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Removal Action Report

Northeast Drainage Ditch
Hattiesburg, Mississippi

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Project No. 21-04

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Executive Summary

From July 2003 through June 2007, Tronox LLC (formerly Kerr-McGee Chemical LLC) and the City of Hattiesburg Public Services Department (hereinafter "the City") completed an environmental cleanup and drainage improvement project in Hattiesburg, Mississippi. The project, known as the northeast drainage ditch removal action, was designed to address affected sediment and soil in an open ditch that flowed eastward from the Norfolk Southern railroad tracks to a point immediately south of the Francis Street Apartments. The objectives of the removal action were to eliminate the potential for exposure to affected media within and beneath the ditch and to improve surface water drainage in the project area.

Investigations conducted in 1998 and 2000 identified polycyclic aromatic hydrocarbons (PAHs) in sediment, soil and ground water within and beneath the northeast drainage ditch. In August 2001, a document entitled *Removal Action Work Plan, Northeast Drainage Ditch* (Michael Pisani & Associates, Inc.) was submitted to the Mississippi Department of Environmental Quality (MDEQ). Construction drawings and specifications for replacing the open ditch with a buried culvert system (Shows, Dearman & Waits, Inc.) were submitted with the work plan. MDEQ issued conditional approval of the *Removal Action Work Plan* and construction drawings in a May 8, 2002 letter.

In January 2003, Tronox and the Mississippi Commission on Environmental Quality entered into an Agreed Order for site remediation (Order No. 4539 03), which included the implementation of the MDEQ-approved *Removal Action Work Plan*. Because the City had already obtained permanent easements for its proposed drainage improvements, Tronox agreed to fund the project with the City serving as contractor. After soliciting and evaluating public bids, the City awarded the project to Lampkin Construction Company of Vicksburg, Mississippi in May 2003. The City contracted Shows, Dearman and Waits to administer the contract and serve as resident inspector on behalf of the City.

Beginning in July 2003, Lampkin Construction, with Singley Construction Company serving as its environmental remediation subcontractor, implemented the *Removal Action Work Plan*. The removal action included the following:

- Removal and offsite disposal of approximately 1,400 linear feet of existing culvert;
- Removal and offsite disposal of 14,000 tons of sediment, soil and debris;
- Placement of an HDPE liner and sand bed (as necessary to achieve plan elevations) in the excavated ditch;

- Installation of over 4,400 linear feet of new culvert and associated drop inlets; and
- Backfilling around culvert with clean fill soil and vegetating backfilled areas with native grass.

The removal action was successful in achieving its objectives. The potential for exposure to PAHs in the ditch has been eliminated through the removal of affected sediment and soil followed by the installation of a liner and a buried culvert system. In addition to the benefit derived from the environmental cleanup, the replacement of the open ditch with a buried culvert system has resulted in significant improvements to drainage in the project area.

1.0 Introduction

1.1 Project Background

Before 2003, an open ditch extended eastward from the intersection of Scooba Street and the Norfolk Southern railroad tracks to a point just south of the Francis Street Apartments in Hattiesburg, Mississippi. The City had plans to perform drainage improvements in the area between the railroad tracks and the upstream end of the recently-completed Hall Avenue drainage project, a total distance of approximately 3,700 feet or 0.7 miles (a site location map is provided as Figure 1-1). After this work was planned by the City, and in the course of investigating the former Gulf States Creosoting site, it was discovered that sediment, soil and ground water within and beneath some segments of the ditch were affected with PAHs. Following this discovery, Kerr-McGee Chemical LLC (now Tronox LLC) began working with the City to coordinate the City's planned drainage improvements with the environmental cleanup necessary to address affected materials in the ditch.

The purpose of the work documented in this report was to improve existing drainage in the project area and to address ditch sediment and soil containing polycyclic aromatic hydrocarbons (PAHs). The activities described herein were originally presented as part of a *Remedial Action Work Plan* for the former Gulf States Creosoting site, which was submitted to the MDEQ in February 2000. In order to expedite completion of the ditch project, the plan for improving drainage and cleaning up the ditch was subsequently removed from the *Remedial Action Work Plan* and submitted in a stand-alone *Removal Action Work Plan* for the northeast drainage ditch (Michael Pisani & Associates, Inc., August 3, 2001).

1.2 Removal Action Objectives

The scope of work described in this report was designed to address affected media within and adjacent to the northeast drainage ditch. The specific objectives of this removal action were to:

- eliminate the potential for exposure to affected sediment and soil in the ditch;
- eliminate the potential for surface runoff to come in contact with affected sediment and soil; and
- eliminate or greatly reduce the potential for infiltration of precipitation through affected sediment and soil to shallow ground water.

1.3 Selection of Remedial Alternative

Section 4.0 of the February 2000 *Remedial Action Work Plan* presented the results of a Feasibility Study in which a wide range of remedial alternatives for addressing affected media at former wood treating sites was evaluated. The selected alternative for the northeast drainage ditch was removal and offsite disposal of affected sediment and

soil, followed by the installation of a buried culvert system within the existing ditch. Selection of this remedy was based on the following:

- The remedy would result in overall protection of human health and the environment by eliminating the potential for direct contact with affected sediment and soil, as well as eliminating the potential for surface water runoff to come in contact with affected sediment and soil;
- The remedy would result in the reduction of a continuing source of ground water contamination; and
- The remedy represented a readily implementable and cost-effective long-term solution that has met with acceptance by both the public and MDEQ.

1.4 Engineering Design Considerations

The original plan was to remove affected sediment and soil and install a buried culvert system to a distance approximately 2,400 feet downstream of the Norfolk Southern railroad tracks (Station 34+00 on Sheet 8 of the as-built drawings). This distance represents the point past which significant impacts to sediment and soil had not been detected during site investigation activities. During the engineering design study, however, it was determined that in order to accommodate runoff from the upstream drainage basin, it would be necessary to install culvert pipe significantly larger than the pipe already in place. Therefore, the existing culvert system was upgraded for 1,300 additional feet downstream of the originally planned termination point in order to tie in to the recently-completed Hall Avenue drainage project. This design modification was necessary strictly for drainage purposes, since no PAH-affected materials were present in the ditch downstream of Station 34+00.

2.0 Pre-Construction Activities

Certain tasks had to be completed prior to mobilizing to the field for construction activities. These tasks included the following:

- coordinated with the City to obtain construction and drainage easements from surface leaseholders and to identify contracting requirements for the project;
- coordinated the clearance of subsurface and overhead utilities;
- surveyed proposed storm sewer location and construction easement boundaries;
- designated exclusion zones and other work areas; and
- coordinated with the City on traffic control issues.

Details regarding these tasks are provided in this section.

2.1 Coordination with City

The City of Hattiesburg Public Services Department obtained easements from surface leaseholders along the ditch. The City obtained two types of easements for the project:

- a 15-foot wide drainage easement (i.e., 7.5 feet on either side of the centerline of the proposed drainage pipe) to allow the City or its contractor to perform maintenance of the culvert system; and
- 10-foot wide temporary construction easements running parallel with and adjacent to both edges of each drainage easement.

City easements are shown on Sheets 3 through 9 of the as-built drawing package, which is submitted with this report and incorporated herein by reference.

Michael Pisani & Associates, Inc. (MP&A) provided the City with detailed procedures for environmental remediation to include in the contract documents. MP&A also assisted the City in identifying qualified remediation contractors for the project.

2.2 Utilities Clearance

Lampkin Construction was responsible for identifying all subsurface and overhead utility lines located within the easements for the project. This was accomplished by requesting utilities clearance from Mississippi One-Call and coordinating with the City of Hattiesburg Public Services Department. With the exception of several City sanitary sewer and storm water drainage lines, no subsurface utilities were identified that resulted in modifications to the project as planned.

2.3 Surveying and Temporary Fencing

Prior to mobilization, the centerline of the proposed storm sewer line and the outer boundaries of the construction easements on each side of the ditch were surveyed by a professional land surveyor licensed in Mississippi. A line of stakes with flagging tape was driven along the proposed centerline for the storm sewer system. Temporary fencing was erected along the construction easement boundaries prior to commencing excavation.

2.4 Designation of Work Areas

The temporarily fenced area (i.e., the area within the construction easement) was deemed an exclusion zone during construction, with access limited to construction workers, MDEQ personnel, and City personnel only. The surface leases for several lots adjacent to the ditch had reverted to the City of Hattiesburg, and these lots were utilized for temporary equipment and materials storage. A temporary field office was established in a building owned by Courtesy Ford near the dead end of Timothy Lane.

2.5 Traffic Control

During the removal action, existing culverts beneath several City streets had to be removed and replaced. In addition, trucks loaded with material bound for offsite disposal resulted in increased vehicular traffic in the project area. Before commencing construction activities, Lampkin Construction coordinated with the City to address street closings, rerouting of traffic, and appropriate routes for truck traffic.

3.0 Construction Activities

Procedures used during the actual removal action are documented in this section. The as-built drawing package provided with this document includes demolition plans, construction drawings and profiles for the new culvert system, detailed design drawings for all components of the system, and cross sections depicting approximate final culvert elevations. Selected photographs of construction activities are provided as Appendix A.

3.1 Mobilization

Once written approval of the *Removal Action Work Plan* was received from MDEQ and all pre-construction tasks were completed, Lampkin Construction mobilized to the field all equipment, materials, and personnel required to complete the project. Prior to commencing construction, a start-of-job meeting was conducted at the site to discuss the sequence of project tasks and to establish clear lines of communications between all parties. MP&A and MDEQ coordinated with one another to ensure that Singley Construction removed all visibly-affected material from the ditch. Shows, Dearman & Waits, the City's resident inspector, was responsible for seeing that all components of the drainage system were constructed according to the approved plans.

3.2 Clearing and Grubbing

All trees and shrubs within the anticipated excavation boundaries were removed prior to commencing excavation. Tree and shrub removal consisted of cutting the limbs and trunk and grubbing out of the entire root system, to the extent practicable. Trees less than 8 inches in diameter and all shrubs were also removed from the construction easement to allow construction to proceed unencumbered. Larger trees were left in place if they did not interfere with construction.

3.3 Excavation and Loading

Excavation and loading was performed using a trackhoe, with all excavated material loaded directly into trucks for immediate transportation and offsite disposal. Only clean fill material was stockpiled onsite during construction activities. A minimum of 18 inches of sediment and soil beneath the existing base of the ditch was excavated; typical excavation detail is shown on Sheet 13 of the as-built drawings. More than 18 inches of material was removed in areas where necessary to achieve the proposed elevation for the base of pipe. Excavation extended to depths below the top of ground water only when absolutely necessary to complete the project (see Section 4-1).

In order to keep excavations open for as short a time as possible, the new culvert system was installed and clean backfill was placed as soon as the old culvert and affected materials were removed. The project generally progressed from downstream to upstream so that the new, larger-diameter culvert would not be flowing into the old, smaller-diameter culvert.

3.4 Transportation and Disposal

Prior to beginning construction, ditch sediment and soil were tested and determined to be non-hazardous. The majority of the excavated material (i.e., all but 300 tons of the approximately 14,000 tons of material removed from the ditch) was disposed at a Subtitle D industrial solid waste landfill (Waste Management's Central Landfill in McNeill, Mississippi). As a precautionary measure, approximately 300 tons of heavily-impacted material were disposed at a Subtitle C hazardous waste landfill (Waste Management's Emelle, Alabama facility) as non-hazardous waste. Manifests, weigh tickets, and acknowledgement of receipt forms are provided on a CD as Appendix B. Transportation and disposal tonnages are summarized in Table 3-1.

3.5 Installation of Liner and Sand Bed

In order to preclude contact with residual site constituents during culvert installation, and to minimize the potential for infiltration of surface water to ground water, an HDPE liner was installed in the excavation prior to piping. The 20 mil liner covered the bottom and the sides of the excavation, and was keyed into the sidewall by excavating a small "shelf" for a flap, as shown on Figure 3-1. Fill material was placed on the flap to keep the liner in place until the pipe was installed and the excavation was backfilled.

In much of the excavated area, the culvert pipe was placed directly atop the liner in the base of the excavation. In areas where overexcavation was required, however, a sand bed was placed atop the liner to achieve the appropriate elevation for the base of pipe.

3.6 Installation of Culvert System

The culvert system was installed as shown on the as-built drawings. The new concrete culvert piping ranges in size from 24-inch diameter reinforced concrete pipe at the inception of the project to tandem box culverts (72 by 42 inches and 96 by 36 inches) at the downstream end of the project. Pipe joints were constructed in accordance with Mississippi Department of Transportation specifications. Grated storm water inlets were installed at approximately 100- to 150-foot intervals at locations shown on the drawings.

3.7 Backfilling and Seeding

Backfilling was performed as the system was installed so that the excavation did not remain open longer than necessary. Backfilled materials were compacted to 90% of standard proctor density until the pipe had a cover of not less than one foot. Excavations across roadways or in paved areas were backfilled in 6-inch layers and were compacted to 95% of standard proctor density. To facilitate storm water collection, the surface of the backfilled culvert trench was graded to direct surface flow to the nearest storm water inlet. All backfilled areas were seeded with a mixture of Bermuda and Rye grass.

4.0 Deviations from Removal Action Work Plan

The removal action and culvert installation were completed in substantial conformance with the plans. The City's project close-out documents are provided as Appendix C. Deviations from the procedures specified in the *Removal Action Work Plan* are documented in this section; deviations from the construction plans are documented on the as-built drawings.

4.1 Extraction of Shallow Ground Water

Section 5.3 of the *Removal Action Work Plan*, in which procedures for excavation and loading were established, included the statement that "In no instance will excavation proceed past the first encountered ground water." However, unanticipated conditions near the downstream end of the project required excavation below the top of ground water in the segment of the project between approximately Stations 34+00 and 37+00 (i.e., at the rear of the Francis Street Apartments). This segment of the project was downstream of affected soil and ground water as determined by sampling during the Remedial Investigation.

Due to the presence of shallow ground water and sandy soils within the uppermost 10 feet of land surface, the excavation was filling with ground water and caving in before the liner and pipe could be installed at the required elevations. It was decided that the best way to allow for excavation to the required depths would be the installation of a shallow dewatering system. The dewatering system consisted of a series of 10- to 20-foot deep well points spaced along both sides of the excavation, all connected to a common header which was attached to a vacuum-assisted pump. The extraction system achieved the desired effect, as the water level in shallow soils was lowered to a depth that allowed for installation of the liner and culvert at design elevations.

4.2 116 Townsend Street

During implementation of the *Removal Action Work Plan* in 2003, affected soils were observed in several areas outside of the boundaries of the MDEQ-approved project. At 116 Townsend Street (see Figure 4-1), a seam of visibly-affected soil was observed extending beneath the driveway toward the residence. A review of historical aerial photography revealed that prior to residential development of the area, the ditch actually ran through the property at 116 Townsend Street, entering on the Harrell Street side and exiting on the Francis Street side of the lot. At some time during the development of the area, a culvert was installed along Harrell Street, and the segment of the ditch crossing the lot for 116 Townsend Street was abandoned and apparently backfilled. In 2006, Tronox reached an agreement with the residents at 116 Townsend Street, who owned the improvements and still hold the lease for the property, to remove affected soils from the subsurface beneath the property.

In addition to the affected soil beneath 116 Townsend Street, visibly-affected soil was observed surrounding a sanitary sewer line beneath Harrell Street immediately adjacent to that property. During the 2003 removal action, the affected soils were removed and the sanitary sewer line was replaced within the boundaries of the ditch and culvert project. Tronox committed to the City of Hattiesburg and MDEQ to remove additional impacted soils and replace additional sewer line at a later date.

After MDEQ reviewed and commented on an earlier plan, MP&A prepared and submitted the *Final Removal Action Work Plan, 116 Townsend Street and Harrell Street Sewer Line* on April 19, 2006. The work performed during implementation of that plan is documented in the following subsections.

4.2.1 Demolition and Clearing

In order to excavate affected materials from the former ditch, it was first necessary to remove the house on the property. Prior to demolition, the house was inspected for asbestos by Environmental Services, LLC, a licensed asbestos abatement contractor, and asbestos-containing materials (floor tiles and window glaze) were removed and disposed of in accordance with applicable regulations. On February 27, 2006, demolition of the house was completed by TL Construction of Hattiesburg. Building materials were sent to a construction and demolition landfill for disposal.

4.2.2 Soil Removal and Sampling

On May 15 through 17, 2006, just over 500 tons of soil were excavated from the trace of the former ditch and sent to Waste Management's Central Landfill in McNeill, Mississippi for disposal. The excavated trench was approximately 100 feet long and averaged 15 feet wide and 6 feet deep. In accordance with the MDEQ-approved plan, MP&A collected 10 surface soil samples from a depth of zero to one foot below land surface (bls) immediately adjacent to the ditch and 10 sidewall samples from depths of 3 to 5 feet bls. "Step-out" samples were also collected from zero to one foot bls at a distance of approximately five feet from all of the surface soil samples.

After soil removal and sampling activities were completed, the excavated trench was backfilled with clean, offsite fill material to pre-existing grade. The surface soil and sidewall samples were all analyzed for PAHs by SW-846 Method 8310. The "step-out" samples were extracted and held for analysis pending the results of surface soil and sidewall sampling.

4.2.3 Summary of Soil Sampling Results

The results of soil sampling conducted by MP&A are summarized in Table 4-1. Laboratory reports are provided in Appendix D.

Based on risk-based exposure calculations, MDEQ had established a cleanup goal of less than 1 milligram per kilogram (mg/kg), averaged across the property, for soils in the zero

to one foot depth interval. Samples from five of 10 surface soil sampling location contained benzo(a)pyrene concentrations exceeding 1 mg/kg. MP&A reported these preliminary results to MDEQ, and it was agreed that MP&A would have the "step-out" samples at those locations analyzed for PAHs.

Benzo(a)pyrene concentrations in the 15 surface soil samples averaged 2.44 mg/kg (see Table 4-2). MP&A suggested to MDEQ that by removing one foot of additional soil in the area encompassing SS-05, -07, -09, and their respective step-outs, the residual average concentration would 0.61 mg/kg. MDEQ agreed that this approach would be protective of human health and the environment and approved Tronox's proposal for removal of additional soil.

4.2.4 Additional Soil Removal and Site Restoration

On August 10, 2006, approximately 40 additional tons of soil were removed from an area approximately 50 feet long by 10 feet wide by 1 foot deep at 116 Townsend Street. The excavated area was backfilled with clean, offsite fill material to pre-existing grade. The disturbed portion of the property was then seeded with Bermuda grass seed.

4.3 Eastside Avenue to Florence Street

MDEQ requested several modifications to the approved *Removal Action Work Plan* in the project segment between Eastside Avenue and Florence Street. All of these modifications were implemented as part of the removal action in an attempt to remove as much affected material as practicable. These modifications are summarized in the following subsections.

4.3.1 American Legion and Bevon Properties

With the exception of 116 Townsend Street, the segment of the project from Eastside Avenue to the downstream end of the Bevon Property was the only area where new culvert pipe was not installed in place of old culvert pipe or open ditch. The MDEQ-approved *Removal Action Work Plan* called for the existing culvert beneath the American Legion and Bevon properties to be abandoned in place by pumping the pipe full of flowable fill (i.e., a "flowable" mixture of cement and sand). In the course of the removal action, however, it was discovered that the 40-foot segment of former ditch between Eastside Avenue and the front of Down Home Cookin' restaurant and the 50-foot segment of the former ditch between the downstream side of a commercial building and the downstream boundary of the Bevon property contained affected sediment and soil beneath the existing pipe. MDEQ requested that Tronox remove the pipe and affected material where accessible, then abandon in place the approximately 115-foot long segment of existing culvert that runs beneath existing buildings by pumping it full of flowable fill.

On September 9 through 12, 2006, approximately 200 tons of material, consisting of culvert pipe and affected sediment and soil, were removed from the American Legion and Bevon properties and sent to Waste Management's Central Landfill in McNeill,

Mississippi for disposal. The excavated areas were backfilled with clean, offsite fill material to pre-existing grade. The disturbed portion of the American Legion property, which is within a parking lot, was paved with asphalt; the backfilled area on the Bevon property was seeded with Bermuda grass seed.

4.3.2 MDEQ Sample Location Florence 375A

In May 2004, MDEQ conducted surface soil sampling adjacent to the completed portions of the northeast drainage ditch removal action project. The purpose of sampling was to determine if residual PAHs were present at concentrations that may have posed a risk to human health or the environment. After reviewing the data, EPA Region 4 issued a memorandum stating that the concentrations in soil did not exceed EPA's target risk ranges. However, to error on the side of caution, MDEQ requested that Tronox remove a small area (approximately 10 feet by 10 feet by 1 foot deep) surrounding MDEQ sample Florence 375A, where benzo(a)pyrene was reported at a concentration of 7.59 mg/kg.

After completing soil removal on the Bevon property, MP&A directed the excavation of soil in the area surrounding MDEQ sample location Florence 375A. The location was determined using GPS coordinates provided by MDEQ. The small excavation was backfilled with clean, offsite fill material to pre-existing grade then seeded with Bermuda grass seed.

4.3.3 106 Scooba Street

During the 2003 removal action, the leaseholder of the property at 106 Scooba Street would not allow the City onto her property to complete the soil removal and drainage improvements required by the MDEQ-approved plan. For this reason, Sheet 5 of the as-built drawings shows the drainage improvements behind the residence at 106 Scooba Street as "Deleted."

Tronox negotiated to purchase the 106 Scooba Street lease in early 2007. During the week of April 23, 2007, the old culvert and affected soil were removed from 106 Scooba Street and new culvert system was installed in accordance with the construction plans. MDEQ collected six surface soil samples immediately adjacent to the excavated trench and had the samples analyzed for PAHs.

Due to slightly elevated levels of PAHs, MDEQ requested that Tronox excavate a small volume of affected soil (approximately one backhoe bucket-width and depth) immediately adjacent to the former excavation trench. Tronox returned to the 106 Scooba Street and conducted the additional soil removal on May 31, 2007. Once that additional work was performed, MDEQ concurred that all work necessary to address affected sediment and soil east of the Norfolk Southern railroad tracks had been completed.

5.0 Health and Safety

Before beginning work, Singley Construction developed a comprehensive Health and Safety Plan for the project. The plan required that all workers involved in the removal and handling of affected materials be HAZWOPER trained in accordance with OSHA regulation 40 CFR 1910.120. This plan addressed physical and chemical hazards, safe work practices, hazard communications, worker personal protective equipment, and key health and safety personnel. All persons working at or visiting the site, including but not limited to Tronox, MDEQ and City of Hattiesburg personnel, were required to adhere to the provisions of the Health and Safety Plan.

Air monitoring was not required by the Health and Safety Plan because the primary routes of exposure for PAHs are ingestion and dermal contact, not inhalation. However, in early September 2003, MDEQ requested that air monitoring be conducted when affected materials were being excavated and odors were generated. Tronox complied with this request, and had Singley subcontract an air monitoring firm (EarthCon out of Jackson, Mississippi) to perform air monitoring. EarthCon recorded measurements using a field screening meter and collected air samples for laboratory analysis for coal tar pitch volatiles (CTPVs), which make up the volatile fraction of creosote. The air monitoring reports provided in Appendix E indicate that at no time did concentrations of any CTPV exceed the worker protection limits specified by OSHA, meaning that there was no significant exposure to creosote constituents via the air pathway during the removal action.

6.0 Summary

From 2003 through 2007, Tronox LLC and the City of Hattiesburg worked together to complete an environmental cleanup and drainage improvement project in Hattiesburg, Mississippi. The objectives of the removal action were to eliminate the potential for exposure to affected media within and beneath the ditch and to improve surface water drainage in the project area. All work on the project was performed in accordance with plans approved by MDEQ and with MDEQ oversight.

The removal action included the following tasks:

- Removal and offsite disposal of approximately 1,400 linear feet of existing culvert;
- Removal and offsite disposal of 14,000 tons of sediment, soil and debris;
- Placement of an HDPE liner and sand bed (as necessary to achieve plan elevations) in the excavated ditch;
- Installation of over 4,400 linear feet of new culvert and associated drop inlets; and
- Backfilling around culvert with clean fill soil and vegetating backfilled areas with native grass.

The removal action was successful in achieving its objectives and MDEQ has concurred that all work necessary to address affected sediment and soil within and adjacent to the former ditch has been completed. The potential for exposure to PAHs in the ditch has been eliminated through the removal of affected sediment and soil followed by the installation of a liner and a buried culvert system. The replacement of the open ditch with a buried culvert system has also resulted in significant improvements to drainage in the project area.