would require shoring and groundwater dewatering, and extracted groundwater would require extensive treatment prior to discharge. Based on these considerations, Alternative 9 was assigned a poor rating with respect to the implementability criterion.

Alternative 5 involves extensive ISS treatment. Although ISS treatment is well established in the environmental industry, it is not commonplace in the general construction industry and would require specialized equipment and expertise that are unlikely to be readily available in the area. Furthermore, there are challenges implementing ISS treatment at the Site given the large volume and area of soils in the primary and secondary source areas. Based on these considerations, Alternative 5 was assigned a fair rating with respect to the implementability criterion.

7. Cost

Table 4 provides a cost-estimate summary for remedial alternatives.

Table 4. Summary of Estimated Costs for Remedial Alternatives 1, 3, 4, 5, 9 and 10

Estimated Costs	Alternative 1 No Action	Alternative 3 Downgradient Barrier Wall, Phytoremediation, and Engineered Soil Cover	Alternative 4 Barrier Wall Isolation of Source Areas, Phytoremediation, and Engineered Soil Cover
Direct Capital	$0	$11,429,000	$10,907,000
Indirect Capital	$0	$2,500,000	$2,388,000
Periodic Costs	$90,000	$1,520,040	$739,200
Total NPV Costs	$32,000	$14,550,000	$13,593,000

Estimated Costs	Alternative 5 *In Situ* Stabilization of Source Areas and Engineered Soil Cover	Alternative 9 Removal of Surface Soils and Source Area Soils	Alternative 10 RCRA Cap over Source Areas and Engineered Soil Cover
Direct Capital	$72,902,000	$226,262,000	$15,869,000
Indirect Capital	$15,711,000	$48,653,000	$3,455,000
Periodic Costs	$375,000	$135,000	$450,000
Total NPV Costs	$88,760,000	$274,964,000	$19,502,000

8. Support Agency Acceptance

State acceptance of the Preferred Alternative will be more fully evaluated following receipt of comments on this Proposed Plan.

9. Community Acceptance

Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and all comments are reviewed. Comments received during the public comment period will be addressed in the Responsiveness Summary section of the Site's Record of Decision. The Record of Decision is the document in which the EPA will select the Site's long-term remedy.

Comparison Summary

Figure 8 summarizes the results of the detailed evaluation of remedial alternatives presented in this Proposed Plan.

Alternatives 3 and 4 have the highest overall ranking of the remedial alternatives identified and are the most cost-effective alternatives for achieving the RAOs. The substantially higher costs associated with Alternative 5 and Alternative 9 are disproportionate to any additional benefits provided by these alternatives relative to the benefits provided by Alternative 3 and Alternative 4. Although Alternative 10 has a similar estimated cost to Alternative 3 and Alternative 4, it would be considerably less effective at controlling the DNAPL source and preventing migration of COCs with groundwater. Because Alternative 4 rates higher with respect to long-term effectiveness and has a lower estimated cost than Alternative 3, Alternative 4 was assigned an overall rating of excellent and Alternative 3 was assigned an overall rating of good.

SUMMARY OF THE PREFERRED ALTERNATIVE

Alternative 4, "Barrier Wall Isolation of Source Areas, Phytoremediation and Engineered Soil Cover" is EPA's Preferred Alternative (Figure 9).

The more specific RAOs for Alternative 4 are:

- RAO 1: Prevent exposure of future construction workers via inhalation, incidental ingestion and/or dermal adsorption pathways to benzo(a)pyrene in OU5 surface soils above 24 mg/kg.
- RAO 2: Prevent exposure of outdoor and construction workers (and recreational uses that result in less exposure than an industrial/commercial scenario) via inhalation, incidental ingestion and/or dermal adsorption to COCs in OU3 surface and subsurface soils above proposed cleanup levels.
- RAO 3: Prevent the migration of COCs from OU3 and OU5 surface soils through stormwater runoff or wind dispersion of fugitive dust.
- RAO 4: Prevent COCs in OU3 source areas (containing DNAPL and residual contamination) from migrating to the groundwater outside of OU3 source areas by maintaining (on average) a lower elevation water table inside the OU3 source area than outside.

Alternative 4 will achieve RAO 1 with a soil management plan, selected as an interim remedy. RAO 2 will be achieved by placing a soil cover over surface soils that exceed the surface and subsurface soil cleanup levels and by placing land use restrictions to prevent uses that are not protective of human health. RAO 3 will be achieved by following construction related ARARs. RAO 4 will be achieved by installing a low-permeability barrier wall around the OU3 source areas, placing a soil cover over the barrier wall, and operating a phytoremediation cap to maintain a lower elevation water table inside the barrier wall. Alternative 4 will contain source materials and isolate them from the environment. The EPA expects some level of treatment to occur through rhizodegradation and contaminant uptake, but the amount of treatment is not clear and was not a deciding factor in proposing this Alternative. The most decisive considerations were implementability, long-term effectiveness and short-term effectiveness.

The EPA expects that this preferred alternative will protect the health of future users, transition the ongoing groundwater extraction source control to the proposed barrier wall and phytoremediation source control, and will enable community-support reuse. The EPA's Preferred Alternative can change in response to public comment or new information.

Alternative 4 consists of the following remedial components:

Operable Unit 3

- Barrier Wall Isolation of Source Areas: Installation of an approximately 4,550-foot-long vertical barrier wall surrounding the primary and secondary source areas. The barrier wall, in combination with the soil cover, would isolate the source areas and prevent DNAPL and COC migration from these areas as well as address direct contact with contaminated surface soils. The barrier wall would be keyed into the underlying, lower-permeability Eutaw Formation to minimize the potential for DNAPL and groundwater to migrate under the wall. The construction of the barrier wall may include grading and backfilling on-site soils, provided the post-construction surface soil exposed at the site meets all cleanup levels. Soils are not expected to be disposed off-site as a result of the wall installation, but if they were, they would be characterized to determine whether constitutes RCRA hazardous waste (contains RCRA Listed hazardous waste or is considered RCRA toxicity characteristic waste) and managed in accordance with identified ARARs.

- Phytoremediation: To address potential groundwater flow issues caused by the barrier wall, Alternative 4 includes planting of appropriate tree species within the barrier wall enclosure. The trees would prevent mounding of groundwater behind the barrier wall and create an inward hydraulic gradient to prevent impacted groundwater from flowing through or beneath the barrier wall. In addition, phytoremediation would provide limited treatment for dissolved COCs in shallow groundwater through rhizodegradation and contaminant uptake and would enhance the effectiveness of this alternative in controlling groundwater COC migration outside of the OU3 source areas.

- Engineered Soil Cover: Placement of a clean soil cover to address RAOs 2 and 3 by 1) eliminating exposure to OU3 soils with COC concentrations above the OU3 cleanup levels and 2) preventing the migration of COCs from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust. The soil cover will be designed to manage infiltration of rainwater, including use of fine-grained soils, surface contouring to facilitate surface runoff, and planting of vegetation to support evapotranspiration. The soil cover would have the added benefit of reducing local recharge of the shallow alluvial aquifer. The footprint of the soil cover would include, at a minimum, the entirety of the primary and secondary OU3 source areas to manage infiltration to the area enclosed by the vertical barrier wall.

  Additional Soil Cover may be installed outside of the OU3 source areas to eliminate exposure to soil exceeding the surface soil cleanup levels. Remedial design soil sampling will be conducted to identify areas outside of the OU3 source areas requiring soil cover.

- Institutional controls:
  - Institutional controls such as deed restrictions, zoning restrictions or restrictive covenants, would be implemented to limit future land use in OU3 to certain recreational, industrial or commercial uses that would protect human health and protect the engineering components of the remedy.

    - An institutional control consisting of a Soil Management Plan for OU3 and OU5 would be established to require worker personal protective equipment and other protocols to prevent unacceptable exposure of future construction workers to COCs at concentrations that exceed the OU3 and OU5 proposed cleanup levels in soils during future construction activities.
    - Institutional controls would be implemented to prevent groundwater use in OU3 and OU5, and to establish requirements for vapor assessment/management in areas where groundwater and/or soil COC concentrations exceed vapor intrusion screening levels.

- Monitoring: Routine monitoring of groundwater quality would be conducted to evaluate the remedy performance with respect to hydraulic control of the groundwater plume, and to monitor the soil cover integrity and the health of the trees. Maintenance of the soil cover would occur as required, and the trees may require replacement on a periodic basis. Typical lifespan for hybrid poplar trees is around 50 years.

- It is estimated that the trees will take about five years to reach maturity. To prevent mounding of groundwater within the areas enclosed by the barrier wall, the existing groundwater extraction and treatment system will continue to be operated until the trees grow enough that the barrier wall and phytoremediation source control remedial components attain RAO 4. Long-term, achieving RAO 4 requires maintaining an average inward hydraulic gradient as determined by measuring groundwater levels inside and outside the barrier wall.

The EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA 121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the statutory preference for treatment as a principal element to the extent practicable.

Five-Year Reviews

Because hazardous substances will remain at the Site above levels that allow for unlimited exposure and unrestricted use, the EPA will review the remedial action no less than every five years, per CERCLA Section 121(c) and the NCP at 40 CFR 300.430(f)(4)(ii) until the levels of COCs allow for unrestricted use of soil and groundwater with unlimited exposure to these media. If results of the five-year reviews reveal that remedy integrity is compromised and protection of human health and the environment is insufficient, then additional remedial actions will be evaluated by the EPA and MDEQ.

COMMUNITY PARTICIPATION

The Site's RI Report, the OU3 and OU5 FS Report, this Proposed Plan and all supporting documents are available online at www.epa.gov/superfund/kerr-mcgee-chemical-columbus. They have also been placed in the Site's Administrative Record. The public is encouraged to review and comment on all the alternatives presented in this Proposed Plan. The public comment period for the Proposed Plan begins October 16, 2023 and ends November 16, 2023.

The EPA will hold a public meeting on October 26, 2023, starting at 6:00 p.m. Central Time / 7:00 p.m. Eastern Time at Genesis Dream Center, 1820 23rd Street North Columbus, MS 39701. A court recorder will be available to record verbal comments after the presentation. Written comments may be provided that evening or mailed before the close of the comment period to the address below:

Charles King
EPA Remedial Project Manager
Phone: (404) 431-1755 | (800) 435-9233
Email: king.charlesl@epa.gov

L'Tonya Spencer-Harvey
EPA Community Involvement Coordinator
Phone: (404) 562-8463
Email: spencer.latonya@epa.gov

Mailing Address: U.S. EPA Region 4, 61 Forsyth Street, S.W., 11th Floor, Atlanta, GA 30303-8960

The Preferred Alternative may change in response to public comment or new information acquired during the designated public comment period. Responses to comments received will be provided in the ROD, which will identify the selected interim remedial action to be implemented.

Administrative Record

The Administrative Record contains all the information used by the EPA to select a site's remedial action. Copies of the Administrative Record are available at:

Columbus-Lowndes Public Library
314 North Seventh Street
Columbus, Mississippi 39701
(662) 329-5300
Hours: Monday to Thursday, 9:00 a.m. to 7:00 p.m.
Friday to Saturday, 9:00 a.m. to 2:00 p.m.

Online at: www.epa.gov/superfund/kerr-mcgee-chemical-columbus and https://semspub.epa.gov/src/collections/04/AR/MSD990866329.

Figure 1. Site Operable Units

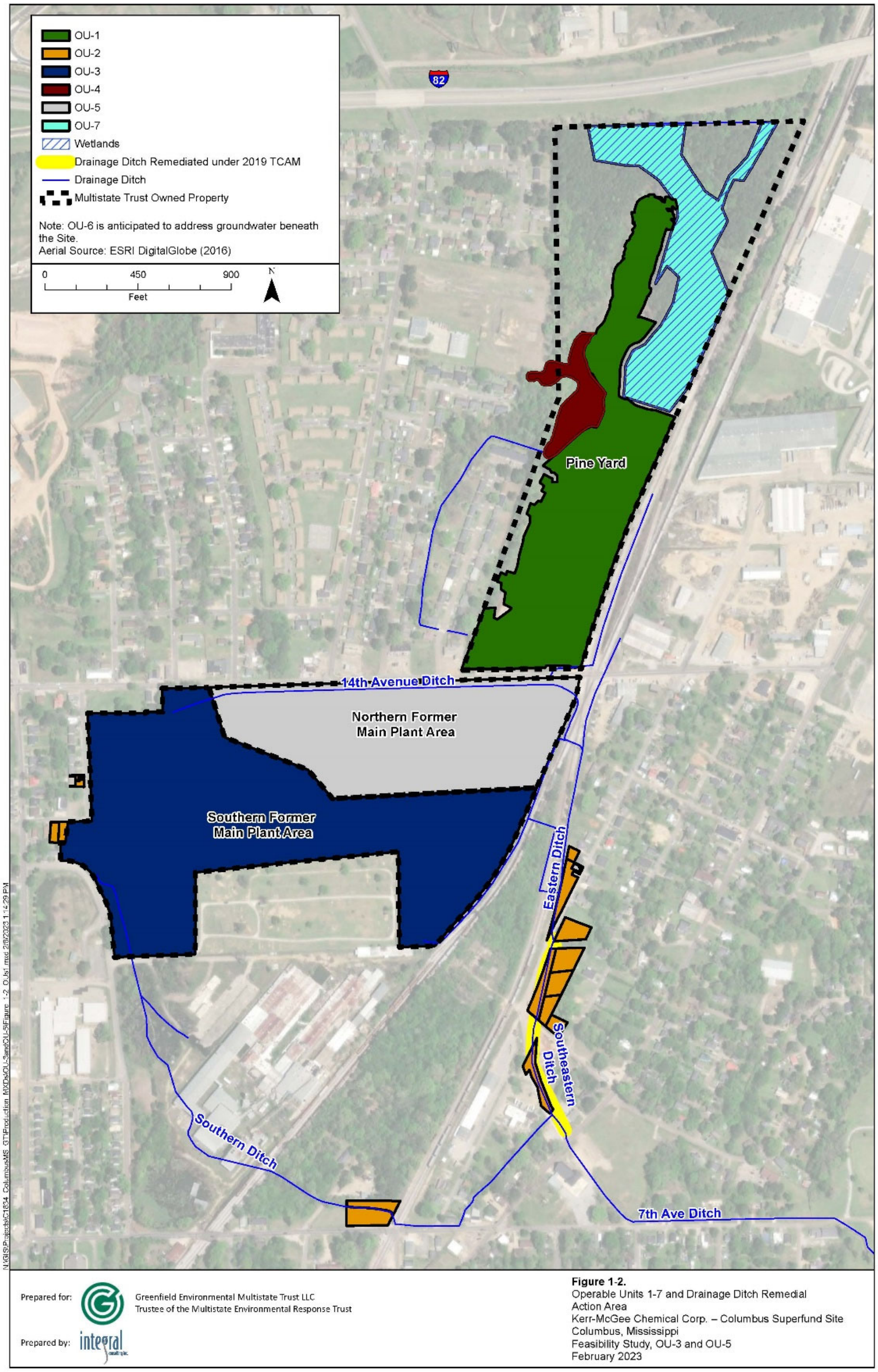


Figure 2. Updated Operable Unit 4 Boundary

Figure 3. OU3 and OU5 Geology

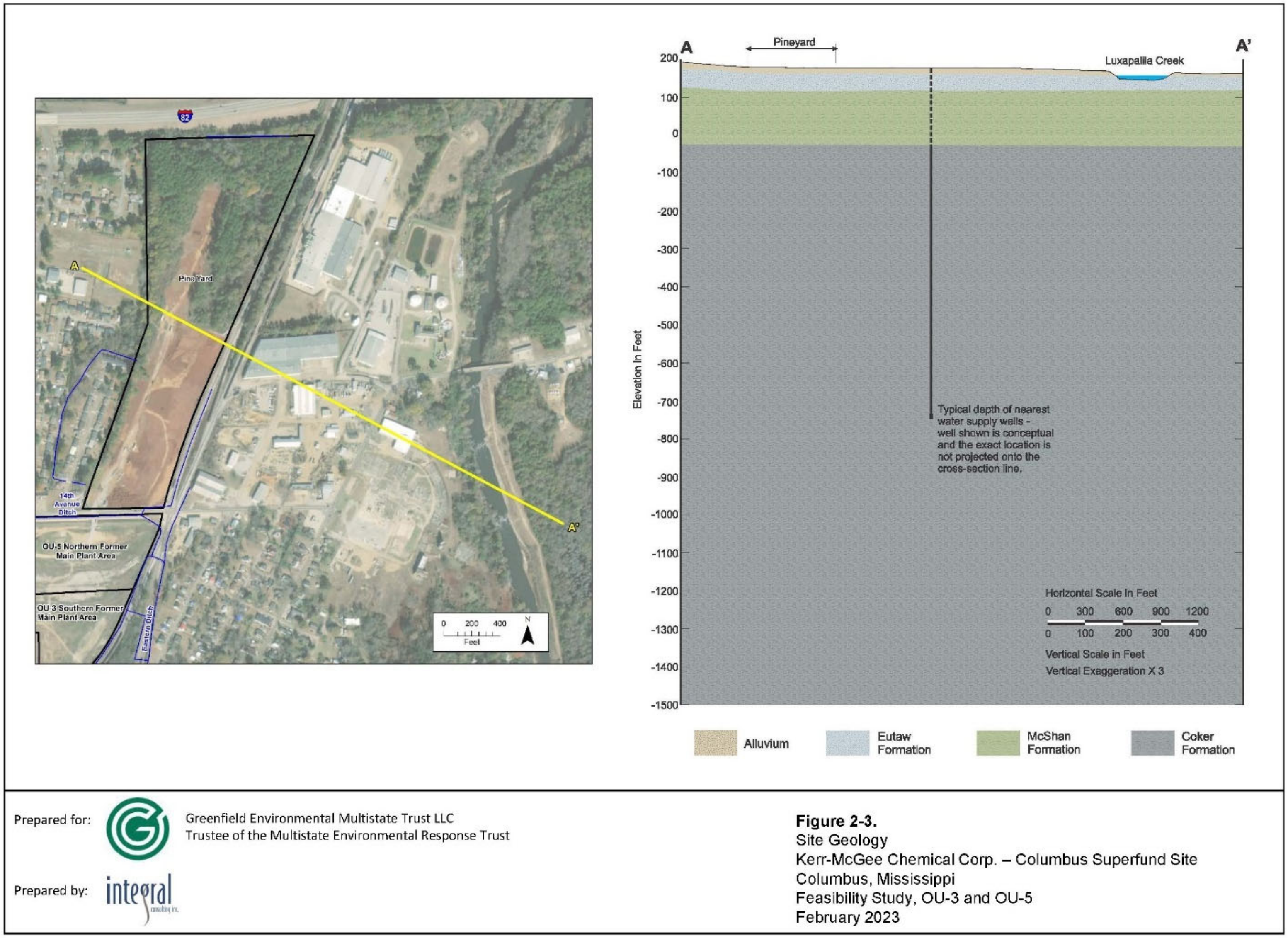


Figure 4. OU3 and OU5 Features

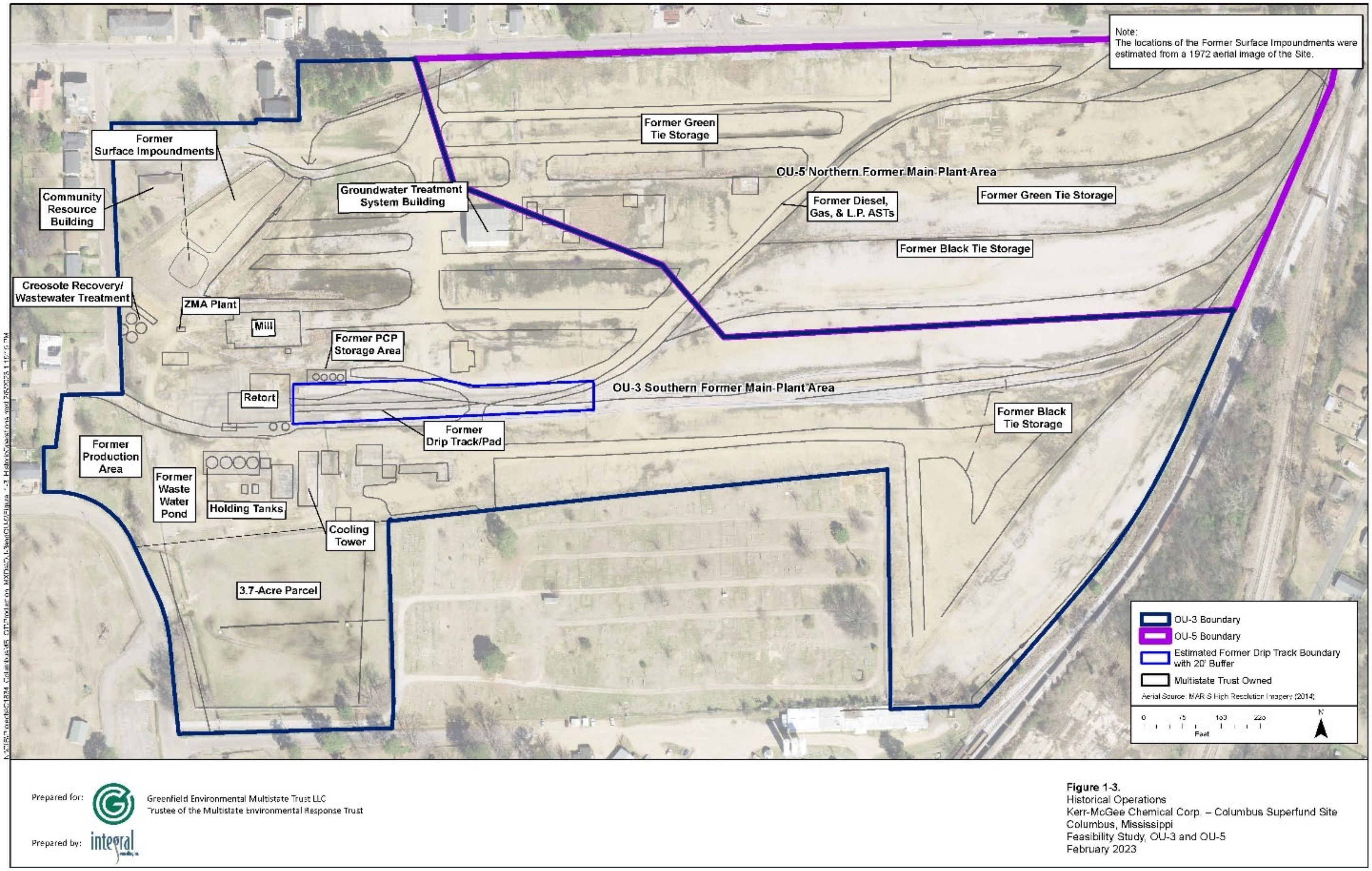


Figure 5. Groundwater Conditions

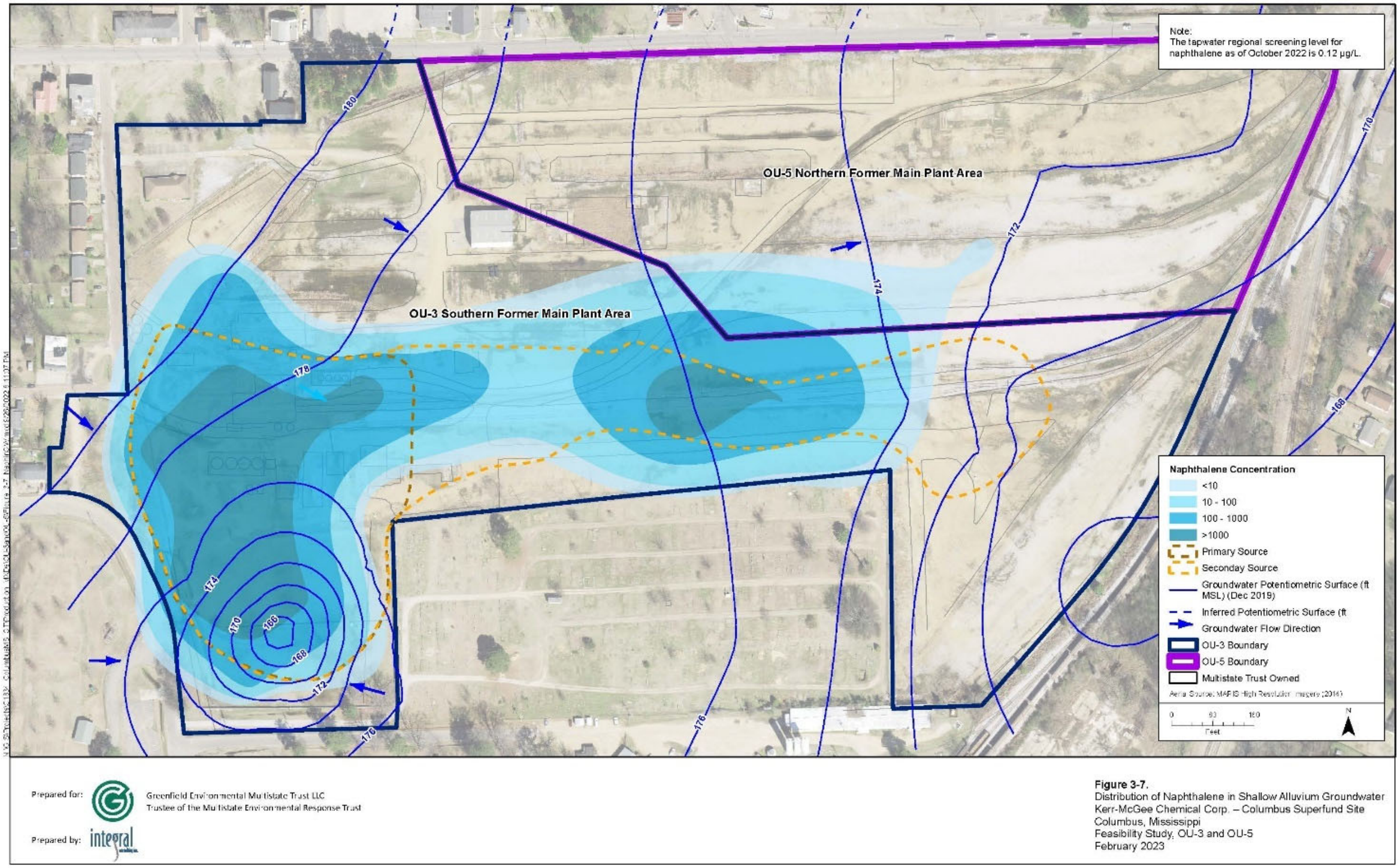
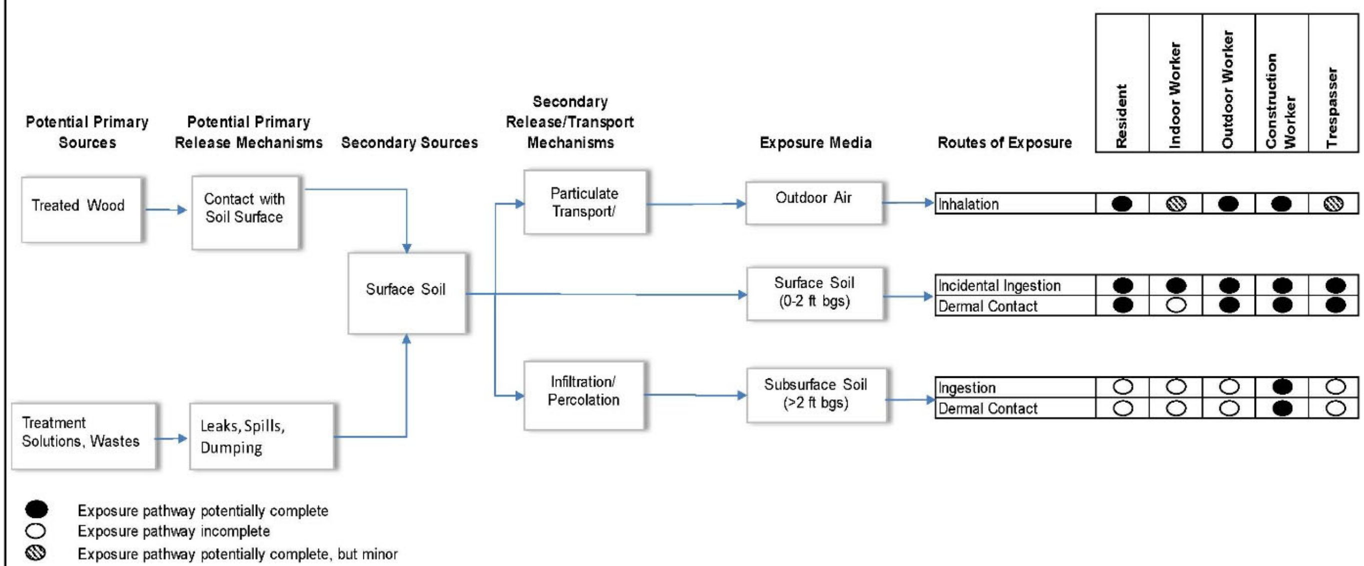


Figure 6. Conceptual Site Exposure Model



Additional receptors that might potentially contact soils at a cemetery were evaluated in the HHRA under the assumption that Union Cemetery was expanded to the west. However this future use is no longer under consideration.

2/8/2023

Prepared for: Greenfield Environmental Multistate Trust LLC
Trustee of the Multistate Environmental Response Trust

Prepared by: integral

Figure 3-8.
Conceptual Site Exposure Model Illustrating Chemical Sources, Transport Mechanisms, and Pathways for Human Exposure for OU-3 and OU-5
Kerr-McGee Chemical Corp. – Columbus Superfund Site
Columbus, Mississippi
Feasibility Study, OU-3 and OU-5
February 2023

Figure 7. Benzo(a)pyrene in OU5 Surface Soils

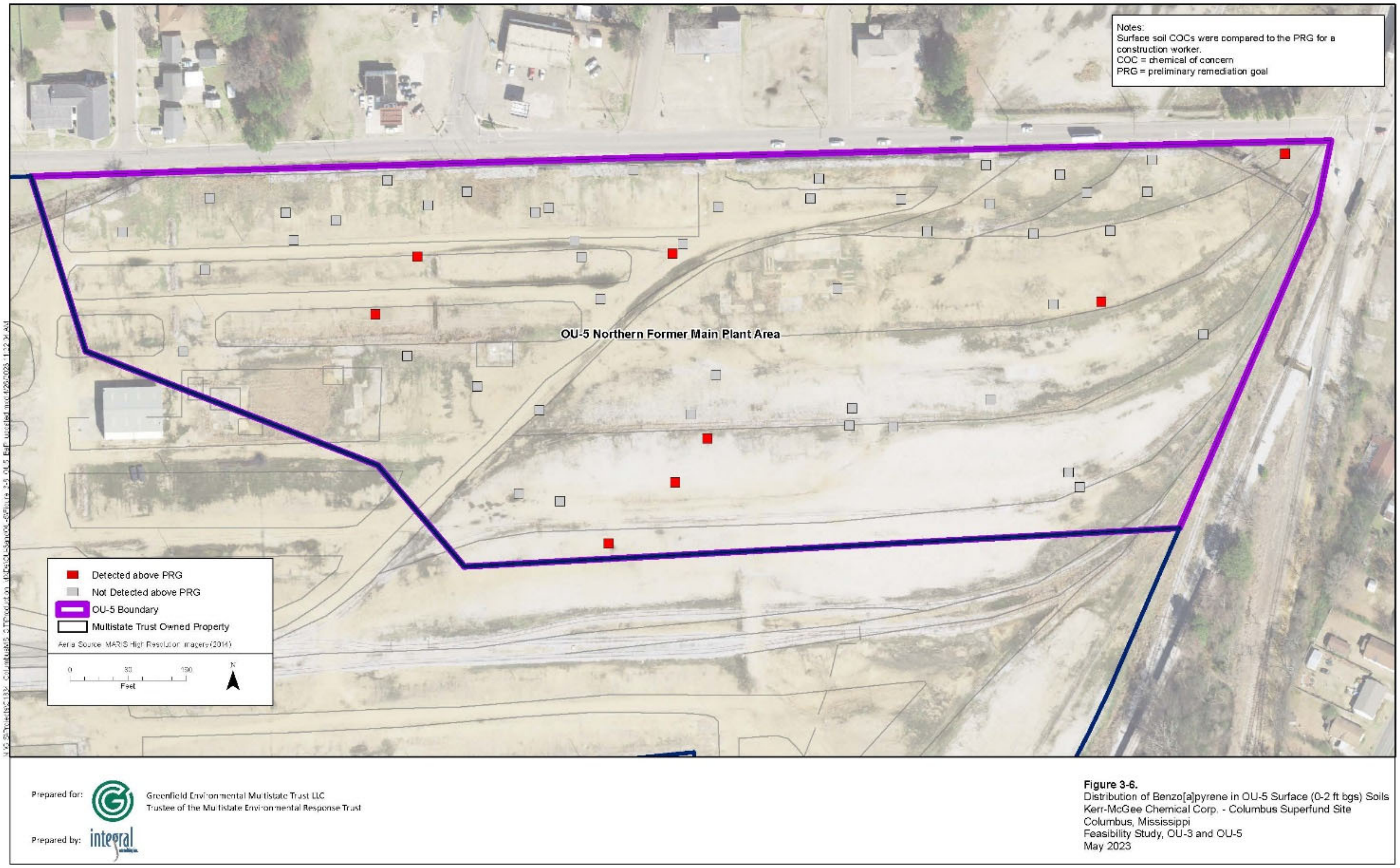


Figure 8. Alternatives Comparison Summary

LEGEND

- ● Excellent
- ◕ Good
- ◑ Fair
- ◔ Poor
- ○ Very Poor

		EVALUATION CRITERIA								
		Threshold		Balancing						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume through Treatment	Implementability	Estimated Cost (millions)		*OVERALL RATING*
Alternative 1	No Action	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Excellent	$0.03	Excellent	Very Poor
Alternative 3	Downgradient Barrier Wall, Phytoremediation, and Engineered Soil Cover	Excellent	Excellent	Good	Excellent	Poor	Excellent	$14.6	Good	Good
Alternative 4	Barrier Wall Isolation of Source Areas, Phytoremediation, and Engineered Soil Cover	Excellent	Excellent	Excellent	Excellent	Poor	Excellent	$13.6	Good	Excellent
Alternative 5	*In Situ* Stabilization of Source Areas and Engineered Soil Cover	Excellent	Excellent	Excellent	Fair	Excellent	Fair	$88.8	Very Poor	Fair
Alternative 9	Removal of Surface Soils and Source Area Soils	Excellent	Excellent	Excellent	Very Poor	Very Poor	Poor	$275	Very Poor	Very Poor
Alternative 10	RCRA Cap Over Source Areas and Engineered Soil Cover	Excellent	Excellent	Poor	Excellent	Very Poor	Excellent	$19.5	Fair	Very Poor

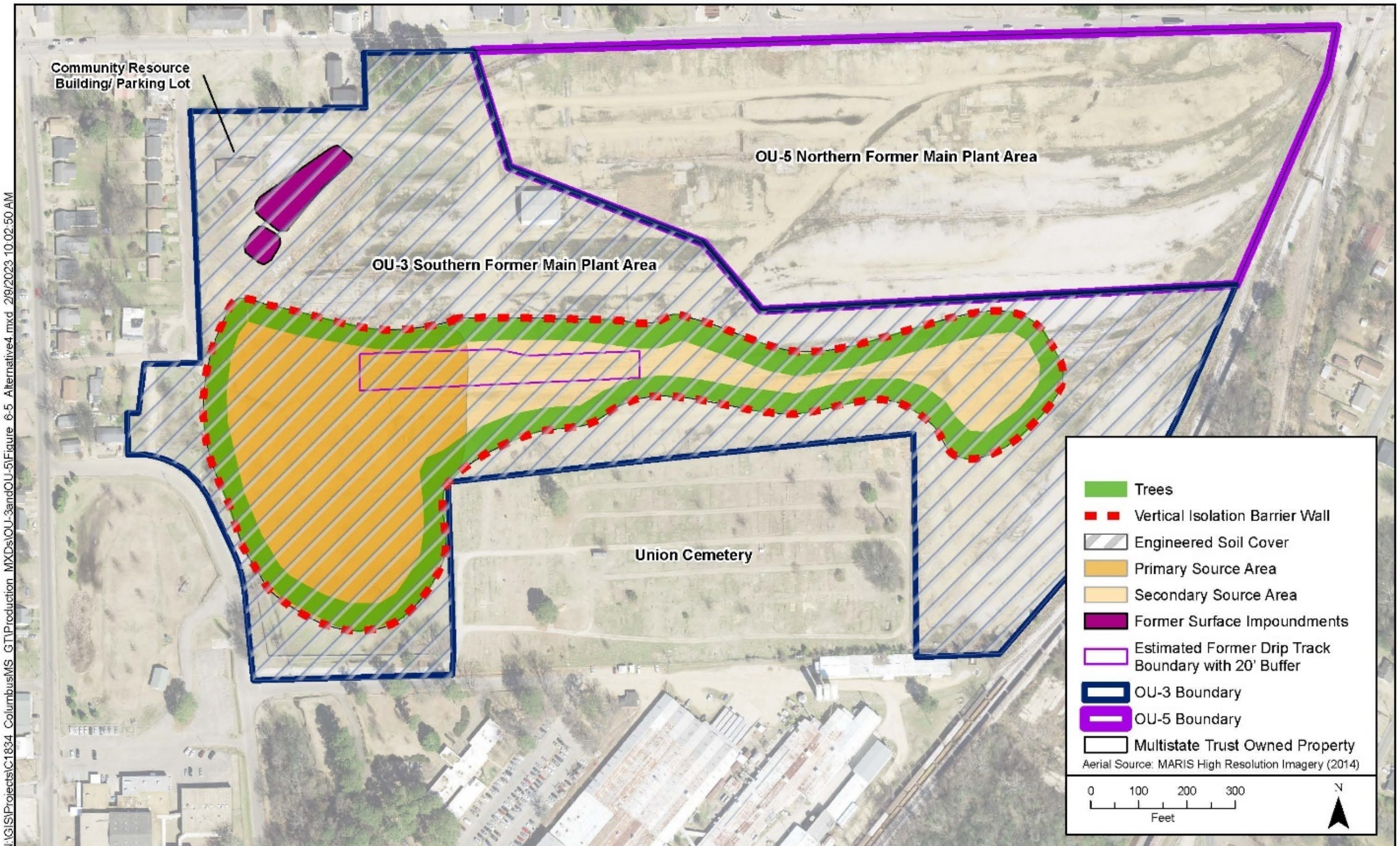
2/8/2023

Prepared for: Greenfield Environmental Multistate Trust LLC
Trustee of the Multistate Environmental Response Trust

Prepared by: integral

Figure 7-1. Summary of the Detailed Comparative Analysis of Remedial Alternatives
Kerr-McGee Chemical Corp. – Columbus Superfund Site
Columbus, Mississippi
Feasibility Study, OU-3 and OU-5
February 2023

Figure 9. Preferred Remedy (Alternative 4) Conceptual Layout



Prepared for: Greenfield Environmental Multistate Trust LLC
Trustee of the Multistate Environmental Response Trust

Prepared by: integral consulting inc.

Figure 6-5.
Conceptual Layout for Remedial Alternative 4
Kerr-McGee Chemical Corp. – Columbus Superfund Site
Columbus, Mississippi
Feasibility Study, OU-3 and OU-5
February 2023