RECORD OF DECISION

KERR-MCGEE COLUMBUS OPERABLE UNIT 2 SUPERFUND SITE

COLUMBUS, LOWNDES COUNTY, MISSISSIPPI

EPA ID: MSD990866329

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SUPERFUND DIVISION
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RECORD OF DECISION

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ACRONYMS AND ABBREVIATIONS

%	percent
ADD	average daily dose
AOC	area of concern
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
BaP	benzo(a)pyrene
BERA	Baseline Ecological Risk Assessment
Black & Veatch	Black & Veatch Special Projects Corp.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical(s) of concern
COPC	chemical(s) of potential concern
CSF	cancer slope factor
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FFS	Focused Feasibility Study
ft	foot or feet
HHRA	Human Health Risk Assessment
HI	hazard index
HMWPAH	high molecular weight PAH
HQ	hazard quotient
HRS	hazard ranking score
HSWA	Hazardous and Solid Waste Amendments
Integral	Integral Consulting Inc.
IC	institutional control(s)
KMCC	Kerr-McGee Chemical Corp.
LADD	lifetime average daily dose
LDR	land disposal restrictions
LMWPAH	low molecular weight PAH
MDEQ	Mississippi Department of Environmental Quality
mg/kg	milligrams per kilogram
MS	Mississippi
Multistate Trust	Greenfield Environmental Multistate Trust, LLC
NCP	National Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OU-2	Operational Unit 2
PAH	polycyclic aromatic hydrocarbon

ACRONYMS AND ABBREVIATIONS (Con't)

PCP	pentachlorophenol
PTW	Principal Threat Waste
RA	remedial action
Ramboll	Ramboll Environ US Corporation
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
RS	Responsiveness Summary
SARA	Superfund Amendments and Reauthorization Act
Site	Kerr-McGee Columbus Superfund Site
SI	site investigation
SPLP	synthetic precipitation leaching procedure
SVOC	semi-volatile organic compound(s)
SWMU	Solid Waste Management Unit
TBC	To Be Considered
TEQdf	toxicity equivalent for dioxins and furans
T/M/V	toxicity/mobility/volume
VOC	volatile organic compound

PART 1: DECLARATION

1.0 Site Name and Location

Kerr-McGee Columbus Superfund Site

2300 14th Avenue North, City of Columbus, Lowndes County, Mississippi

Superfund Site Identification Number MSD990866329

2.0 Statement of Basis and Purpose

This Record of Decision (ROD) presents the Selected Remedy for Operable Unit 2 (OU-2), at the Kerr-McGee Chemical Corporation (KMCC) **Superfund** Site (Site) located in Columbus, Mississippi (Figure 1). The Selected Remedy (Alternative 2: Removal and Disposal) was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) 42 U.S.C. Section 9617 of the Superfund and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as set forth in 40 Code of Federal Regulations (CFR) Part 300.430(f)(2). This decision is based on the Administrative Record (AR) for the Site. The scope of the OU-2 remedy is the surface soils at residential and commercial properties surrounding the former KMCC facility. The OU-2 study area included the 30.3-acre Former Sanderson Plumbing Property. The Former Sanderson Plumbing Property is not included in the scope of this remedy because further investigation, including additional sampling and analysis, is needed to evaluate potential risks to human health and the environment. This will be conducted in coordination with the State.

The U.S. Environmental Protection Agency (EPA) is the lead agency for Site activities, and the Mississippi Department of Environmental Quality (MDEQ) is the support agency. In accordance with 40 CFR Part 300.430(f)(2), MDEQ has provided input during the remedial investigation (RI) and focused feasibility study (FFS) and remedy selection process and the State of Mississippi concurs with the Selected Remedy (see Appendix A).

3.0 Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances to the environment; and pollutants or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare. Surface soils within OU-2 contaminated with dioxins and furans above health-based cleanup levels pose an unacceptable risk to human health.

4.0 Description of Selected Remedy

The Selected Remedy, Alternative 2 Removal and Disposal, includes the following key remedy components:

Excavation of surface soils (up to 2 feet below ground surface (bgs)) from properties with dioxins and furans exceeding the residential cleanup level (50 ppt TEQdf) (Figure 3);

- Beneficial reuse, onsite consolidation, or offsite disposal of excavated soils. The concentrations of dioxins and furans in all but one of the decision units (DUs) within OU-2 are less than the construction worker PRG (230 ppt TEQdf) and thus soils from these properties likely may be considered for beneficial reuse as backfill or cover in Site areas on the Former Main Plant Area (OU-3) designated for industrial/commercial land use;
- Beneficial reuse involves applying the excavated contaminated soil (that has been determined not to contain RCRA hazardous waste and meets chemical criteria) as backfill in areas on the Former Main Plant Area where the contaminated media do not pose a risk to human health and the environment. If considered for beneficial reuse, the excavated soils would be temporarily staged in the Former Main Plant Area and analyzed to determine if the material meets the chemical acceptance criteria for beneficial reuse. Soils identified for beneficial reuse will be stockpiled in the areas of the Former Main Plant Area. Beneficial reuse in areas of the Former Main Plant Area that are designated for industrial/commercial land use as part of future Site remedial actions would allow protective and cost-effective management of the OU-2 soils;
- Disposition of OU-2 soils that are unsuitable for beneficial reuse may be accomplished through onsite consolidation on the Former Main Plant Area where the soils would be managed with soils having similar levels of contamination in the Former Main Plant Area until a final remedy is approved for OU-3. Analytical data to date from the OU-2 areas and process knowledge show that these soils are not a hazardous waste. Notwithstanding, the consolidated soils will be protectively managed in accordance with RCRA regulations and guidance (identified as ARARs and/or To Be Considered) to prevent releases of hazardous substances into the environment. Onsite consolidation will be considered during the development of remedial alternatives for OU-3. Under this scenario, excavated OU-2 soils would be managed by consolidating them with similarly contaminated OU-3 soils;
- Alternatively, soils that are unsuitable for beneficial reuse or consolidation may be disposed of offsite at an EPA-approved, RCRA Subtitle D landfill, such as the Golden Triangle Regional Landfill in Starkville, Mississippi;
- Placement and final grading of imported clean backfill material suitable for residential or commercial/industrial use in the excavated areas;
- Restoration of property as close as possible to its original condition as agreed upon with property owners;
- Because this alternative involves removal of contaminated soils from OU-2 properties, no long-term O&M or post-remedy monitoring will be required; and
- 3- to 5-month implementation time frame.

The Selected Remedy will remove OU-2 soils on 11 properties with contaminant concentrations above the residential cleanup levels and will replace those soils with clean backfill. The Selected Remedy is the final action for the surface soil in OU-2. Following completion of the remedial action, OU-2 will be suitable for unlimited use and unrestricted exposure. There are no known principal threat wastes in OU-2.

The OU-2 remedial action will complement the ongoing time-critical removal action of the drainage ditches. This ROD also selects no action for the eighty-three parcels in OU-2 that were sampled and do not pose an unacceptable risk to human health or the environment. The other OUs of the Site are: OU-1,

the Pine Yard; OU-3, the process portion of the Former Main Plant Area; OU-4 Pine Yard Deep Zone; and OU-5, Northern Portion of the Former Main Plant Area, outside of process area (Figure 2). The ROD for OU-1 was finalized on May 6, 2019, and the remedial action is underway.

5.0 Statutory Determinations

The Selected Remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 U.S.C. § 9621, and the NCP at 40 CFR § 300.430(f)(1)(ii) because it: 1) is protective of human health and the environment; 2) meets a level or standard of control of hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under federal and state laws or justifies a waiver; 3) is cost effective; and 4) utilizes permanent solutions and alternative treatments (or resource recovery) technologies to the maximum extent practicable. Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action. Five-year reviews will be required for other OUs where contamination and/or waste is left in place at levels above those suitable for unrestricted use and unlimited exposure.

The remedy for OU-2 does not satisfy the statutory preference to use treatment to address principal threats as a principal element of the remedy because there are no principal threat wastes known to be present in OU-2 soils. During the identification, screening and evaluation of technologies conducted as part of the feasibility study, the treatment options (i.e., in situ stabilization) were considered. However, none were identified as viable alternatives for OU-2 because they would either be ineffective for the chemicals of concern (COCs) at the Site (dioxins and furans) or would limit future land use including construction options. Consequently, treatment options were eliminated from further consideration. The soils that are unsuitable for beneficial use and that are consolidated in OU-3 will require containment with a cover. Soils that are unsuitable for beneficial reuse or consolidation may also be disposed of offsite at an EPA-approved, RCRA Subtitle D landfill. This approach is consistent with EPA's expectation to use engineering controls for waste that poses a relatively low long-term threat (NCP Section 300.430(a)(1)(iii)(B)).

6.0 Data Certification Checklist

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

- Chemicals of concern and their respective concentrations (Section 5)
- Baseline risk represented by the chemicals of concern (Section 7)
- Cleanup levels established for chemicals of concern and the basis for these levels (Section 8)
- How source materials constituting principal threats will be addressed (Section 11)
- Current and reasonably anticipated future land use assumptions (Section 6)
- Potential land use that will be available at the Site as a result of the Selected Remedy (Section 6)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 10)

- Potential land use that will be available at the Site as a result of the Selected Remedy (Section 6);

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 10);

- Key factors that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 12).

7.0 Authorizing Signature

CAROL MONELL Digitally signed by CAROL MONELL
Date: 2020.09.29 13:56:04 -04'00'

Carol J. Monell, Director
Superfund & Management Emergency Division
U.S. Environmental Protection Agency, Region 4

Date

PART 2: THE DECISION SUMMARY

1.0 Site Name, Location, and Brief Description

The Kerr-McGee Chemical Corp. (KMCC) Columbus Superfund Site (Site), is located at 2300 14th Avenue North in Columbus, Lowndes County, Mississippi (EPA ID: MSD990866329). The U.S. Environmental Protection Agency is the lead agency for Site activities, and the Mississippi Department of Environmental Quality (MDEQ) is the support agency. Through the court-appointed Multistate Trust, the funds for the investigation and cleanup of the Site are provided by the parties responsible for the contamination.

The Site was an industrial wood treating facility operated by KMCC and its predecessors and successors from 1928 to 2003. Most of the Site consists of the property formerly owned and operated by KMCC (the "former KMCC facility"). The former KMCC facility covers approximately 90 acres and includes the Former Main Plant Area, located southwest of the intersection of 14th Avenue North and Moss Street, and the Pine Yard, located northwest of the same intersection. The Site is generally bounded by US 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, and the Pine Yard. Structures were visible at the facility through at least 2007, but all above-grade structures, other than the current office and operation and maintenance buildings (including one which houses the groundwater treatment system) appeared to have been demolished by 2010. The former KMCC facility is closed and access to the Site is restricted by a fence that encloses the entire property.

The EPA divided the Site into multiple OUs. OU-1 is defined as the parts of the Pine Yard with unsaturated contaminated soils with no groundwater contamination and no non-aqueous phase liquid (NAPL). The ROD for OU-1 was finalized on May 6, 2019, and the remedial action is underway. The subject of this ROD is OU-2, the surface soil contamination at residential and commercial properties surrounding the former KMCC facility. The OU-2 remedial action will complement the ongoing time-critical removal action of the drainage ditches. The OUs that are still under investigations include: OU-3 which will address the process area of the Former Main Plant Area; OU-4 which will address the Pine Yard Deep Zone; and OU-5, which will address the Northern Portion of the Former Main Plant Area, outside of the process area.

2.0 Site History and Enforcement Activities

2.1 Site Activities Leading to Current Problems

The wood treating facility was originally developed and operated by T.J. Moss Tie Company. Construction of the plant began on August 15, 1928, and the plant was completed in February 1929. KMCC acquired the Site in 1963 and continued wood treating operations until the facility was closed in 2003. Manufactured products included railroad wooden cross ties, switch ties, and preserved timbers. Wood preservatives used in the operation were primarily creosote, creosote coal tar solutions, and pentachlorophenol (PCP).

During wood treating operations, green lumber was received and sorted at the plant, and 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 that was allowed to dry naturally was stored in the green tie storage areas and in the Pine Yard. The

Boulton drying process involved subjecting the 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. 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.

After treatment, the wood was placed on a drip track for drying. KMCC installed a drip pad adjacent to the retort to collect excess preservative, or "drippage." KMCC reported that drippage collected on the drip pad was discharged to the production process oil/water separators. Treated lumber was supposed to remain on the drip track for 24 hours; however, former employees claimed that timbers were often taken on rail trams directly to the Pine Yard, immediately after coming out of the retort. Between 1992 and 1996, wood was stored throughout the facility, except for the northern portion of the Pine Yard. In 2003, the volume of wood storage was significantly reduced and by 2004, no wood storage or manufacturing activities were apparent at the Site in aerial photographs.

Contamination was transported to the OU-2 properties by various mechanisms, based on the pattern of dioxins and furans. In the Southeast Neighborhood, transport was via episodic flooding of stormwater from the Eastern and Southeastern ditches, and deposition of particulates to properties adjacent to the ditches. In the Southwest Neighborhood, this contaminant distribution suggests transport by fugitive dust and/or "track out" associated with traffic exiting the former KMCC facility. It is also possible that the Southwest Neighborhood properties may have been impacted by short-term aerial deposition during a fire or short-term release event at the former facility if the wind was blowing to the west at the time.

2.2 History of Investigations and Cleanup Actions

Multiple remedial and removal actions at the Site have been completed since 1986. The following investigations and cleanups occurred at the Site prior to 2020:

- 1986: Surface Impoundment Closure (Kearney/Centaur 1988)—Surface impoundments, identified as "Aeration Impoundment" and "Sedimentation Impoundment," were operated under RCRA Interim Status Standards until closure was completed in 1986.
- 1990 to Present: A groundwater extraction and treatment and DNAPL recovery system has been operational at the Former Main Plant Area since 1990.
- 2005: Ditch Sediment Removal (ERM 2005)—Interim measures were completed to remove sediment impacted by polycyclic aromatic hydrocarbons (PAHs) in the ditch system along the eastern Site boundary.
- 2006–2007: Ditch Sediment Removal (Tronox 2010)—Impacted soil was discovered during a City of Columbus drainage improvement project that began at Propst Park, approximately 2,200 ft southeast of the Site at the eastern end of 7th Avenue North (Tronox 2010).
- 2010–2011: Hunt School Removal Action (Tetra Tech 2011)—Removal evaluations and actions were conducted by Tetra Tech on behalf of EPA from October 2010 to May 2011. Removal actions were conducted at Hunt Intermediate School, at a residential property at 1009 Moss Street, and at Maranatha Faith Center.

- 2014–2015: 14th Avenue Ditch Improvement Project (Tetra Tech 2015)—The Multistate Trust's contractor (Tetra Tech) 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 drainage way.
- 2016: Residential Yard Removal—Soil was removed from the backyard of the residential property located at 2614 17th Avenue North where benzo[a]pyrene concentrations were found to exceed the residential regional removal management levels.
- 2016: 7th Avenue North Storm Drainage Ditch Removal Action—The first removal action to address contaminated ditch sediments and soils was implemented along the north side of 7th Avenue North, between the Maranatha Faith Center and North 28th Street. Work to remove the remaining areas of creosote from the ditch system is ongoing.
- The Pine Yard (OU-1) remedial action is underway to make the property at OU-1 available for community-supported redevelopment in as timely a manner as possible. The ROD for OU-1 was signed on May 6, 2019.

History of Investigations and Cleanup Actions for OU-2

Multiple investigations of surface soils at properties surrounding the former KMCC facility have been conducted since 2010. Figure 3 presents the soil sampling locations from the pre-RI, RI, and supplemental sampling in the OU-2 Study Area.

Pre-RI and RI soil sampling included samples collected in 2010 by the EPA Resource Conservation and Recovery Act (RCRA) program and by the EPA Superfund program in 2011. Additional sampling was completed by URS Corporation at the Buttons and Bows Day Care playground in 2011. None of the sampling results from these investigations exceeded the EPA's recommended preliminary remediation goal of 1,000 parts per trillion (ppt) toxicity equivalent concentrations of dioxins and furans (TEQdf) that was in effect for residential soils at the time.

However, in 2012, the EPA completed a reassessment of the noncancer toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin and the EPA established a residential PRG of 50 ppt TEQdf (and industrial PRG of 230 ppt TEQdf) which prompted additional investigation of dioxins and furans at the Site from 2014 to 2017. The PRGs become the cleanup levels in the ROD.

As part of the **Baseline Human Health Risk Assessment** (HHRA) for the Site, the Multistate Trust reviewed all of data collected through 2017 and determined that a total of 14 samples from 11 different properties had TEQdf concentrations greater than or equal to 50 ppt. Based on the findings of the baseline HHRA, supplemental sampling was recommended by the Multistate Trust to establish the extent of dioxins and furans in surface soils exceeding the residential PRG of 50 ppt TEQdf in properties surrounding the former KMCC facility. This supplemental sampling was completed in 2018 and 2019, and the results of those investigations are available in the "2018-2019 Private Property Dioxin/Furan Sampling Report."

The objective of the 2018-2019 soil sampling was to identify whether properties surrounding the former KMCC wood-treating facility have concentrations of dioxins and furans in surface soils at levels exceeding the residential PRG of 50 ppt TEQdf. The 2019 OU-1 ROD cleanup levels for dioxins and furans were used as the PRGs for dioxins and furans in OU-2 FFS. The sampling

program was developed based on consideration of historical data (specifically the results of the EPA's 2010/2011 dioxin/furan sampling) and the current conceptual site model for dioxins and furans.

2.3 History of CERCLA enforcement activities

The following is a brief summary of the regulatory history of the Site:

- KMCC submitted a Resource Conservation and Recovery Act (RCRA) Part A permit application in 1981 that notified 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 No.: HW-90-329-01) was issued to KMCC on September 11, 1990. The permit identified 15 SWMUs and areas of concern (AOCs) that required a RCRA facility investigation. The permit expired on September 11, 2000. The permit was renewed effective June 11, 2001, for a term of 10 years. The permit expired again on May 31, 2011 and was not reissued.
- EPA issued the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit to KMCC on August 1, 1995. The HSWA portion required the facility to investigate releases of hazardous waste or hazardous constituents and to take appropriate corrective action for such releases. The HSWA portion of the permit expired on August 1, 2005. KMCC submitted a letter to EPA dated April 1, 2005, requesting renewal of the HSWA portion of the RCRA permit. The permit was not reissued.
- Permit No. HW-90-329-01 was 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 previously noted, this permit expired on May 31, 2011 and was not reissued.
- EPA placed the Site on the Superfund Program's NPL on September 16, 2011. All O&M, compliance monitoring, and inspections of the closed surface impoundments and the groundwater extraction and treatment system are now subject to the applicable requirements of CERCLA which are or will be addressed in a ROD(s).

Tronox Inc. (KMCC's corporate successor) resolved its environmental liabilities pursuant to a bankruptcy settlement approved by the Court in 2011, which established the Multistate Trust. In 2014, Anadarko Petroleum Corp. settled with the U.S. Department of Justice to resolve fraudulent conveyance claims related to KMCC's environmental liabilities. The settlements provided funding for EPA and the Multistate Trust to continue conducting assessments and cleanup work at the Site. Additional regulatory history for the Site is summarized in the 2018 RI (EarthCon and Integral, 2018).

3.0 Community Participation

The public has been informed of the progress on the RI and FFS and other Superfund actions through community notification flyers, presentations, and updates in accordance with the

community involvement plan developed for the Kerr-McGee Columbus Site. The Proposed Plan for OU-2 was released for public comment on August 4, 2020. The Proposed Plan and other Site-related documents were made available to the public in the administrative record file maintained in the information repository located online at: https://semspub.epa.gov/src/collections/04/AR/MSD990866329. The local information repository is the Columbus-Lowndes Public Library, 314 N. Seventh Street, Columbus, Mississippi, which is open and provides computer access for the community to access the online administrative record file. The notice of availability of these documents was published in the Columbus Dispatch, on August 4, 2020. A public comment period was held from August 4th, to September 5th 2020.

Due to public health concerns related to spread of the COVID-19 virus, the EPA did not hold an in-person public meeting about the Proposed Plan. The EPA and its Superfund site teams have cancelled or postponed in-person public meeting events, door-to-door visits, and other site-related face-to-face interactions to reflect current COVID-19 guidance from federal, state, tribal and local officials. Protecting the health and safety of our staff, contractors, and the communities we serve is our top priority.

The EPA posted online a pre-recorded video presentation where the Remedial Project Manager (RPM) for the Site presented the Proposed Plan. The presentation, complete with closed captioning, is accessible at www.epa.gov/superfund/kerr-mcgee-chemical-columbus.

Through these alternative means, the EPA sought to provide a full opportunity for public participation and comment without risking public health. However, the EPA offered the opportunity for a live virtual meeting if the community requested one. The community did not request a live meeting. Comments that were received by EPA during the public comment period are summarized and addressed in the Responsiveness Summary (see Part 3 and Appendix B).

The EPA, MDEQ, and the Multistate Trust conduct regular Community Advisory Group meetings with the Memphis Town Community Advisory Group as part of the ongoing remedial and removal actions underway at the Site. The Multistate Trust provides community updates through regular factsheets. The EPA and the Multistate Trust maintain websites with additional information at www.epa.gov/superfund/kerr-mcgee-chemical-columbus and columbus.greenfieldenvironmental.com/

The EPA, MDEQ, and the Multistate Trust are using a T.E.A.M. (Together Everyone Accomplishes More) concept with a locals first approach to conduct the cleanup work. To date, over 90 percent of the construction work has been done by local contractors. The EPA, MDEQ, and the Multistate Trust also have conducted several focus group forums to get community input for post-cleanup redevelopment and reuse options. For OU-2, the reasonably anticipated future land use is based on input received during the community meetings and from local stakeholders.

4.0 Scope and Role of the Response Action

The overall strategy for remedial action at the KMCC Columbus Site is to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Due to its size and complexity, the KMCC Site has been divided into multiple OUs.

- OU-1: The Pine Yard unsaturated contaminated soils. The remedial action is ongoing pursuant to a 2019 ROD.
- OU-2: Residential/Commercial Properties with Site-related contamination above clean-up levels
- OU-3: The process portion of the Former Main Plant Area;
- OU-4: Pine Yard Deep Zone; and
- OU-5: Northern Portion of Former Main Plant Area, outside of the process area.

The scope of this ROD is OU-2 surface soils at residential and commercial properties surrounding the former KMCC facility. The overall cleanup strategy for OU-2 is removal of surface soils that contain dioxins and furans at TEQdf concentrations that exceed the human health-based cleanup levels based upon residential direct exposure. The ecological risk assessment found that OU-2 does not contain ecological habitat, so there are no unacceptable ecological risks in OU-2. The OU-2 remedial action and the ongoing time-critical removal action of the drainage ditches will address off-facility contaminated areas of the Site. The OU-2 study area included the 30.3-acre Former Sanderson Plumbing Property, which is not included in the scope of this remedy. The Former Sanderson Plumbing Property requires further investigation, including additional sampling and analysis, to evaluate the potential risks to human health and the environment, which will be conducted in coordination with the State.

5.0 Site Characteristics

5.1 Conceptual Site Model

The Conceptual Site Model (CSM) incorporates information on the potential chemical sources, affected media, release mechanisms, routes of migration, and known or potential human and ecological receptors. In this way, it illustrates the physical, chemical, and biological relationships between contaminant sources and affected resources. One simplified, idealized CSM depicting important features of the surface soil, sources of contamination, and aspects of contaminant degradation and migration was developed for the Site.

Transport of dioxins and furans from the former KMCC facility is directly tied to particulate transport mechanisms. These mechanisms are described below:

- Airborne Transport (e.g., windblown dust, air emissions associated with burning)—The prevailing wind directions are from the north-northwest and south-southeast suggesting that impacts associated with airborne transport of dioxins and furans would occur predominantly north-northwest and south-southeast of the former KMCC facility. However, impacts associated with short-term releases (e.g., a fire) would follow the wind direction at the time of the event;
- Storm Runoff—Flooding of stormwater runoff from the Eastern Ditch and Southeastern Ditch is believed to be a primary mechanism by which dioxins and furans associated with the former KMCC facility were transported to and deposited in surface soils in properties located east of the Site; and
- Vehicular Transport—Historically, an entrance to the former KMCC facility was located at the intersection of 21st Street North and 13th Avenue North, on the western side of the

property. It is possible that properties in this area may have been impacted by dioxins and furans associated with the facility as a result of the vehicular traffic related to the former KMCC facility and associated transport mechanisms (e.g., fugitive dust from trucks, track out).

5.2 Overview of the Site

The former KMCC facility is about 90 acres. The extent of OU-2 parcels requiring an action under this ROD are collectively about 3.2 acres.

5.2.1 Geologic, Hydrogeologic, and Topographic Information

The former KMCC facility is relatively flat. Stormwater has historically infiltrated into the ground or flowed into a series of drainage ditches that run through and adjacent to the Site. Ultimately, the drainage ditches flow through the 7th Avenue Ditch to Luxapalila Creek. Stormwater runoff transports particulates to properties located along the ditches during flooding. Flood maps show that much of the Southeast Neighborhood falls within the Luxapalila Creek 100-year floodplain (Federal Emergency Management Agency Flood Insurance Rate Map Number 28087C0170K (revised February 18, 2011)). The Eastern Ditch is subject to episodic flooding, and water in the ditch has historically flooded onto properties adjacent to the ditch during large storm events. Flooding from the Eastern Ditch and Southeastern Ditch is believed to be a primary mechanism by which contaminants from the former KMCC facility were transported to and deposited on properties located east of the Site.

5.3 Sampling Strategy

The sampling strategy was developed based on historical data and the CSM for dioxins and furans. An adaptive approach was employed during the sampling program, where the results of the initial sampling efforts were evaluated and used to inform the need for, and scope of, additional sampling events to bound the extent of TEQdf ≥50 ppt in the OU-2 Study Area property soils.

A supplemental sampling program was initiated in October 2018, with two additional sampling events completed in January and April 2019. Properties were selected for sampling to bound the extent of soils contaminated above 50 ppt TEQdf. Each property identified for sampling was divided into one or more decision units (DUs) based on potential for human exposure and/or other factors (such as proximity of a portion of the property to the former KMCC facility or drainage ditch that conveys stormwater from the facility). In most cases, residential properties were divided into a front yard and back yard DU. Surface soils were sampled from 0 to 1 ft bgs using the multi-increment sampling (MIS) methodology to provide a representative average of concentrations of dioxins and furans in the top 1 ft of surface soil within a decision unit. The 11 properties with historical (pre-2018) surface sampling results of ≥40 ppt TEQdf were re-sampled using the MIS method to better quantify average TEQdf concentrations in the top foot of surface soil. Because dioxins and furans have limited opportunity for vertical migration, and because surface soils represent the depth horizon with the highest potential for human exposure, the sampling focused on the top 1 ft of soils (0 to 1 ft bgs). Five-point composite samples were collected from 1 to 2 ft bgs for dioxins and furans analysis at any DU where the 0 to 1 ft bgs soil sample had a TEQdf concentration equal to or greater than 50 ppt.

5.4 Known or Suspected Sources of Contamination

Historical wood-treating operations in the Former Plant Area are understood to have been the primary source of dioxins and furans observed at the Site. Dioxins and furans are contaminants that can be formed as by-products during the production of PCP and are thus a common contaminant at wood treatment sites, such as Columbus, where PCP was used as part of the wood treatment process.

5.5 Nature and Extent of Contamination

Between 2010 and 2019, the EPA, MDEQ and the Multistate Trust conducted extensive sampling of surface soils to evaluate the impact of wood-treating operations on the properties near the former KMCC facility. The OU-2 Study Area included sampling of more than 200 properties for Site-related contaminants. Of those, 96 properties in the North Neighborhood, Southwest Neighborhood and Southeast Neighborhood were sampled for dioxins and furans (Figure 3). Lab results found that 11 DUs at 11 different properties have dioxins and furans in surface soil requiring cleanup due to concentrations exceeding the residential PRG (50 ppt TEQdf). The other 83 residential properties do not pose an unacceptable risk to human health or the environment.

In the 11 DUs contaminated above the PRG in the top 1 foot of soil, the 1 to 2-foot interval was sampled. Three of the 11 DUs also exceeded the PRG in the 1 to 2 ft bgs samples. The table below summarizes the sampling results for OU-2.

Summary of Supplemental Sampling Results

Location	DUs Sampled	DUs with 0–1 ft bgs Surface Soil TEQdf ≥50 ppt	DUs with 0–2 ft bgs Surface Soil TEQdf ≥50 ppt
Southwest Neighborhood	37	3	1
North Neighborhood	9	0	NA
Southeast Neighborhood	49	5	2

Notes:
NA = not applicable
TEQdf = toxicity equivalent concentrations of dioxins and furans
ppt = parts per trillion
TEQdf was analyzed in 1–2 ft bgs surface soil samples for DUs with TEQdf ≥50 ppt in 0–1 ft bgs surface soils.

Ninety-four properties in the Study Area were evaluated based on anticipated residential land use:

Southeast Residential Neighborhood

- Seven DUs in the Southeast Neighborhood posed an unacceptable risk to human health based on residential land use. The observed pattern of contamination in OU-2 properties in the Southeast Neighborhood suggests transport via episodic flooding of stormwater from the Eastern and Southeastern ditches, and deposition of particulates to properties

adjacent to the ditches. All seven of the DUs exceeding 50 ppt TEQdf in the Southeast Neighborhood are located adjacent to the Eastern, Southeastern, and Southern ditches, while DUs located further from the ditches (e.g., on the other side of the home on residential parcels) were below 50 ppt TEQdf (Figure 3).

Southwest Residential Neighborhood

- Four DUs in the Southwest Neighborhood posed an unacceptable risk to human health based on residential land use. The four properties exceeding 50 ppt TEQdf in the Southwest Neighborhood are all located in the vicinity of the former KMCC facility entrance, at the intersection of 21st Street North and 13th Avenue North (Figure 3). In all cases, the DUs exceeding 50 ppt TEQdf abut one or both of these roads. This distribution suggests that these properties were impacted by fugitive dust and/or track out associated with traffic exiting the former KMCC facility. It is also possible that these properties may have been impacted by short-term aerial deposition during a fire or short-term release event at the former facility if the wind was blowing to the west at the time of the event. The impacted properties are topographically higher than the former process area of the KMCC facility, indicating that storm runoff was not a likely source of dioxins and furans to the Southwest Neighborhood.

No Action Properties in Study Area Based on Residential Land Use

- Eighty-three of the properties sampled in the Study Area met EPA's criteria for a No Action remedial decision because sampling results found no unacceptable risk to human health based on residential land use.

Properties in Study Area Evaluated Based on Industrial / Commercial Land Use

Two properties in the Study Area were evaluated based on current and reasonably anticipated future industrial/commercial land use. The EPA used the construction worker PRG of 230 ppt TEQdf to determine if there was an unacceptable risk based on Industrial / Commercial Land Use. Key findings of the supplemental sampling for these properties include:

- Five discrete soil samples were collected from the property east of the former KMCC facility (IDs 18-43 through 18-47). One of the five discrete samples had a concentration of 390 ppt TEQdf. The sample is located in the northern end of the property in the area where the former KMCC facility Drainage Ditch 4 passes through the property (Figure 3). A DU was subsequently defined for the northern portion of this property and sampled using multiple increment sampling in October 2019—resulting in a concentration of 75.9 ppt TEQdf. Because this result is less than the construction worker PRG (230 ppt TEQdf), the property meets the no action criteria; and

- Six discrete samples were collected from the 30.3-acre Former Sanderson Plumbing property (IDs 19-16 through 19-21). One of the six discrete samples had a concentration of 296 ppt TEQdf. The sample is located in the northeast end of the property. The Former Sanderson Plumbing Property is not included in the scope of this remedy because further investigation, including additional sampling and analysis, is needed to evaluate potential

risks to human health and the environment. This will be conducted in coordination with the State.

5.5.1 Quantity/volume of waste that needs to be addressed.

This remedial action will address about 7,000 cubic yards of contaminated soil, which may change based on additional delineation sampling.

5.5.2 Concentrations of COCs in each medium.

Contaminated soils in the 11 DUs requiring an action in OU-2 are contaminated between 56 and 368 ppt TEQdf. The average TEQdf concentration of the 11 DUs is 119.6 ppt TEQdf

5.5.3 RCRA hazardous wastes and affected media.

Soil in OU-2 has been determined to not contain RCRA hazardous waste based upon TCLP sampling/testing and process knowledge associated with origins of the contamination at the affected properties.

6.0 Current and Potential Future Land Uses.

The OU-2 Study Area includes both residential and commercial/industrial zoning. However, in an abundance of caution, the EPA has determined that the reasonably anticipated future land use of residential is appropriate for most of OU-2. The residential PRG was applied to the vast majority of the OU-2 Study Area properties. Eleven areas exceeded the residential PRG and require remedial action. Eighty-three areas did not exceed the residential PRG, and thus meet the EPA's criteria for a No Action remedial decision .

Two properties in the OU-2 Study Area were evaluated based on a current and reasonably anticipated industrial/commercial land use. The construction worker PRG was applied to these properties to determine if there was an unacceptable risk. One property met the criteria for no action based on industrial/commercial land use. The second property, the Former Sanderson Plumbing Property is not included in the scope of this remedy because further investigation, including additional sampling and analysis, is needed to evaluate potential risks to human health and the environment. This will be conducted in coordination with the State.

7.0 Summary of Site Risks

The EPA and MDEQ adopted the cleanup levels from the OU-1 ROD to use in OU-2 because the exposure parameters for evaluating OU-1 soils the OU-1 cleanup levels are identical for to those used for evaluating OU-2 soils. This ROD includes an estimate of the unacceptable risks in OU-2 based on the soil sampling data collected through 2019. The discussion below describes the Site-wide risk assessments that were completed in 2018.

A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a human health risk assessment (HHRA) and a baseline ecological risk assessment (BERA). It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. A baseline HHRA was completed in August 2018 (Integral 2018) to estimate the risks and hazards associated with the current and future effects of

contaminants on human health and the environment. A BERA was also conducted in 2018 (Ramboll, 2018) to assess the risks posed to ecological receptors due site- related contamination. The purpose of the baseline HHRA and BERA is to identify potential cancer risks and noncancer health hazards and ecological effects caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future (residential and industrial) site uses.

7.1 Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario:

- Hazard Identification – uses the analytical data collected to identify the chemicals of potential concern (COPC) at the site for each medium, with consideration of several factors explained below;
- Exposure Assessment - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed;
- Toxicity Assessment - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and
- Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contamination with concentrations which exceed acceptable levels, defined by the NCP as an excess lifetime cancer risk greater than 1 x 10^{-6} to 1 x 10^{-4}, or a Hazard Index greater than 1.0; contaminants at these concentrations are considered COCs and are typically those that will require remediation at the site. Also included in this section is a discussion of the uncertainties associated with these risks.

The HHRA estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the HHRA for this site.

7.1.1 Hazard Identification

The HHRA considered all data collected at the Site through 2017 and identified the data needs that were the basis for the supplemental sampling completed in 2018 and 2019. The results of the supplemental sampling were evaluated in an addendum to the HHRA and are presented in Appendix A of the OU-2 FFS. The risk assessment selected chemicals of potential concern (COPCs) for further evaluation by comparing maximum detected concentrations in surface soils (0–2 ft bgs) and subsurface soils (2–10 ft bgs) to residential screening values available from EPA. If the maximum detected concentration was higher than the screening level, the chemical was selected as a COPC for further evaluation. Based on this screening, for OU-2 Study Area properties, ten chemicals were selected as surface soil COPCs. No chemical concentrations detected in subsurface soils exceeded residential screening values, and therefore no subsurface COPCs were selected for further evaluation. The HHRA evaluated the potential for excess

lifetime cancer risks and noncancer hazards to current and future residential receptors with assumed exposure to COPCs in surface soils.

7.1.2 Exposure Assessment

The exposure assessment calculates potential chemical intake, or exposure concentration, for the exposure pathways evaluated in the HHRA. Exposure is a function of the chemical concentration at the point of contact (i.e., exposure point concentrations or EPCs) and parameters that characterize the activity patterns of the potentially exposed receptors. OU-2 is zoned for residential/industrial use. Under current conditions, use of the former facility is limited to workers and trespassers. A broader set of receptor groups, including residents, recreators, and trespassers, use the areas surrounding the former facility. A range of future use scenarios (e.g., residential, industrial/commercial worker, indoor worker scenarios) was evaluated in the HHRA to support decisions regarding the management of the Site. The CSM for the site is shown as Figure 4. The following exposure pathways were evaluated in the HHRA:

- Residents (future)—incidental ingestion of surface soil, dermal contact with surface soil, inhalation of particulates and volatile compounds in outdoor air;
- Outdoor workers (future)—incidental ingestion of surface soil, dermal contact with surface soil, and inhalation of particulates and volatile compounds in outdoor air;
- Indoor workers (future)—incidental ingestion of surface soil;
- Construction workers (future)—incidental ingestion of soil, dermal contact with soil, and inhalation of particulates and volatiles in outdoor air. (Exposure to the surface and subsurface soil increments were evaluated separately for construction workers); and
- Trespasser (current, future)—incidental ingestion of soil and dermal contact with surface soil.

The exposure parameters used to calculate the risk to receptors are summarized in Table 4-1 in the 2018 HHRA with details on the sources and rationale for each exposure parameter included in Appendix C of the HHRA document (Integral, 2018b).

7.1.3 Toxicity Assessment

The toxicity assessment summarizes the health effects that may be associated with exposure to the COPCs selected for the risk assessment and identifies doses that may be associated with those effects. It involves evaluating the potential for a constituent to cause an increase in the incidence of adverse effects in exposed individuals and quantitatively characterizing the chemical dose and the incidence of adverse health effects in the exposed receptor. The potential toxicological effects induced by a given dose of a chemical are classified as either non-cancer effects or cancer effects. Toxicity values typically employed to calculate baseline non-carcinogenic hazards include reference doses (RfDs) for oral and dermal exposures and reference concentrations (RfCs) for inhalation exposures; oral and dermal cancer slope factors (CSFs) and inhalation unit risks (IURs) are typically used to estimate carcinogenic risks. Constituent-specific toxicity values were used to calculate potential effects for these two types of effects. Toxicological criteria were selected following EPA's hierarchy (USEPA, 2003), as follows for the HHRA:

- Tier 1 - EPA's Risk Assessment Information System (IRIS), (EPA, 2018a);

- Tier 2 - EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), (EPA, 2018b); and
- Tier 3 - Other toxicity values including EPA and non-EPA sources of toxicity information including, but are not limited to:
  - California's Office of Environmental Health Hazard Assessment (OEHHA);
  - Agency for Toxic Substances and Disease Registry (ATSDR);
  - EPA Health Effects Assessment Summary Table (HEAST) values.

Chronic toxicological criteria were used for all exposure scenarios evaluated in the HHRA.

7.1.4 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Cancer Risk (unitless) = LADD x CSF

Where: LADD = lifetime average daily dose of the chemical (mg/kg-day)
CSF = cancer slope factor (kg-day/mg)

Cancer risk estimates are expressed as the incremental probability that the individual described by an exposure scenario might develop cancer during his or her lifetime as a result of exposure to COPCs in the area under study. The term "incremental" reflects the fact that the calculated risk associated with any exposures is in addition to the background risk of cancer experienced by all individuals in the course of daily life. Lifetime cancer risks are calculated as the product of the estimated dose and the expression of the carcinogenic potency of a chemical.

Both federal and state regulatory agencies define what they consider to be an acceptable level of incremental cancer risk associated with exposure to chemicals in environmental media. These risks are probabilities that usually are expressed in scientific notation (e.g., 1E-06 or 10^{-6}). An excess lifetime cancer risk of 10^{-6} indicates that an individual experiencing the RME estimate has a 1 in 1,000,000 chance of developing cancer over a 70-year lifetime as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. For cancer risk, EPA considers 10^{-4} to 10^{-6} to be the acceptable risk range.

Noncancer health risks are termed hazards. The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQ's from different contaminants and exposure

routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health. The hazard quotient (HQ) is calculated as:

Non-cancer HQ = ADD / RfD

Where: ADD = average daily dose of the chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

Cancer Risk

The residential cleanup level that corresponds to a Cancer Risk of 10^{-4} (1 in 10,000) is 477 ppt TEQdf. In OU-2, with an average TEQdf of 120, the Cancer Risk would be approximately 2.5 x 10^{-5}. This is within the range of acceptable cancer risk.

Noncancer Hazard

The residential cleanup level that corresponds to an HI of 1 is 50 ppt TEQdf. In OU-2, with an average TEQdf of 120, the HI would be approximately 2.4. The minimum TEQdf was 56, which would be an approximate HI of 1.1. The maximum TEQdf was 368, which would be an approximate HI of 7.4. This is above the acceptable hazard level and represents an unacceptable risk under CERCLA.

7.2 Ecological Risk Assessment

The 2018 BERA did not identify any ecological habitat within OU-2. Therefore, based on the findings of the BERA, it was concluded that there are no ecological risks in OU-2.

7.3 Basis for Action

Based on the results of the baseline risk assessment, the response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Residential land use was assumed for most of the OU-2 Study Area. Eleven areas pose an unacceptable risk to human health and require remedial action, with estimated noncancer hazard indexes ranging from 1.1 to 7.4 for residential exposure scenarios. Figure 5 shows the OU-2 properties requiring remedial action under this ROD. Eighty-three areas did not pose an unacceptable risk to human health, and thus meet the EPA's criteria for a No Action remedial decision.

Two properties in the OU-2 Study Area were evaluated based on a current and reasonably anticipated industrial/commercial land use. One property did not pose an unacceptable risk to human health and met the criteria for no action based on industrial/commercial land use. The second property, the Former Sanderson Plumbing Property, is not included in the scope of this remedy because further investigation, including additional sampling and analysis, is needed to evaluate potential risks to human health and the environment. This will be conducted in coordination with the State.

8.0 Remedial Action Objectives

Before developing cleanup alternatives for a Superfund site, EPA establishes remedial action objectives (RAOs) to protect human health and the environment. RAOs are specific goals to protect human health and the environment. These objectives 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.

The following RAOs have been identified for OU-2:

- Prevent potential unacceptable risk to humans due to exposure to surface soils (up to 2 ft bgs) with concentrations of dioxins and furans above the residential PRG of 50 ppt TEQdf at properties that presently have a residential use or have a reasonable potential for future residential use;
- Prevent potential unacceptable risk to industrial/commercial workers due to potential exposure to surface soils (up to 2 ft bgs) with concentrations of dioxins and furans above the PRG of 230 ppt TEQdf at properties assumed to have a future industrial/commercial use;
- Prevent potential unacceptable risk to construction workers from potential exposure to surface and subsurface soils with concentrations of dioxins and furans above the construction worker PRG of 230 ppt TEQdf; and
- Prevent/minimize the migration of dioxins and furans from contaminated surface soils through stormwater runoff or wind dispersion of fugitive dust.

Cleanup levels to meet the RAOs are identified in the below table. The OU-1 ROD included soil cleanup levels for both residential and industrial/commercial land use. Based on the EPA's determination of the reasonably anticipated future land uses, the EPA is using residential cleanup levels for most of the OU-2 Study Area and is using the industrial/commercial cleanup levels for two properties.

Surface Soil COCs and Cleanup Levels for Residential and Industrial/Commercial Land Use

	Residential		Industrial/Commercial	
COC	Cleanup Level (ppt)	Basis	Cleanup Level (ppt)	Basis
TEQdf	50	Noncancer	230	Noncancer

Notes: For non-residential soil, the lower of the industrial/commercial and construction worker cleanup level are shown.
nc = noncancer basis; noncancer cleanup levels are based on a target hazard index of 1; COC = chemical of concern; TEQdf = toxicity equivalent concentration for dioxins and furans

9.0 Description of Alternatives

The four remedial alternatives identified in the FFS for OU-2 soils are:

- Alternative 1: No Action—No action provides an assessment of the "as is" condition as a baseline for evaluating active remedial alternatives;

- Alternative 2: Removal and Disposal—This alternative includes the following main elements: excavation of contaminated OU-2 soils, placement of clean backfill, and disposal and/or reuse of excavated soils;
- Alternative 3: Soil Cover— This alternative includes the following main elements: placement of a soil cover consisting of imported clean fill material suitable for residential or commercial/industrial use; and restoration of property as agreed upon with property owners; and
- Alternative 4: In Situ Stabilization— This alternative includes the following main elements: Mixing of a stabilizing reagent (e.g., cement or similar) in the soils to bind the contamination in place; and restoration of property as agreed upon with property owners.

Terminology used to describe and differentiate the alternatives are described further below:

- Capital costs – Capital Costs are those expenditures that are required to construct a remedial alternative;
- Operational and Maintenance (O&M) costs – O&M are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis;
- Indirect costs – These are the project and construction management costs necessary for the management of the remedial action as well as costs associated with institutional controls;
- Present value – This represents the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project, calculated using a discount rate of seven percent and a 30-year time interval; and
- Construction time – This is the time required to construct and implement the alternative and does not include the time required to design the remedy, negotiate performance of the remedy with the responsible parties, or procure contracts for design and construction.

9.1 Alternative 1 - No Action

Estimated Capital Cost: $0

Estimated Annual Operation and Maintenance Cost: NA

Indirect Costs: $0

Net Present Value: $70,000

Estimated Construction Timeframe: 0 year

Estimated Time to Achieve RAOs: RAOs would not be met

The NCP requires that a “No Action” alternative be developed as a baseline for comparing other remedial alternatives. No remedial action or **monitoring** would be performed under this

alternative. The No Action alternative provides for an assessment of the environmental conditions if no remedial actions are implemented. Under the No Action Alternative, no funds would be expended for remediation of OU-2 soils.

The minimum activities for the No Action Alternative include the mandatory 5-year reviews over the course of a 30-year period, resulting in a total of six 5-year reviews.

9.2 Alternative 2 - Removal and Disposal

Estimated Capital Cost: $1,702,000 - $2,293,000

Estimated Annual Operation and Maintenance Cost: NA

Indirect Costs: $371,000 - $394,000

Net Present Value: $2,087,000 – 2,701,000

Estimated Construction Timeframe: 3 to 5 months

Estimated Time to Achieve RAOs: 3 to 5 months

Alternative 2 includes the following key elements:

- Excavation of surface soils (up to 2 ft bgs) from private property DUs with concentrations of dioxins and furans that exceed the residential PRG (50 ppt TEQdf) (Figure 5);
- Beneficial reuse, onsite consolidation, or offsite disposal of excavated soils. The concentrations of dioxins and furans in all but one of the DUs within OU-2 are less than the construction worker PRG (230 ppt TEQdf) and thus likely may be considered for beneficial reuse as backfill or cover in Site areas on the Former Main Plant Area (OU-3) designated for industrial/commercial land use;
- Beneficial reuse involves applying the excavated contaminated soil (that has been determined not to contain RCRA hazardous waste and meets chemical criteria) as backfill in areas on the Former Main Plant Area where the contaminated media do not pose a risk to human health and the environment. If considered for beneficial reuse, the excavated soils would be temporarily staged in the Former Main Plant Area and analyzed to determine if the material meets the chemical acceptance criteria for beneficial reuse. Soils identified for beneficial reuse will be stockpiled in the areas of the Former Main Plant Area. Beneficial reuse in areas of the Former Main Plant Area that are designated for industrial/commercial land use as part of future Site remedial actions would allow protective and cost-effective management of the OU-2 soils;
- Disposition of OU-2 soils that are unsuitable for beneficial reuse may be accomplished through onsite consolidation on the Former Main Plant Area where the soils would be managed with soils having similar levels of contamination in the Former Main Plant Area until a final remedy is approved for OU-3. Analytical data to date from the OU-2 areas show that these soils are not a hazardous waste. The consolidated soils will be protectively managed in accordance with relevant RCRA regulations and guidance.

Onsite consolidation will be considered during the development of remedial alternatives for OU-3. Under this scenario, excavated OU-2 soils would be managed by consolidating them with similarly contaminated OU-3 soils;

- Alternatively, soils that are unsuitable for beneficial reuse or consolidation may be disposed of offsite at an EPA-approved, RCRA Subtitle D landfill, such as the Golden Triangle Regional Landfill in Starkville, Mississippi;
- Placement and final grading of imported clean backfill material suitable for residential or commercial/industrial use in the excavated areas;
- Restoration of property as agreed upon with property owners;
- Because this alternative involves removal of contaminated soils from OU-2 properties, no long-term O&M or post-remedy monitoring will be required;
- 3- to 5-month implementation time frame; and
- Removal of soils with concentrations exceeding the applicable PRG would be a highly effective and permanent remedy for OU-2 soils and would meet all the CERCLA criteria, as is summarized below.

Key ARARs associated with Alternative 2 include Clean Water Act (CWA) regulations for control of erosion due to stormwater runoff while conducting land disturbing activities, RCRA requirements for characterization of contaminated soil, temporary staging, and transportation/disposal. Work conducted in a 100-yr floodplain will be conducted to minimize adverse impacts per Executive Order 11988 Section 1. *Floodplain Management* and associated FEMA regulations identified as ARARs and **To Be Considered** Guidance (TBC).

9.3 Alternative 3 – Soil Cover

Estimated Capital Cost: $1,114,000

Estimated Annual Operation and Maintenance Cost: NA

Indirect Costs: $359,000

Net Present Value: $1,487,000

Estimated Construction Timeframe: 3 to 5 months

Estimated Time to Achieve RAOs: 3 to 5 months

Alternative 3 includes the following key elements:

- Placement of a soil cover consisting of imported clean fill material suitable for residential or commercial/industrial use;
- Restoration of property as agreed upon with property owners;
- Routine monitoring of the cover integrity and maintenance as required;

- Implementation of institutional controls, where possible to limit activity/use that could disturb the soil cover;
- A 3- to 5-month implementation time frame is anticipated for placement of the soil cover; and
- Covering the soils with concentrations exceeding the applicable PRG would be an effective and permanent remedy for OU-2 soils, however, would not meet all the CERCLA criteria, as is summarized below.

Key ARARs associated with Alternative 3 include CWA regulations for control of erosion due to stormwater runoff while conducting land disturbing activities, RCRA requirements for characterization of contaminated soil, temporary staging, and disposal. Additionally, the MS RCRA landfill requirements for a vegetated cover are relevant and appropriate. Work conducted in a 100-yr floodplain will be conducted to minimize adverse impacts per Executive Order 11988 Section 1. *Floodplain Management* and associated FEMA regulations identified as ARARs and TBC.

9.4 Alternative 4 – In Situ Stabilization

Estimated Capital Cost: $1,342,000

Estimated Annual Operation and Maintenance Cost: NA

Indirect Costs: $357,000

Net Present Value: $1,713,000

Estimated Construction Timeframe: 3 to 5 months

Estimated Time to Achieve RAOs: 3 to 5 months

Alternative 4 includes the following key elements:

- Mixing of a stabilizing reagent (e.g., cement or similar) in the soils to bind the contamination in place;
- Restoration of property as agreed upon with property owners;
- Routine monitoring of the treated soils and maintenance as required;
- A 3- to 5-month implementation time frame is anticipated for treatment of the soils; and
- Stabilizing the soils with concentrations exceeding the applicable PRG would be an effective and permanent remedy for OU-2 soils, however, would meet few of the CERCLA criteria, as is summarized below. As a result, Alternative 4 has an overall poor ranking with respect to the CERCLA criteria.

Key ARARs associated with Alternative 4 include CWA regulations for control of erosion due to stormwater runoff while conducting land disturbing activities, RCRA requirements for characterization of contaminated soil, temporary staging, and disposal. Additionally, the MS RCRA landfill requirements for a vegetated cover are relevant and appropriate. Work conducted

in a 100-yr floodplain will be conducted to minimize adverse impacts per Executive Order 11988 Section 1. *Floodplain Management* and associated FEMA regulations identified as ARARs and TBC.

10.0 Comparative Analysis of Alternatives

In selecting a remedy, EPA considered the factors set out in Section 121 of CERCLA, 42 U.S.C.§ 9621, by conducting a detailed analysis of the viable remedial response measures pursuant to the NCP, 40 CFR §300.430(e)(9), and OSWER Directive 9355.3-01. The detailed analysis consisted of an assessment of each of the individual response measures per remedy component against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each response measure against the criteria. This section of the ROD describes the relative performance of each alternative against seven of the nine criteria, noting how each compare to the other options under consideration. A detailed analysis of the alternatives can be found in the 2019 Final FFS Report (Integral, 2019) and Proposed Plan for OU-2.

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

10.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through exposure pathway are eliminated, reduced or controlled, through treatment, engineering controls and/or ICs.

All alternatives evaluated in the FFS except for Alternative 1 (No Action) would be protective of human health and the environment. The current condition of surface soils for a portion of the OU-2 properties represents a potentially unacceptable risk and does not meet the RAO. Without engineering and controls and institutional controls (in the form of land use restrictions) there is a potential for exposure to OU-2 soils for current and future site users.

Alternatives 2 through 4 will effectively meet the threshold criteria. Alternative 2 will result in conditions that are protective and meet the RAOs by removing OU-2 soils with TEQdf concentrations above the residential PRG and replacing those soils with clean backfill. Under this alternative, excavated soils would be beneficially reused as fill, where appropriate, or, if the soils are unsuitable for beneficial reuse, they either would be consolidated in the Former Main Plant Area or would be transported off-site to a permitted RCRA landfill for disposal.

Alternative 3 will meet the RAOs by isolating OU-2 soils with TEQdf concentrations above the residential PRG beneath a soil cover. Alternative 4 will meet the RAOs by mixing a stabilizing reagent in OU-2 soils with TEQdf concentrations above the residential PRG to bind the dioxins and furans in a monolith—thereby eliminating/limiting potential exposure. Both Alternatives 3 and 4 would leave the contamination in place and would require implementation of land-use controls in the form of deed restrictions. This would result in a post-remediation condition that would limit the owner's ability to do as they wish with their property and require long-term monitoring to ensure that the integrity of the remedy is maintained.

10.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that RAs at CERCLA sites attain legally applicable or relevant and appropriate federal and more stringent state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4). ARARs do not include occupational safety or worker protection requirements. Compliance with OSHA standards is separately required by 40 CFR §300.150.

Under CERCLA Section 121(e)(1), federal, state, or local permits are not required for the portion of any removal or remedial action conducted entirely 'on-site' as defined in 40 CFR §300.5. See also 40 CFR §300.400(e)(1) & (2). Also, CERCLA response actions must only comply with the "substantive requirements," not the administrative requirements of a regulation or law. Administrative requirements include permit applications, reporting, record keeping, inspections, and consultation with administrative bodies. Although consultation with state and federal agencies responsible for issuing permits is not required, it is often recommended for determining compliance with certain requirements such as those typically identified as location-specific ARARs.

Applicable requirements, as defined in 40 C.F.R. § 300.5, means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements, as defined in 40 C.F.R. § 300.5, means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

Per 40 C.F.R. § 300.400(g)(5), only those state standards are promulgated, are identified in a timely manner, and that are more stringent than federal requirements may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term promulgated means that the standards are of general applicability and are legally enforceable. State ARARs are considered more stringent where there is no corresponding federal ARAR, where the State ARAR provides a more stringent concentration of a contaminant, or the where a State ARAR is broader in scope than a federal requirement.

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. *See* 40 C.F.R. § 300.400(g)(3).

ARAR Categories

For purposes of ease of identification, the EPA has created three categories of ARARs: Chemical-, Location- and Action-Specific. Under 40 C.F.R. § 300.400(g)(5), the lead and support agencies shall identify their specific ARARs for a particular site and notify each other in a timely manner as described in 40 C.F.R. § 300.515(d). Chemical-, and Location-Specific ARARs should be identified as early as scoping phase of the Remedial Investigation, while Action-Specific ARARs are identified as part of the Feasibility Study for each remedial alternative. See 40 C.F.R. §§ 300.430(b)(9) & 300.430(d)(3).

Chemical-Specific - Requirements that establish health- or risk-based numerical concentration limits or assessment methodologies for chemical contaminants in environmental media. No chemical-specific ARARs were identified for this remedial action.

Location-Specific - Requirements that can restrict, or limit response action based upon specific locations (e.g., wetlands, floodplains, historic places, or sensitive habitats). A portion of OU-2 falls within the 100-year floodplain. Location-specific ARARs are presented in Table 1.

Action-Specific - Requirements that set controls or restrictions on the design, implementation, and performance levels of activities related to the management of hazardous substances, pollutants, or contaminants. Action-specific ARARs are presented in Table 2.

Alternative 1 would not meet compliance with ARARs as no action would be taken. Alternative 2 will comply with federal and any more stringent state ARARs. Alternatives 3 and 4 would largely comply with federal and state ARARs but work conducted in a 100-yr floodplain that leaves contamination in place and net fill would have to be conducted to minimize adverse impacts per Executive Order 11988 Section 1. *Floodplain Management* and associated FEMA regulations identified as ARARs and TBC.

BALANCING CRITERIA – The next five criteria, criteria 3 through 7, are known as "primary balancing criteria". These criteria are factors by which tradeoffs between response measures are assessed so that the best options will be chosen, given site-specific data and conditions.

10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Alternative 1 would not alter the status quo and thus would not achieve the RAOs. Alternative 2 would meet the criteria of long-term effectiveness and permanence through removal of OU-2 surface soils with TEQdf concentrations above the residential PRG. Under Alternative 2, excavated soils would be beneficially reused as backfill or cover on portions of the Former Main Plant Area that are designated for commercial/industrial use or, if portions of the soils were found to be unsuitable for reuse, consolidated onsite within OU-3 or disposed of off-site in an appropriately permitted RCRA landfill. Removal of soils containing TEQdf levels above the residential PRG from OU-2 properties will prevent potential migration or receptor exposure. For these reasons, Alternative 2 is ranked higher for this criterion than the other alternatives.

Alternatives 3 and 4 would meet the criterion of long-term effectiveness and permanence through either isolation or treatment of OU-2 surface soils with TEQdf concentrations above the residential PRG. Both alternatives would leave the contamination in place on the property and would require implementation of land-use controls in the form of deed restrictions. Further, these alternatives would require monitoring and maintenance to ensure the long-term effectiveness and permanence of the remedy. Such monitoring and maintenance would require access from the property owner, which cannot be assured over the long term and as ownership changes hands. As a result, Alternatives 3 and 4 rank less favorably than Alternative 2 with respect to long-term effectiveness and permanence.

10.4 Reduction of Toxicity, Mobility, and Volume

Reduction of toxicity, mobility or volume (T/M/V) through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives 1 through 3 would not reduce the toxicity, mobility, or volume through treatment, and thus all have been given a poor ranking with respect to this criterion. However, by removing OU-2 soils with TEQdf concentrations above the residential PRG, Alternative 2 would eliminate the volume of soil contamination with contamination that poses an unacceptable risk in OU-2. Under this alternative, the volume of contamination would be moved to the Former Main Plant Area OU-3 or disposed off-site in an approved RCRA landfill.

Alternative 4 would reduce the toxicity and mobility of the dioxins and furans in OU-2 soils through treatment, and thus ranks highest with respect to this criterion. However, because Alternative 4 would increase the volume of contaminated media, it only has a moderate ranking with respect to this criterion. Further, although Alternative 4 ranks higher than the other alternatives for this treatment criterion, it is not more protective of human health and the environment than Alternatives 2 and 3.

10.5 Short-Term Effectiveness

Short-term effective addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternatives 2 through 4 would involve the use of conventional construction techniques and would be effective immediately upon completion. The potential for short-term exposures to workers, property owners, and the community will be readily addressed though proper design and execution of the remedial action, including use of well-established best management practices. Many of the potential short-term exposures associated with the implementation of remedial actions are related to the transport of contaminated soils, fill, and reagents. Some of the key factors related to these activities include, but are not limited to:

- Inherent hazards associated with the use of heavy machinery
- Potential to generate dusts, chemical vapors, and odors that, without proper controls, can represent a hazard or at least a nuisance to both workers and the adjacent community
- Truck traffic and associated risks (e.g., potential for truck-related accidents) and nuisance (e.g., noise, emissions) posed to the community

- Noise associated with use of heavy machinery and truck traffic
- Potential for release of contaminants to the environment during handling and transport of excavated soils, and due to potential stormwater contact with excavated surfaces and stockpiles.

With well-established best management practices in place, risks associated with these factors would be effectively mitigated.

Although the short-term potential risks associated with a remedial action do not exist under Alternative 1, leaving the surface soils containing TEQdf above the residential PRG in place on OU-2 properties would not achieve the RAOs and thus would be ineffective at protecting human health both in the short- and long-term. Alternatives 2 through 4 would be immediately effective upon completion of the remedial action and achieve the RAOs. Therefore, these alternatives rank higher than the Alternative 1.

10.6 Implementability

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

This criterion does not apply to Alternative 1 because no remedial actions would be implemented. Alternative 2 is straightforward to implement using readily available and highly reliable technologies and equipment. Alternative 2 does not impede additional remedial actions in the future, in the unlikely event they should be needed. There are no known significant challenges that cannot be overcome associated with coordination and approval for implementation of Alternative 2.

Alternatives 3 and 4 present significant challenges to implement. Both alternatives would raise the elevation of the properties' ground surface and would require special provisions to be compatible with existing structures and other features (e.g., driveways, sidewalks, stairs) on the property. Further, Alternative 4 would likely require special provisions, such as hand mixing, to achieve full treatment of impacted soils on the OU-2 properties. As a result, Alternatives 3 and 4 rank poorly with respect to implementability relative to Alternative 2.

10.7 Cost

Cost estimates, including capital costs and long-term operating costs, were prepared for each remedial alternative, and are summarized below.

ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES				
Activity	**Alternative #1**	**Alternative #2**	**Alternative #3**	**Alternative #4**
Estimated Capital Cost	$0	$1,702,000 – 2,293,000	$1,114,000	$1,342,000
Indirect Cost	$0	$371,000 - $394,000	$359,000	$357,000
Estimated O&M Costs	$70,000	$15,000	$15,000	$15,000

ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES				
Net Present Value	$70,000	$2,087,000 – 2,701,000	$1,487,000	$1,713,000
Estimated Time to Achieve RAOs	RAOs not achieved	3-5 months	3-5 months	3-5 months

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

10.8 State Acceptance

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

The State has reviewed the public comments received and accepts the preferred alternative (Appendix A).

10.9 Community Acceptance

This criterion summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

The public comments received during the comment period, were generally supportive of the preferred alternative.

11.0 Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Principal threat wastes (PTW) are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The NCP specified that principal threat wastes (PTWs) are to be treated wherever practicable. There are no principal threat wastes known to be present in OU-2 soils.

12.0 Selected Remedy

Based upon the above information/assumptions contained in the AR file, the Agency's remedy for the Kerr McGee Columbus Site OU-2 is **Alternative 2: Removal and Disposal**. The estimated cost for the Preferred Alternative is $2,087,000 – $2,701,000.

Based on the information currently available, EPA believes Alternative 2 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. EPA expects the selected remedy to satisfy the following statutory requirements of CERCLA Section 121(b), 42 U.S.C. §9621(b): 1) be protective of human health and the environment; 2) comply with ARARs unless a waiver is justified; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. As described earlier, removal of the contaminated soil from the identified properties will achieve the RAOs and thereby permanently prevent any unacceptable risk to human health but no treatment or resource recovery technologies are utilized. None of the alternatives, including the selected alternative, satisfy the preference for treatment as a principal element since the OU-2 soils are not considered PTW.

12.1 Detailed Description of the Selected Remedy

The major components of the selected remedy include:

- Excavation of surface soils (up to 2 ft bgs) from DUs with concentrations of dioxins and furans that exceed the residential PRG (50 ppt TEQdf) (Figure 5);
- Beneficial reuse, onsite consolidation, or offsite disposal of excavated soils. The concentrations of dioxins and furans in all but one of the DUs within OU-2 are less than the construction worker PRG (230 ppt TEQdf) and thus likely may be considered for beneficial reuse as backfill or cover in Site areas on the Former Main Plant Area (OU-3) designated for industrial/commercial land use;
- Beneficial reuse involves applying the excavated contaminated soil (that has been determined not to contain RCRA hazardous waste and meets chemical criteria) as backfill in areas on the Former Main Plant Area where the contaminated media do not pose a risk to human health and the environment. If considered for beneficial reuse, the excavated soils would be temporarily staged in the Former Main Plant Area and analyzed to determine if the material meets the chemical acceptance criteria for beneficial reuse. Soils identified for beneficial reuse will be stockpiled in the areas of the Former Main Plant Area. Beneficial reuse in areas of the Former Main Plant Area that are designated for industrial/commercial land use as part of future Site remedial actions would allow protective and cost-effective management of the OU-2 soils;
- Disposition of OU-2 soils that are unsuitable for beneficial reuse may be accomplished through onsite consolidation on the Former Main Plant Area where the soils would be managed with soils having similar levels of contamination in the Former Main Plant Area until a final remedy is approved for OU-3. Analytical data to date and process knowledge from the OU-2 areas show that these soils are not a hazardous waste. Notwithstanding, the consolidated soils will be protectively managed in accordance with RCRA regulations and guidance (identified as ARARs and/or To Be Considered) to prevent releases of hazardous substances into the environment. Onsite consolidation will be considered during the development of remedial alternatives for OU-3. Under this scenario, excavated OU-2 soils would be managed by consolidating them with similarly contaminated OU-3 soils;

- Alternatively, soils that are unsuitable for beneficial reuse or consolidation may be disposed of offsite at an EPA-approved, RCRA Subtitle D landfill, such as the Golden Triangle Regional Landfill in Starkville, Mississippi;
- Placement and final grading of imported clean backfill material suitable for residential or commercial/industrial use in the excavated areas;
- Restoration of property as agreed upon with property owners;
- Because this alternative involves removal of contaminated soils from OU-2 properties, no long-term O&M or post-remedy monitoring will be required; and
- 3- to 5-month implementation time frame.

The EPA is selecting a No Action decision for:

One property east of the former KMCC facility (containing DU samples 18-43 through 18-47) that meets the EPA criteria for a No Action remedial decision because sampling found no unacceptable risk to human health based on industrial/commercial land use.

Eighty-three of the properties in the OU-2 Study Area meet the EPA criteria for a No Action remedial decision because sampling found no unacceptable risk to human health based on residential land use.

12.2 Summary of the Rationale for the Selected Remedy

Based upon consideration of the results of the site investigations, the requirements of CERCLA, the detailed analysis of the response measures, and public comments, EPA has determined that Alternative 2: Removal and Disposal is the appropriate remedy for the contamination found in the surface soil in OU-2, because it best satisfies the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR § 300.430(e)(9). Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element, bias against off-site treatment and disposal, and considering State and community acceptance.

EPA and MDEQ concur that the selected remedy will satisfy the following statutory requirements of CERCLA Section 121(b), 42 U.S.C. § 9621(b): 1) be protective of human health and the environment; 2) comply with ARARs; and 3) be cost effective. As described earlier, removal of the contaminated soil from the identified properties will achieve the RAOs and thereby permanently prevent any unacceptable risk to human health but no treatment or resource recovery technologies are utilized.

12.3 Cost Estimate for the Selected Remedy

The information in the cost estimate summary table below is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form

of a memorandum, in the Administrative Record file, an Explanation of Significant Differences, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The full cost estimate can be found in the FFS (Integral 2020).

ESTIMATED COSTS FOR SELECTED REMEDY	
Activity	**Alternative #2**
Estimated Capital Cost	$1,702,000 – 2,293,000
Indirect Cost	$371,000 - $394,000
Estimated O&M Costs	$15,000
Net Present Value	$2,087,000 – 2,701,000
Estimated Time to Achieve RAOs	3-5 months

12.4 Estimated Outcomes of the Selected Remedy

The Selected Remedy will protect human health and the environment by eliminating, reducing, or controlling risks at OU-2 through physical removal of contaminated soil from residential areas. Future land use of OU-2 is anticipated to be a mix of residential and industrial/commercial.

Implementation of the Selected Remedy and achievement of the final cleanup levels will accomplish the RAOs for OU-2. The final cleanup levels are identified in the below table. The EPA is using residential cleanup levels for most of OU-2. The EPA is using the industrial/commercial cleanup levels for decision making at one property, based on the EPA's determination of the reasonably anticipated future land uses.

Surface Soil COCs and Cleanup Levels for Residential and Industrial/Commercial Land Use				
	Residential		Industrial/Commercial	
COC	Cleanup Level (ppt)	Basis	Cleanup Level (ppt)	Basis
TEQdf	50	Noncancer	230	Noncancer

Notes: For non-residential soil, the lower of the industrial/commercial and construction worker cleanup level are shown.
nc = noncancer basis; noncancer cleanup levels are based on a target hazard index of 1; COC = chemical of concern; TEQdf = toxicity equivalent concentration for dioxins and furans

13.0 Statutory Determinations

As was previously noted, 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, and utilize permanent solutions and alternative treatment technologies or resource recovery

technologies to the maximum extent practicable. Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants, or contaminants at a site. Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state environmental laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

13.1 Protection of Human Health and the Environment

Protection of human health and the environment will be achieved through removal of contaminated soil exceeding the residential cleanup level and offsite disposal or consolidation of soil contamination at the Former Main Plant Area (OU-3).

The Selected Remedy, Alternative 2, will provide a greater degree of protection for human health and the environment through the excavation and removal of contaminated surface soil in OU-2 properties. This action will result in the reduction of exposure levels to acceptable risk levels within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogens and below a HI of 1.0 for noncarcinogens.

Implementation of the Selected Remedy will not pose any unacceptable short-term risks to human health and the environment.

13.2 Compliance with ARARs

Section 121(d) of CERCLA, as amended, specifies, in part, that remedial actions for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs) to the hazardous substances or particular circumstances at a site or justify invoking a waiver under Section 121(d)(4). *See also* 40 C.F.R. §§ 300.430(f)(1)(ii)(B) and (C), and 40 C.F.R. §§ 300.430(f)(5)(ii)(B) and (C). ARARs include only federal and state environmental or facility siting laws/regulations and do not include occupational safety or worker protection requirements. Compliance with OSHA standards is required by 40 C.F.R. § 300.150 and therefore the CERCLA requirement for compliance with or wavier of ARARs does not apply to OSHA standards.

Under CERCLA Section 121(e)(1), federal, state, or local permits are not required for the portion of any removal or remedial action conducted entirely on-site as defined in 40 C.F.R. § 300.5. *See also* 40 C.F.R. §§ 300.400(e)(1) & (2). Also, CERCLA actions must only comply with the "substantive requirements," not the administrative requirements of a regulation. Administrative requirements include permit applications, reporting, record keeping, and consultation with administrative bodies. Although consultation with state and federal agencies responsible for issuing permits is not required, it is recommended for determining compliance with certain requirements such as those typically identified as Location-Specific ARARs.

In accordance with 40 C.F.R. § 300.430(f)(5)(ii)(B) this ROD includes ARARs that the remedy is expected to attain that were identified by EPA and the State of Mississippi. Tables 1 and 2 list respectively the Location-, and Action-Specific ARARs/TBCs for the selected remedial action.

Any remediation wastes that are generated and subsequently transferred off-site or transported in commerce along public right-of-ways must meet any applicable requirements such as those for packaging, labeling, marking, manifesting, and placarding requirements for hazardous materials. In addition, CERCLA Section 121(d)(3) provides that the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions be sent to a treatment, storage, or disposal facility that is in compliance with applicable federal and state laws and has been approved by EPA for acceptance of CERCLA waste. *See also* 40 C.F.R. § 300.440 (so called "Off-Site Rule").

13.3 Cost Effectiveness

EPA has determined that the Selected Remedy is cost-effective and that the overall protectiveness of the remedy is proportional to the overall cost. As specified in 40 CFR § 300.430(f)(1)(ii)(D), the cost-effectiveness of the Selected Remedy was assessed by comparing the protectiveness of human-health and the environment in relation to three balancing criteria (i.e., long-term effectiveness and permanence; reduction in T/M/V; and short-term effectiveness) with the other alternatives considered.

While more than one remedial alternative can be considered cost-effective, CERCLA does not mandate that the most cost-effective or least expensive remedy be selected.

13.4 Use of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions can be utilized in a practicable manner at the Site. As described earlier, removal of the contaminated soil from the identified properties will achieve the RAOs and thereby permanently prevent any unacceptable risk to human health but no treatment or resource recovery technologies are utilized.

The Selected Remedy does not present short-term risks different from the other treatment alternatives. There are no special implementability issues that set the Selected Remedy apart from any of the other alternatives evaluated.

13.5 Preference for Treatment as a Principal Element

The remedy for OU-2 does not satisfy the statutory preference for treatment of principal threat waste as a principal element of the remedy because there are no principal threat wastes known to be present in OU-2 soils. Treatment options (i.e., in situ stabilization) were considered. However, none were identified as viable alternatives for OU-2 because they would either be ineffective for the chemicals of concern (COCs) at the Site (TEQdf) or would limit future construction options. Consequently, treatment options were eliminated from further consideration. The soils that are unsuitable for beneficial use and that are consolidated in OU-3 will require containment with a cover. This approach is consistent with EPA expectation to use engineering controls for waste that poses a relatively low long-term threat (NCP Section 300.430(a)(1)(iii)(B)).

13.6 Five-Year Review Requirements

Excavation and removal of contaminated portions of OU-2 that achieves the residential cleanup level will allow for unlimited use and unrestricted exposure and thus will not require five-year

reviews pursuant to CERCLA Section 121(c). EPA will conduct five-year reviews for other parts of the Site where hazardous substances remain in place at levels that do not allow for unlimited use and unrestricted exposure.

13.7 Documentation of Significant Changes

Pursuant to CERCLA Section 117(b) and NCP §300.430(f)(3)(ii), the ROD must document any significant changes made to the Preferred Alternative discussed in the Proposed Plan.

EPA reviewed all written and verbal comments submitted during the public comment period. There are no other significant changes to the remedy, as originally identified in the Proposed Plan.

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PART 3: RESPONSIVENESS SUMMARY

1.0 Public Review Process

1.1 Introduction

This Responsiveness Summary (RS) provides a summary of comments and concerns received during the public comment period related to the Kerr-McGee Chemical Corporation Superfund Site, Operable Unit 1 (OU-2) Proposed Plan, and provides the responses of the US Environmental Protection Agency (EPA) to those comments and concerns.

A RS serves two functions: first, it provides the decision maker with information about the views of the public, government agencies, and potentially responsible parties (PRPs) regarding the proposed remedial action and other alternatives; and second, it documents the way in which public comments have been considered during the decision-making process and provides answers to significant comments.

Public involvement in the review of Proposed Plans is stipulated in Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These regulations provide for active solicitation of public comment.

All public comments received are addressed in this RS. The RS was prepared following guidance provided by the EPA in *Community Relations in Superfund: A Handbook* (EPA, 1992) and the (*Community Relations during Enforcement Activities and Development of the Administrative Record* (EPA, 1988). The comments presented in this document have been considered in EPA's decision in the selection of a remedy to address contaminated soils at OU-2 of the Kerr-McGee Site.

The text of this RS explains the public review process and how comments were responded to. Appendix B provides the Comment and Response Index, which contains summaries of every comment received during the public comment period and EPA's response.

1.2 Public Review Process

The EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the Proposed Plan for the Kerr-McGee OU-2 Superfund Site, Columbus, Mississippi was made available to the community on August 4, 2020.

The complete Administrative Record file, which contains the RI/FS report and risk assessments, upon which the Selected Interim Remedy is based, is available at the locations listed below.

Information Repositories for the Kerr-McGee Superfund Site Administrative Record

Online at: https://semspub.epa.gov/src/collections/04/AR/MSD990866329

The local information repository is the Columbus-Lowndes Public Library, 314 N. Seventh Street, Columbus, Mississippi, which is open and provides computer access for the community to access the online administrative record.

1.3 Public Comment Period, Public Meeting and Availability Sessions

The public comment period is intended to gather information about the views of the public regarding both the remedial alternatives and general concerns about the site. A notice of the start of the public comment period, the public meeting date, the preferred remedy, contact information, and the availability of above-referenced documents was provided in a fact sheet distributed to the public on August 4, 2020 and published in the *Columbus Packet* on the same day.

The public comment period for the KMCC Columbus Site OU-2 Proposed Plan commenced on August 4, 2020 and continued until September 5, 2020 for a total of 30 days.

1.4 Receipt and Identification of Comments

Public comments on the Proposed Plan and EPA Region 4 responses were received as written comments submitted to the EPA Region 4 via USPA, e-mail and oral comments made at the public meeting.

1.5 Locating Responses to Comments within the Comment and Response Index

The Comment and Response Index (Appendix B) contains a complete listing of all comments and responses from the EPA. The index allows readers to find answers to specific questions they have raised and is organized as follows:

The first column in Appendix B provides the comment.

The second column in Appendix B provides the response to the comment.

2.0 References

EPA, 1988. Community Relations During Enforcement Activities and Development of the Administrative Record. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9836.0-01A. November 1988

EPA, 1992. Community Relations in Superfund: A Handbook. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9230.0-03C. EPA 540-R-92-009. January 1992

TABLES

Table 1. Location-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Location–Specific ARARs and TBC			
Location	**Requirement**	**Prerequisite**	**Citation**
Presence of Floodplains designated as such on a map[1]	Shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.	Federal actions that involve potential impacts to, or take place within, floodplains – **TBC**	Executive Order 11988 Section 1. *Floodplain Management*
	Shall consider alternatives to avoid, to the extent possible, adverse effects and incompatible development in the floodplain. Design or modify its action in order to minimize potential harm to or within the floodplain		Executive Order 11988 Section 2.(a)(2) *Floodplain Management*
	Where possible, an agency shall use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration.		Executive Order 13690 Section 2 (c)
Presence of floodplain designated as such on a map	The Agency shall design or modify its actions so as to minimize[2] harm to or within the floodplain.	Federal actions affecting or affected by Floodplain as defined in 44 CFR § 9.4 – **relevant and appropriate**	44 CFR § 9.11(b)(1) *Mitigation*
	The Agency shall restore and preserve natural and beneficial floodplain values.		44 CFR § 9.11(b)(3) *Mitigation*
	The Agency shall minimize: • Potential harm to lives and the investment at risk from base flood, or in the case of critical actions[3] from the 500-year flood; • Potential adverse impacts that action may have on floodplain values.		44 CFR § 9.11(c)(1) and (3) *Minimization provisions*

[1] Under 44 CFR § 9.7 *Determination of proposed action's location*, Paragraph (c) Floodplain determination. One should consult the FEMA Flood Insurance Rate Map (FIRM), the Flood Boundary Floodway Map (FBFM) and the Flood Insurance Study (FIS) to determine if the Agency proposed action is within the base floodplain.
[2] Minimize means to reduce to smallest amount or degree possible. See 44 C.F.R. § 9.4 *Definitions*.
[3] See 44 C.F.R. § 9.4 *Definitions, Critical action*. Critical actions include, but are not limited to, those which create or extend the useful life of structures or facilities such as those that produce, use or store highly volatile, flammable, explosive, toxic or water-reactive materials.

Table 1. Location-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

ARAR = Applicable *or* Relevant and Appropriate Requirement
C.F.R = *Code of Federal Regulations*
CWA = Clean Water Act
TBC = To Be Considered
USACE = United States Army Corps of Engineers

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	General Construction Standards – All Land Disturbing Activities (e.g., excavation, backfilling and grading)		
Activities causing storm water runoff (e.g., clearing, grading, excavation)	Implement good construction management techniques in accordance with the substantive requirements for permits issued pursuant to 40 CFR § 122.26(c) – storm water discharges associated with industrial activity or under a General Permit.	Dewatering or storm water discharges associated with construction activity disturbing one or more acres as defined in 40 CFR 122.26(b)(15) – **applicable**	40 CFR Part § 122.26(c)(1)
	Shall provide a narrative description of: (A) The location (including a map) and the nature of the construction activity; (B) The total area of the site and the area of the site that is expected to undergo excavation; (C) Proposed measures, including BMPs to control stormwater discharges during construction, including a brief description of applicable State and local erosion and sediment control requirements; (D) Proposed measures to control pollutants in storm water discharges that will occur after construction operations have been completed, including a brief description of applicable State or local erosion and sediment control requirements; (E) Estimate of the runoff coefficient of the site and the increase in impervious area after the construction is completed, the nature of fill material and existing data describing the soil or the quality of the discharge; and (F) The name of the receiving water.		40 CFR Part § 122.26(c)(1)(ii)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
Activities causing storm water runoff (e.g., clearing, grading, excavation) *cont.*	You must design, install, and maintain stormwater controls required in Parts 2.2 and 2.3 to minimize the discharge of pollutants in stormwater from construction activities. Must develop a Storm Water Pollution Prevention Plan (SWPPP) consistent with the requirements in Part 7 in the EPA 2017 Construction General Permit. *NOTE*: Under CERCLA § 121(e)(1) permits are not required for on-site response actions. However, compliance with the substantive requirements in the EPA 2107 Construction General Permit (determined to be TBC) is recommended to ensure management of stormwater in order to prevent erosion or unauthorized discharges.	Dewatering or storm water discharges associated with construction activity disturbing one or more acres as defined in 40 CFR 122.26(b)(15) – **TBC**	2017 EPA NPDES General Permit for Discharges from Construction Activities https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents
Activities causing fugitive dust emissions	Shall not cause, allow, or permit the emission of particles, or any contaminants in sufficient amounts or of such duration from any process as to be injurious to humans, animals, plants, or property, or to create a condition of air pollution.	Fugitive emissions from construction operations, grading, or the clearing of land – **applicable**	MDEQ Regulation APC-S-1, Section 3, Paragraph 3
Waste Generation, Characterization – Primary waste (e.g., excavated soils and debris)[1]			
Characterization of ***solid waste*** (all primary and secondary wastes)	Must determine if solid waste is hazardous waste or if waste is excluded under 40 CFR § 261.4; and Must determine if waste is listed as a hazardous waste under 40 CFR Part 261.	Generation of solid waste as defined in 40 CFR § 261.2 – **applicable**	40 CFR § 262.11(a) and (b)

[1] The State of Mississippi incorporates by reference the federal regulations governing hazardous waste generation, characterization, segregation, and storage. See MDEQ Regulations HW-1 (Sept. 29, 2008). Accordingly, only the federal regulations are cited in this table.

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR part 261by either: • Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, or according to an equivalent method approved by the Administrator under 40 CFR 260.21; or • Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.		40 CFR § 262.11(c)(1) and (2)
	Must refer to 40 CFR Parts §§ 261, 262, 264, 265, 266, 268, and 273 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste that is determined to be hazardous – **applicable**	40 CFR § 262.11(d)
Characterization of ***hazardous waste*** (all primary and secondary wastes)	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 CFR §§ 264 and 268	Generation of RCRA hazardous waste for storage, treatment, or disposal – **applicable**	40 CFR § 264.13(a)(1)
Determinations for management of hazardous waste	Must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 CFR 268 *et seq.*. This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter. *NOTE:* For purposes of part 268, the waste will carry the code any applicable listed waste (40 CFR 261, subpart D). In addition, where the waste exhibits a characteristic, the wastes will carry one or more characteristic codes (40 CFR 261, subpart C).	Generation of RCRA hazardous waste for storage, treatment, or disposal – **applicable**	40 CFR § 268.9(a)
	Must determine the underlying hazardous constituents [as defined in 40 CFR § 268.2(i)] in the characteristic waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal – **applicable**	40 CFR § 268.9(a)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	A generator of hazardous waste must determine if the waste has to be treated before it can be disposed. This is done by determining if the hazardous waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. *NOTE:* This determination can be made concurrently with the hazardous waste determination required in 40 CFR § 262.11.	Generation of hazardous waste for storage, treatment or disposal – **applicable**	40 CFR § 268.7(a)
Characterization of remediation wastes	Obtain a detailed chemical and physical analysis of a representative sample of the hazardous remediation wastes to be managed at the site. At a minimum, the analysis must contain all of the information which must be known to treat, store or dispose of the waste according to this part and part 268 of this chapter and must be kept up to date.	Management of remediation wastes at facility that does not have a RCRA permit – **applicable**	40 CFR § 264.1(j)(2)
Waste Storage – Primary waste (e.g., excavated soils)[2]			
Temporary on-site storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that: • waste is placed in containers that comply with 40 CFR §§ 265.171-173; and • the date upon which accumulation begins is clearly marked and visible for inspection on each container; • container is marked with the words "hazardous waste" or	Accumulation of RCRA hazardous waste on-site as defined in 40 CFR § 260.10 – **applicable**	40 CFR § 262.34(a); 40 CFR § 262.34(a)(1)(i) 40 CFR § 262.34(a)(2) and (3)
	• container may be marked with other words that identify contents	Accumulation of 55 gals. or less of RCRA hazardous waste or 1 Qrt. of acutely hazardous waste at or near any point of generation – **applicable**	40 CFR § 262.34(c)(1)

[2] The State of Mississippi incorporates by reference the federal regulations governing waste generation, characterization, segregation, and storage. See MDEQ Regulations HW-1 (Sept. 29, 2008). Accordingly, only the federal regulations are cited in this table.

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
Use and management of hazardous waste in containers	If container is not in good condition or if it begins to leak, must transfer waste into container in good condition	Storage of RCRA hazardous waste in containers – **applicable**	40 CFR § 265.171
	Use container made with lined materials compatible with waste to be stored so that the ability of the container is not impaired		40 CFR § 265.172
	Keep containers closed during storage, except to add/remove waste		40 CFR § 265.173(a)
	Open, handle, and store containers in a manner that will not cause containers to rupture or leak		40 CFR § 265.173(b)
Storage of hazardous waste in a container area	Area must have a containment system designed and operated in accordance with 40 CFR § 264.175(b)	Storage of RCRA hazardous waste in containers *with free liquids* – **applicable**	40 CFR § 264.175(a)
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid	Storage of RCRA hazardous waste in containers that do not contain free liquids (other than F021, F022, F023, F026 and F027) – **applicable**	40 CFR § 264.175(c)
Closure performance standard for RCRA container storage unit	Must close the facility (e.g., container storage unit) in a manner that: • minimizes the need for further maintenance; • controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or the atmosphere; and • complies with the closure requirements of subpart, but not limited to, the requirements of 40 CFR § 264.178 for containers.	Storage of RCRA hazardous waste in containers – **applicable**	40 CFR § 264.111

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
Closure of RCRA container storage unit	At closure, all hazardous waste and hazardous waste residues must be removed from the containment system. Remaining containers, liners, bases, and soils containing or contaminated with hazardous waste and hazardous waste residues must be decontaminated or removed. [Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate in accordance with 40 CFR § 261.3(d) of this chapter that the solid waste removed from the containment system is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262 through 266 of this chapter].	Storage of RCRA hazardous waste in containers in a unit with a containment system – **applicable**	40 CFR § 264.178
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils, debris)	Must be located within the contiguous property under the control of the owner/operator where the wastes are to be managed in the staging pile originated.	Accumulation of *non-flowing hazardous remediation waste* (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 CFR § 260.10 – **applicable**	40 CFR § 264.554(a)(1)
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils, debris)	May be temporarily stored (including mixing, sizing, blending, or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility if used only during remedial operations provided that the staging pile: • must facilitate a reliable, effective, and protective remedy; • must be designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, run-off/run-on controls)		40 CFR § 264.554(a)(1)(i) and (ii)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
Operation of a staging pile	The staging pile must not operate for more than two years, except when the Director grants an operating term extension under 40 CFR § 264.554(i). *NOTE:* Must measure the 2-year limit (or other operating term specified) from first time remediation waste placed in staging pile.	Accumulation of *non-flowing hazardous remediation waste* (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 CFR § 260.10 – **applicable**	40 CFR § 264.554(d)(1)(iii)
	The Director may allow a staging pile to operate for up to two years after the hazardous waste is first placed into the pile. Must not use staging pile longer than the length of time designated by the Director in the permit, closure plan, or order ("operating term"), except as provided in paragraph (i) of this section. *NOTE:* Additional time limits for storage will be justified and documented in an ESD, ROD Amendment issued by EPA.	Accumulation of *non-flowing hazardous remediation waste* (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 CFR § 260.10 – **applicable**	40 CFR §264.554(h)
Extension for operation of a staging pile	The Director may grant one operating term extension of up to 180 days beyond the operating term limit contained in the permit, closure plan, or order. To justify to the Director the need for the extension, you must provide sufficient and accurate information to enable the Director to determine that continued use of the staging plie: (i) Will not pose a threat to human health and the environment; and (ii) Is necessary to ensure timely and efficient implementation of the remedial actions at the facility.		40 CFR §264.554(h)(i)(1)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils, debris)	In setting standards and design criteria, must consider the following factors: • length of time pile will be in operation; • volumes of waste intended to store in pile; • physical and chemical characteristics of waste to be stored in unit • potential for releases from the unit hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and • potential for human and environmental exposure to potential releases from the unit	Accumulation of *non-flowing hazardous remediation waste* (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 CFR § 260.10 – **applicable**	40 CFR § 264.554(d)(2)(i)-(vi)
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils, debris)	Must not place ignitable or reactive remediation waste in a staging pile unless the remediation waste has been treated, rendered, or mixed before placed in the staging pile so that: • the remediation waste no longer meets the definition of ignitable or reactive under 40 CFR § 261.21 or 40 CFR § 261.23; and • you have complied with 40 CFR §264.17(b); or Must manage the remediation waste to protect it from exposure to any material or condition that may cause it to ignite or react.	Storage of "ignitable" or "reactive" remediation waste in staging pile – **applicable**.	40 CFR § 264.554(e) 40 CFR § 264.554(e)(1)(i) 40 CFR § 264.554(e)(1)(ii) 40 CFR § 264.554(e)(2)
	Must not place in the same staging pile unless you have complied with 40 CFR § 264.17(b).	Storage of "incompatible" remediation waste (as defined in 40 CFR 260.10) in staging pile – **applicable**	40 CFR § 264.554(f)(1)
	Must separate the incompatible waste of materials, or protect them from one another using a dike, berm, wall, or other device.	Staging pile of remediation waste stored nearby to incompatible wastes or materials in containers, other piles, open tanks or land disposal units – **applicable**.	40 CFR § 264.554(f)(2)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	Must not pile remediation waste on same base where incompatible wastes or materials were previously piled unless the base has been sufficiently decontaminated in compliance with 40 CFR § 264.17(b)		40 CFR § 264.554(f)(3)
Closure of staging pile of remediation waste	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate.	Storage of remediation waste in staging pile in *previously contaminated area* – **applicable**	40 CFR § 264.554(j)(1)
	Must decontaminate contaminated sub-soils in a manner that EPA determines will protect human health and the environment.		40 CFR § 264.554(j)(2)
	Must be closed within 180 days after the operating term according to 40 CFR §§ 264.258(a) and 264.111 or 265.258(a) and § 265.111.	Storage of remediation waste in staging pile *in uncontaminated area* – **applicable**	40 CFR § 264.554(k)
Air emissions from RCRA waste storage units	The requirements of RCRA Subpart CC – *Air Emission Standards for Tanks, Surface Impoundments, and Containers* do not apply to a waste management unit that is solely used for on-site treatment or storage of hazardous waste that is placed in the unit as result of implementing remedial activities required under RCRA § 3004(u) and (v), or § 3008(h), or CERCLA authorities.	Air pollutant emissions with volatile organics from a hazardous waste tank, surface impoundment, or container – **relevant and appropriate**	40 CFR § 264.1080(a)(5)
Waste Treatment and Disposal – Primary waste (e.g., excavated soils and debris)[3]			
Disposal of RCRA hazardous waste in land-based unit	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 CFR § 268.40 before land disposal.	Land disposal, as defined in 40 CFR § 268.2, of restricted RCRA waste – **applicable**	40 CFR § 268.40(a)

[3] The State of Mississippi incorporates by reference the federal regulations governing land disposal restrictions. See MDEQ Regulations HW-1 (Sept. 29, 2008). Accordingly, only the federal regulations are cited in this table.

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	All underlying hazardous constituents [as defined in 40 CFR § 268.2(i)] must meet the Universal Treatment Standards, found in 40 CFR § 268.48 Table UTS prior to land disposal.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well – **applicable**	40 CFR § 268.40(e)
	To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards of 40 CFR § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentration in the waste extract or waste, or the generator may use knowledge of the waste. If the waste contains constituents (including UHCs in the characteristic wastes) in excess of the applicable UTS levels in 40 CFR § 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.	Land disposal of RCRA toxicity characteristic wastes (D004 –D011) that are newly identified (i.e., wastes, soil, or debris identified by the TCLP but not the Extraction Procedure) – **applicable**	40 CFR § 268.34(f)
Disposal of RCRA – *hazardous waste soil* in a land–based unit	Must be treated according to the alternative treatment standards of 40 CFR § 268.49(c) or according to the UTSs specified in 40 CFR § 268.48 applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal	Land disposal, as defined in 40 CFR 268.2, of restricted hazardous soils – **applicable**	40 CFR § 268.49(b)
Disposal of RCRA *hazardous waste debris* in a land–based unit (i.e., landfill)	Must be treated prior to land disposal as provided in 40 CFR § 268.45(a)(1)-(5) unless EPA determines under 40 CFR 261.3(f)(2) that the debris no longer contaminated with hazardous waste or the debris is treated to the waste – specific treatment standard provided in 40 CFR 268.40 for the waste contaminating the debris.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA hazardous debris – **applicable**	40 CFR § 268.45(a)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	Soil Cover		
Leaving contaminated soil in-place in Former Main Plant Area	Must install a final cover system designed to minimize infiltration and erosion. The erosion layer must consist of a minimum of 6 inches of earthen material that is capable of sustain native plant growth.	Closure of MSWLF unit used for disposal of solid waste – **relevant and appropriate**	MS Rule 1.4 *Landfill Requirements* E.(2)(a)(2) Nonhazardous Solid Waste Management Regulations
	A native grass or other shallow-rooted vegetation suitable to minimize soil erosion, as approved by the Department, must be planted and maintained. Trees may not be used in lieu of or in addition to grass cover.		MS Rule 1.4 *Landfill Requirements* E.(2)(e)
	Waste Transportation		
Transportation of hazardous waste *on-site*	The generator manifesting requirements of 40 CFR §§ 262.20-262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 CFR §§ 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way – **applicable**	40 CFR § 262.20(f)
Transportation of hazardous waste *off-site*	Must comply with the generator requirements of 40 CFR §§ 262.20-262.23 for manifesting, § 262.30 for packaging, § 262.31 for labeling, § 262.32 for marking, § 262.33 for placarding, §§ 262.40 and 262.41(a) for record keeping requirements, and § 262.12 to obtain EPA ID number.	Preparation and initiation of shipment of RCRA hazardous waste off-site – **applicable**	40 CFR § 262.10(h)
Transportation of waste samples	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when: • the sample is being transported to a laboratory for the purpose of testing; or • the sample is being transported back to the sample collector after testing.	Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition – **applicable**	40 CFR § 261.4(d)(1) 40 CFR § 261.4(d)(1)((i) 40 CFR § 261.4(d)(1)(ii)

Table 2. Action-specific ARARs and TBCs
Kerr McGee Superfund Site OU-2 ROD - Columbus, Mississippi

Action	Requirements	Prerequisite	Citation
	In order to qualify for the exemption in paragraphs (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: • Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements. • Assure that the information provided in (1) thru (5) of this section accompanies the sample. • Package the sample so that it does not leak, spill, or vaporize from its packaging.		40 CFR § 261.4(d)(2)(i) 40 CFR § 261.4(d)(2)(i)(A) 40 CFR § 261.4(d)(2)(i)(B)
Transportation of *hazardous materials*	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 CFR §§ 171-180 related to marking, labeling, placarding, packaging, emergency response, etc.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material – **applicable**	49 CFR § 171.1(c)

ARAR = applicable or relevant and appropriate requirement
EPA = Environmental Protection Agency
ESD = Explanation of Significant Differences
CFR = Code of Federal Regulations
CWA = Clean Water Act of 1972
DEACT = deactivation
DOT = U.S. Department of Transportation
EPA = U.S. Environmental Protection Agency
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
MDEQ = Mississippi Department of Environmental Quality
MSWLF = Municipal Solid Waste Landfill Facility
MS Rule = MDEQ Administrative Rules and Regulations
NPDES = National Pollution Discharge Elimination System
POTW = publicly owned treatment works
RCRA = Resource Conservation and Recovery Act of 1976
TBC = to be considered
UTS = Universal Treatment Standard

FIGURES

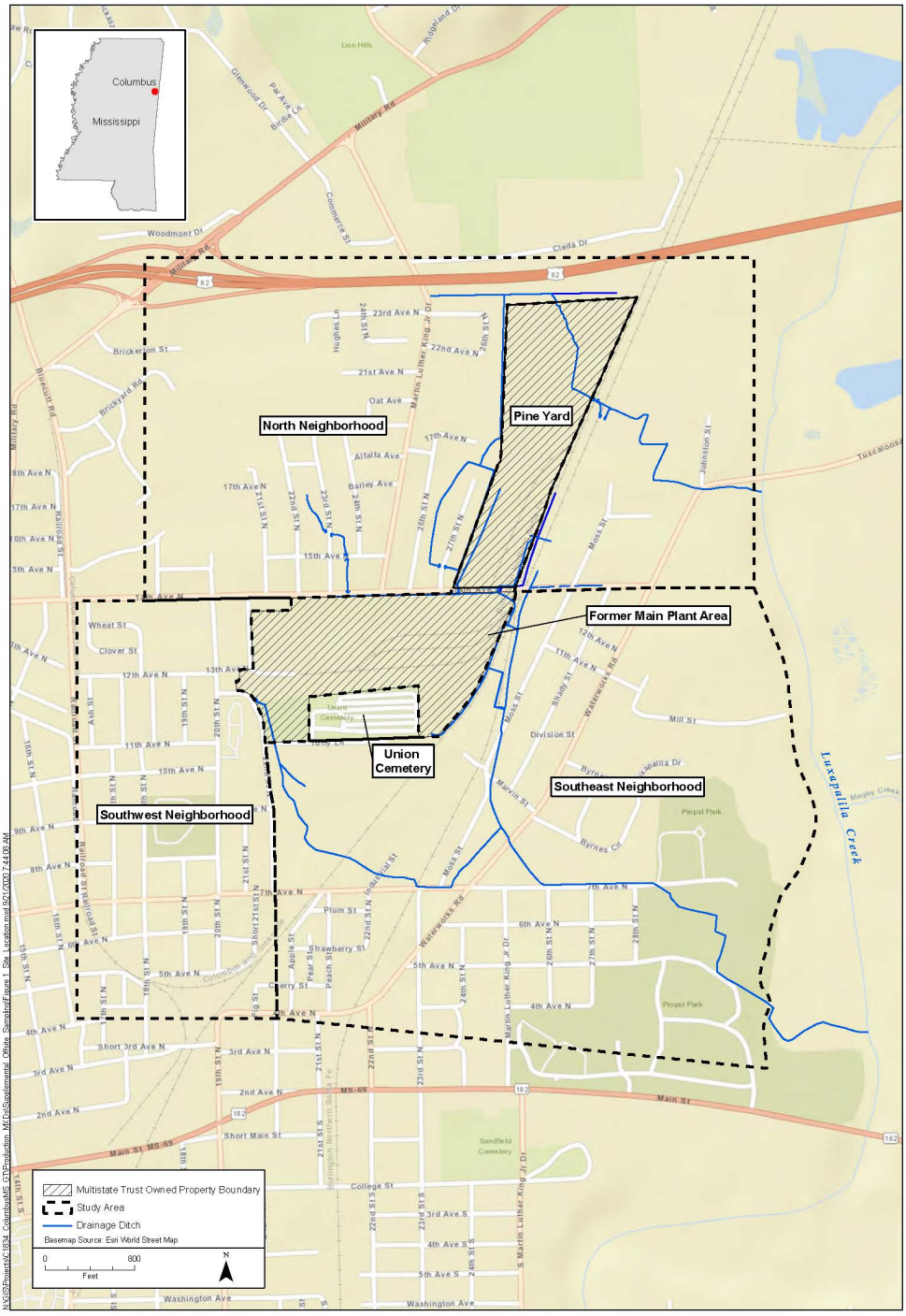

Figure 1 Site Location

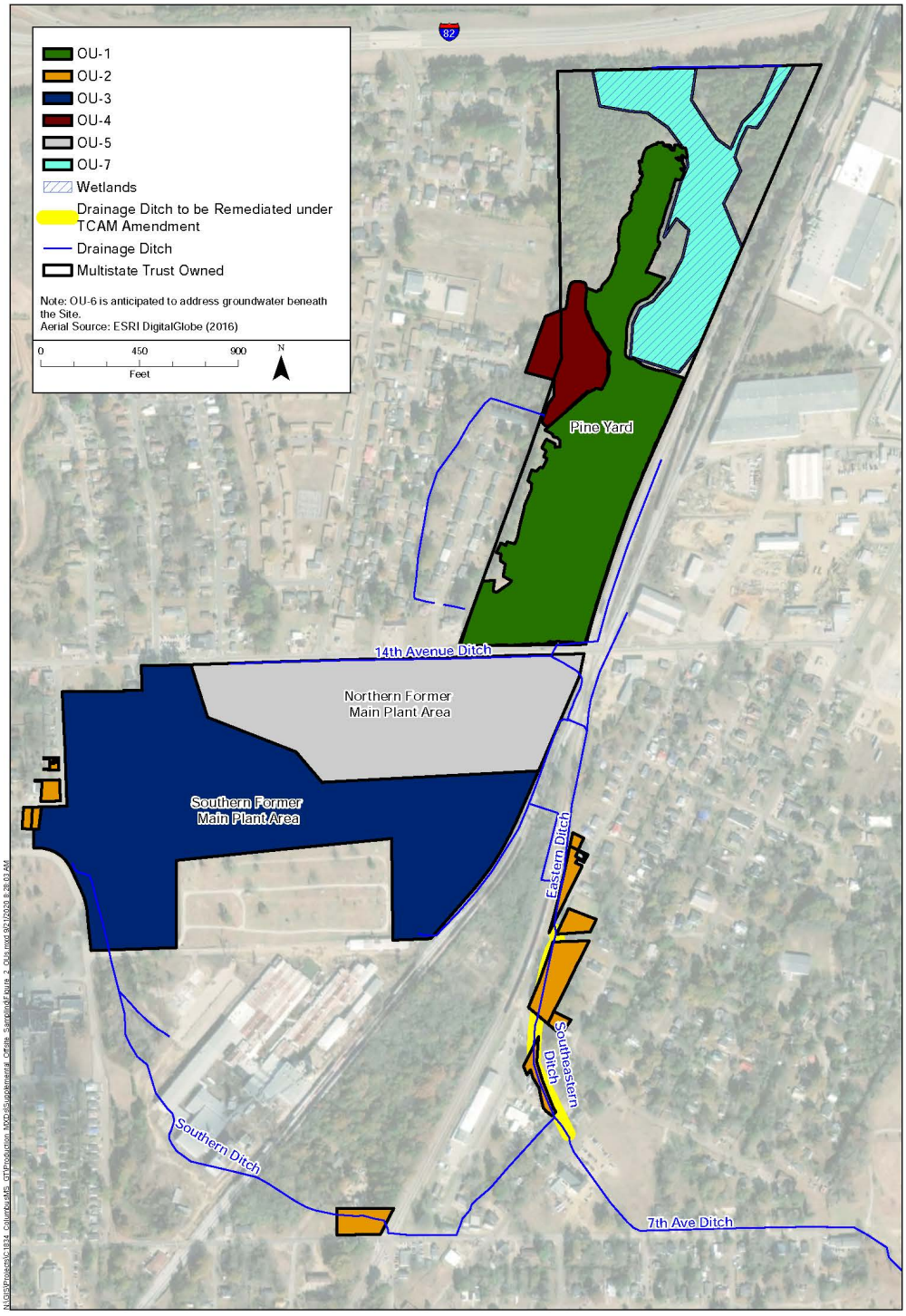

Figure 2 Location of Operable Units, Site Characteristics

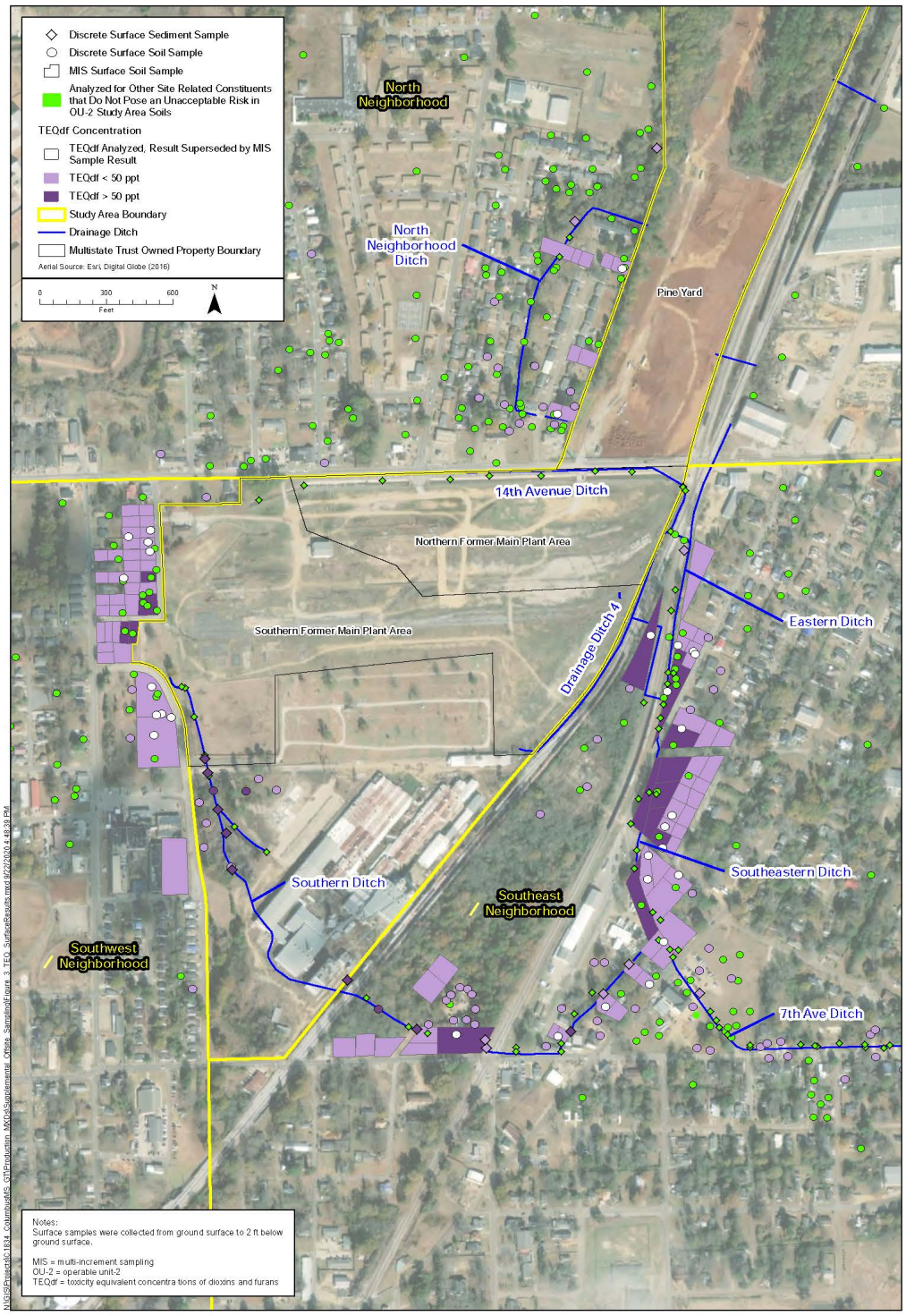

Figure 3 OU-2 Study Area Surface Soil Sampling Locations

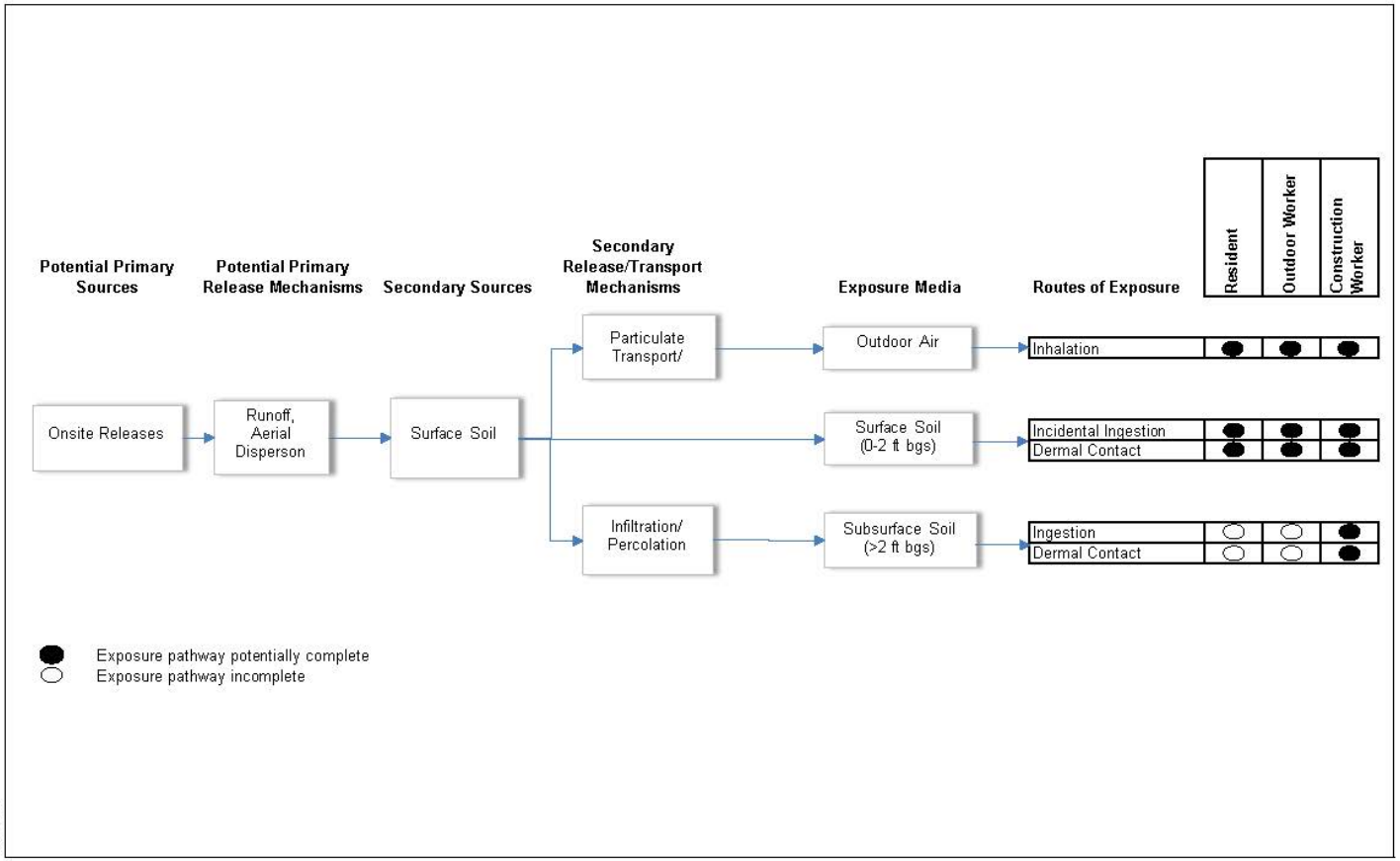

Figure 4 Conceptual Site Model Illustrating Dioxin and Furan Sources, Transport Mechanisms and Pathways for Human Exposure for OU-2

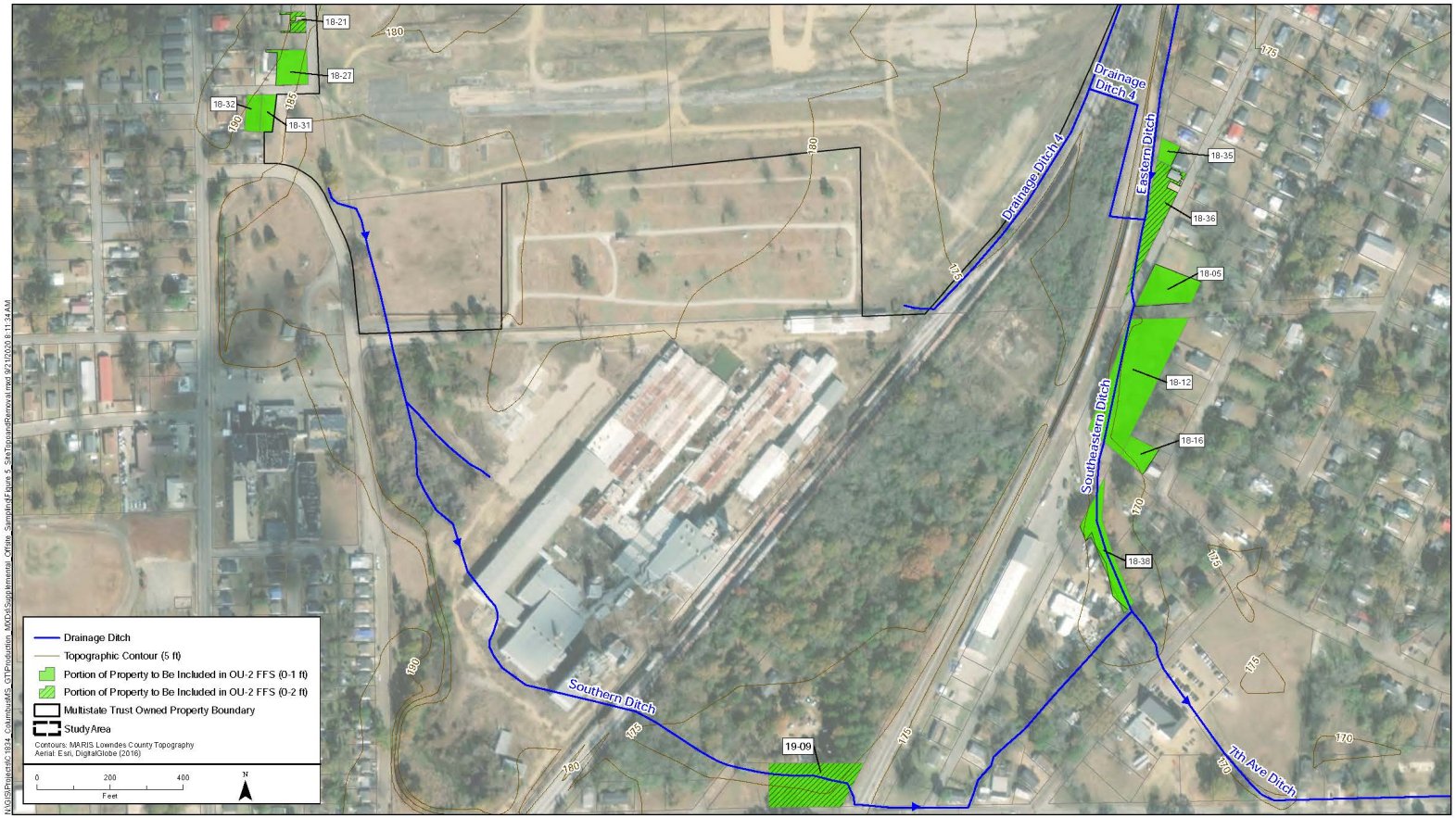

Figure 5 OU-2 Properties Requiring Remedial Action

APPENDIX A
STATE OF MISSISSIPPI CONCURRENCE

STATE OF MISSISSIPPI
TATE REEVES
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
CHRIS WELLS, INTERIM EXECUTIVE DIRECTOR

July 29, 2020

Mr. Charles King
Remedial Project Manager
US EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Re: ***Draft PROPOSED PLAN* dated July 2020**
Kerr McGee Columbus, OU-2
Columbus, Lowndes County, Mississippi

Dear Mr. King:

The Mississippi Department of Environmental Quality (MDEQ) has reviewed the above referenced draft of the proposed plan as submitted by the Environmental Protection Agency (EPA) on July 28, 2020. MDEQ concurs with the selection of the Preferred Remedial Alternative #2: Removal and Off-Site Disposal. This concurrence is contingent upon review of public comments during the upcoming public comment period. Please contact me at 601-961-5240 if you have any questions regarding this matter.

Sincerely,

Thomas L. Wallace, P.E.
Branch Chief – GARD I

APPENDIX B
COMMENT AND RESPONSE INDEX

- **A. Summary of Stakeholder Issues and Lead Agency Responses**

The EPA received two comments from stakeholders during the Proposed Plan public comment period. One is supportive of the EPA's remedy selection but wants to be sure that residents will receive the information and support that they need to manage any risks to human health that may occur during the cleanup. The other commenter is concerned about some of the conditions she observed while earlier cleanups were taking place at the site.

The EPA commits to providing nearby residents with clear and timely information about any risks that the cleanup may pose to human health and the environment. The EPA will also comply with all applicable, relevant and appropriate practices to mitigate or prevent exposure to contaminants during the cleanup activities.

- **B. Technical and Legal Issues**

Comment #1
One commenter agrees with the EPA's preferred remedy selection for OU2. The commenter indicated that the EPA should inform the homeowners of the actual risk associated with the contaminated soils found at each property. In addition, the commenter expressed a desire for EPA to provide housing while the cleanup of the property is being conducted.

EPA Response
The EPA acknowledges the commenter's agreement with the preferred remedy selection for OU2. The EPA will ensure that the residents are informed of any risk associated with the cleanup and restoration of their properties. Based on current information, the EPA has determined that cleanup activities can be safely conducted without relocating residents. If conditions change, and it is determined by the EPA that temporary relocation of residents is required to safely conduct the cleanup, the EPA will require the Greenfield Multistate Trust to pay for all appropriate temporary relocation costs associated with the cleanup.

Comment #2A
A commenter expressed a concern about having seen red dirt being tracked out from the site by trucks, possibly migrating into the stormwater ditch system and eventually getting into the water supply.

EPA Response
Since OU2 cleanup activities have not begun, it is assumed that the commenter is referring to Pine Yard (OU1) or stormwater ditch (14th Avenue or 7th Avenue) cleanup activities. While some of the previous cleanup activities were ongoing in 2017, an incident regarding a significant amount of red dirt on 14th Avenue was reported to the Kerr-McGee site hotline. After investigating the report of the incident, it was determined that the dirt and debris in the street were not associated with the Kerr-McGee cleanup activity but were associated with another project being conducted in the area by a local utility company.

During the Pine Yard cleanup activities, all vehicles (including trucks) that entered the Pine Yard were required to pass through a decontamination station manned by several workers,

whose primary responsibility was to ensure that site-related dirt/mud was removed (by pressure washing and scrubbing with brushes) from the tires of all vehicles before leaving the site. If on a rare occasion some dirt from the site entered the street, it was immediately identified and removed by site workers.

During the 14th Avenue and 7th Avenue stormwater ditch cleanup activities, any debris or dirt generated was removed immediately. These cleanup activities were documented by the contractors in the daily photograph logs and written notes.

Regardless of the source of the red dirt observed by the commenter, the public water supply would not have been threatened. The public water supply in the area of Columbus surrounding the site is drawn from an aquifer over five hundred feet below the ground surface and is not impacted by surface or storm water run-off.

During the OU2 cleanup, just as in the earlier cleanups, the EPA will comply with all applicable, relevant and appropriate practices to prevent contamination from migrating off-site.

Comment #2B
The commenter also expressed concerns regarding the strong smell of creosote in the air and difficulty of breathing that she encountered during her early years, when the facility was in operation. She indicated that the health of many in the area were affected by the operations of the Kerr-McGee Columbus, Mississippi facility. She expressed her opinion that the company cared more about making money than people's health.

EPA Response
It has been well documented that residents reported strong smells of creosote in the air while the facility was operating. Air monitoring was conducted during all excavation activities in OU1, and levels measured downwind of excavations were consistently below 5% of the maximum allowable levels. Air monitoring of site-related contaminants of concern will also be conducted during OU2 cleanup activities. Based on the current sampling results and the recent successful cleanups that have been conducted in the Pine Yard and the stormwater ditches, the EPA expects the OU2 cleanup activities to be conducted without exceeding the allowable air concentrations. However, if air monitoring identifies levels that approach the maximum allowable limits, the contractor will follow procedures contained in the approved workplan, (including stop work, if necessary) to ensure the protection of human health and the environment.

The Multistate Trust funds can be used only to investigate and cleanup contamination, manage the former Kerr-McGee property and prepare for safe, beneficial Site reuse. A different trust, the Garretson Trust, was set up by the bankruptcy court specifically to address personal injury (health or medical) claims. Anyone with questions about personal injury claims should contact the Garretson Trust (the Tronox Tort Claims Trust) at (800) 753-2480 or helpline@tronoxtorttrust.com.