

# **STATEMENT OF BASIS**

## **PROPOSED REMEDY SELECTION**

**and**

## **HAZARDOUS AND SOLID WASTE AMENDMENTS (HWA)**

## **PERMIT RENEWAL**

**Grenada Solar, LLC/Beazer East, Inc.  
Grenada, Mississippi**

**EPA ID NUMBER: MSD 007 027 543**

**June 1, 2023**

**United States Environmental Protection Agency  
Region 4**



## **INTRODUCTION**

The United States Environmental Protection Agency (EPA) prepared this Statement of Basis pursuant to Title 40 of the Code of Federal Regulations (CFR), Section 124.7, for a permit renewal and remedy selection for the Grenada Solar, LLC/Beazer East, Inc. facility located at 1 Koppers Drive, Grenada, Mississippi 38901 (the Facility).

The EPA is issuing this Statement of Basis consistent with the public participation provisions of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984.

The purpose of the Statement of Basis is to identify remedy alternatives, propose a Final Remedy for corrective action and explain the rationale for the proposed Final Remedy. This Statement of Basis also summarizes the corrective action history for the Facility, describes the alternatives considered during selection of the proposed remedy, and solicits public participation. The EPA invites the public to review the Administrative Record for this action and submit comments to the EPA on the HSWA Permit renewal and the proposed Final Remedy, alternative remedial designs, and any remedies not mentioned. The EPA will make a decision on the Final Remedy and permit renewal after evaluating any information received during the public comment period.

## **PUBLIC PARTICIPATION**

The EPA Region 4 developed this Statement of Basis for the Final Remedy selection for all SWMUs based on the RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) Work Plan/Corrective Measures Implementation Plan (CMIP), and the associated Workplans and Reports. Alternatives not evaluated in the CMS/CMIP, and the associated Workplans and Reports may be proposed by the public at this time.

The regulations under 40 CFR § 124.10 require that a 45-day comment period be instituted for each draft permit under RCRA. The public comment period will begin on June 1, 2023 and end on July 23, 2023. The draft HSWA Permit, and Statement of Basis are available for public review at the following locations:

Harbhajan Singh  
U.S. Environmental protection Agency, Region 4  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, Georgia 30303  
Office Hours: Mon - Fri: 8:00 a.m. to 4:30 p.m.  
Phone: (404) 562-8473

Chief Librarian  
Elizabeth Jones Library  
1050 Fairfield Avenue

Grenada, Mississippi 38902  
Phone: (662) 226-2072  
Hours: 8:30 a.m. – 4:30 p.m. (central time)

Mississippi Department of Environmental Quality  
515 East Amite Street  
Jackson, Mississippi 39202  
Hours: 8:00 a.m. – 4:30 p.m. (central time)  
Contact: Deidre Thompson  
Phone: (601) 961-5758

A copy of the entire Administrative Record for the HSWA Permit renewal and Statement of Basis are available for public review at the EPA Region 4 address listed above. A fee for copying and/or mailing may be charged, and arrangements should be made in advance. Additionally, the public notice, draft HSWA Permit, and Statement of Basis will be available on the EPA Region 4 website: <https://semspub.epa.gov/src/collection/04/AR67335>.

A public hearing has not been scheduled at this time. Persons wishing to comment on the HSWA Permit renewal and selection of the Final Remedy should submit comments in writing to EPA, Harbhajan Singh at [singh.harbhajan@epa.gov](mailto:singh.harbhajan@epa.gov), or at the above address. If a public hearing is requested, the time and place of the hearing will be published in another public notice.

After the EPA's evaluation of public comments received, the EPA will summarize and respond to such comments in a Final Decision and Response to Comments document. This Response to Comments document will be prepared after conclusion of the public comment period and will be incorporated into the Administrative Record. When the EPA makes a final permit decision, notice will be given to the permit applicants and each person who has submitted written comments or requested notice of the final decision. The final permit decision shall become effective thirty (30) days after service of notice of the decision unless a later date is specified or review is requested under 40 CFR § 124.19. If no comments are received requesting a change in the draft Permit, the final Permit along with the Final Remedy shall become effective immediately upon issuance.

## **RCRA PERMIT PROCESS AND HSWA PERMIT STRUCTURE**

In Mississippi, implementation of the environmental permitting regulations under RCRA is shared between the Mississippi Department of Environmental Quality (MDEQ) and the EPA. The State of Mississippi has been authorized by the EPA to issue permits for the operation, closure, and post-closure care of Hazardous Waste Management Units (HWMUs), while the EPA retains authority to issue permits requiring corrective action for releases from Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). SWMUs are any units which have been used for the treatment, storage, or disposal of solid waste at any time, irrespective of whether the unit is or was intended for the management of solid waste. AOCs are areas having a probable release to the environment of a hazardous waste or hazardous constituent which is not associated with a SWMU and is determined to pose a current or potential threat to human health or the environment. This draft HSWA Permit will be a companion permit to the Hazardous

Waste Post-Closure Permit issued by MDEQ. Together, the EPA and MDEQ permits constitute the full RCRA Permit for this Facility.

The Facility submitted a HSWA Permit renewal application on December 16, 2021, and a Revised HSWA Permit renewal application on March 1, 2022. The EPA approved the Revised HSWA Permit renewal application on March 15, 2022.

The HSWA Permit is divided into three (3) parts: a cover sheet setting forth the basic legal authority for issuing the Permit; a section on standard conditions applicable to all hazardous waste management facilities (Part I); and a section on the corrective action conditions applicable to this Facility (Part II).

## **PROPOSED REMEDY**

The proposed Final Remedy addresses all Solid Waste Management Units (SWMUs) that have been identified at the Facility. A SWMU is any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous wastes. SWMUs include areas that have been contaminated by routine and systemic releases of hazardous wastes or hazardous constituents, excluding one-time accidental spills that are immediately remediated and cannot be linked to solid waste management activities (e.g., product or process spills).

The proposed Final Remedy includes a no further action (NFA) determination for some SWMUs. The proposed NFA determination is based on investigations concluding that concentrations of most hazardous constituents were detected below the human health risk-based concentrations, and that where concentrations of hazardous constituents were detected above the human health risk-based concentrations, those exceedances were attributed either to naturally occurring or background concentrations, or were anomalous and isolated in occurrence, and therefore pose no threat to human health and the environment.

The proposed Soil Final Remedy will include the placement of an engineered-cover system over the impacted surface soils areas in select portions of the Process Area along with minor grading to ensure appropriate surface water flow away from the impacted areas, followed by institutional controls (land use controls, etc.). This Final Remedy for soils will be protective of human health and the environment.

The proposed Groundwater Final Remedy will include dense-non-aqueous-phase-liquid (DNAPL) source removal/control along with Monitored Natural Attenuation (MNA) in the area of the contaminated groundwater plume, followed by institutional controls (land use controls, etc.). The DNAPL source removal/control before this proposed permit renewal occurred as an interim measure and consisted of DNAPL collection from the recovery wells upgradient of the sheet-pile wall and from the Central Ditch underdrain collection system. With this permit renewal, this interim measure is being made a Final Remedy in conjunction with MNA. This Final Remedy for groundwater will be evaluated periodically through EPA's long-term stewardship efforts to monitor remedial decisions at RCRA Corrective Action facilities nationally.

## FACILITY BACKGROUND AND STATUS

The Facility is bordered by the Carver Circle community areas on the east, the Illinois Central railway services to the west, and the Koppers Drive/Bailey Road community areas before its entrance on the southwest. The Facility encompasses 171-acres and extends approximately 1.2 miles long from northwest to southeast and 0.3 miles wide (Figure 2-1). Two surface water streams flow across the Facility towards the Batupan Bogue: the Northern Stream in the North and the Central Ditch in the center. Several private water supply wells are located within a 2-mile radius of the Facility. The Facility and residents of adjacent communities are currently supplied with municipal drinking water.

The Facility is a former wood treatment plant. It manufactured treated wood products such as railroad ties, poles, and lumber in pressurized cylinders using various conditioning and treating processes. Wood treating operations involved pentachlorophenol and creosote-based preservatives.

The Facility has a long history of owners since beginning its operations in 1904. In June 1988, BNS Acquisition, Inc., an indirect wholly owned subsidiary of Beazer PLC, acquired the outstanding common stock of Koppers Company, Inc. In December 1988, the wood treating operations were sold to Koppers Industries, Inc. (known as Koppers Inc. [Koppers]). On January 26, 1989, the name Koppers Company, Inc. was changed to Beazer Materials and Services, Inc. In April 1990, the name Beazer Materials and Services, Inc. was changed to Beazer East, Inc. As a condition of sale to Koppers, Beazer retained certain environmental responsibilities for the Facility.

Based on the configuration of operations, the Facility has been divided into three areas: wood storage in the northern area; wood treating facilities and office buildings in the central area; and wood storage in the southern area. General features of the Facility are depicted in Figure 2-2. Historical operations resulted in DNAPL impacts to the groundwater. The constituents of potential concern in the groundwater are pentachlorophenol, benzene, and polynuclear aromatic hydrocarbons (PAHs). The constituents of potential concern in the soil are pentachlorophenol, PAHs, and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzo furans (PCDDs/PCDFs).

Koppers ceased operations at the Facility in 2012. Site decommissioning activities conducted since then included: (a) cleaning, decontaminating, and removing equipment, including tanks; (b) cleaning, demolishing, and removing aboveground secondary containment structures and buildings (except the office and other key usable structures); (c) cleaning and decontaminating subgrade containment structures, breaching floors of subgrade containment structures (for drainage), followed by filling subgrade structures to grade with clean fill; (d) cleaning, decontaminating, and sampling of the concrete drip pad, followed by breaching of the concrete pad at grade to promote surface water runoff upon approval of decontamination; and (e) bringing decommissioned areas in the former Process Area to grade with clean fill. The decommissioning activities were completed in early 2015.

Koppers sold the Facility to Grenada Solar, LLC in July 2021. Grenada Solar plans to operate a solar facility at the property.

## **CORRECTIVE ACTION HISTORY**

In 1987, the EPA conducted a *RCRA Facility Assessment* (RFA) of the Site and identified the following 13 SWMUs (see Figure 2-2).

SWMU 1	Oil/Water Separator
SWMU 2	Surface Impoundment
SWMU 3	Spray Irrigation Field
SWMU 4	Boiler
SWMU 5	Boiler Ash Landfill
SWMU 6	Process Cooling Reservoir
SWMU 7	Container Storage Area
SWMU 8	Drip Track Area
SWMU 9	Chemical Unloading Area
SWMU 10	Underground Storage Tank
SWMU 11	Former Wastewater Treatment System
SWMU 12	North Waste Piles
SWMU 13	South Waste Piles

In 1988, a *Phase I RCRA Facility Investigation (RFI)* of each SWMU identified in the RFA was initiated. This investigation consisted of: (a) drilling and sampling 43 borings; (b) installing and sampling 47 groundwater monitoring wells; and (c) collecting and analyzing eight (8) sediment samples and four (4) surface water samples. The findings of this investigation along with recommendations for additional investigations were presented in the 1989 report entitled, *Soil and Groundwater Investigation of Solid Waste Management Units*.

In 1990, Beazer prepared the *Phase II RFI Work Plan, RCRA Facility Investigation (RFI)* for the additional investigations of the SWMUs. The MDEQ and EPA approved this investigation with revisions as documented in the *Supplemental Work Plan* in 1991. The investigation consisted of: (a) collecting and analyzing 24 sediment samples; (b) seven (7) surface soil samples; (c) drilling and sampling 75 soil borings; and (d) collecting and analyzing 25 groundwater samples and 14 surface water samples.

The *Draft Phase II RCRA Facility Investigation Report* was completed in 1992 and revised in 1994 and 1996. In 1997, the *RCRA Facility Investigation, Work Plan Addendum* was prepared and consisted of: (a) drilling and sampling 74 soil borings; (b) installing seven (7) temporary monitoring wells and collecting 14 groundwater samples from them; and (c) installing and sampling two (2) groundwater monitoring wells.

In 1996, the emphasis of the ongoing investigations related to the Former Wastewater Treatment System (SWMU 11) and consisted of 24 soil borings, 10 test pits, and a pump test. This investigation was documented in the 1996 *RCRA Interim Measure Predesign Investigation Report and Conceptual Design* which led to Interim Measures (IM) at SWMU 11. In 1998,

additional investigation, consisting of 24 sediment transects and samples, was conducted to fortify the IM.

By 1998, four additional SWMUs were identified and added to the 1998 HSWA Permit. These SWMUs included:

SWMU 14	Temporary Storage of Soil
SWMU 15	Two Soil Containment Structures
SWMU 16	Old Oil/Water Separator
SWMU 17	Old South Drip Pad/Track

The *Work Plan to Complete Phase II RCRA Facility Investigation* was submitted in 1999 and the EPA approved it in 2000. The Phase II activities consisted of: (a) nine (9) soil sampling locations; (b) 15 sediment samples in the Northern Stream; (c) 10 vertical profile borings with groundwater sampling; (d) installation of three (3) groundwater monitoring wells; (e) and baseline natural attenuation sampling. In 2003, Beazer provided the *Results of Soil Characterization, Vicinity of the Former "Creosote Hole."* Beazer submitted the *Complete Phase II RCRA Facility Investigation Report* in 2003, and the *Addendum to the Complete RFI Risk Assessment and Sediment Toxicity Work Plan for Northern Stream Sediments* in 2005. The EPA approved the *Complete Phase II RFI* in 2005 and *Sediment Toxicity Testing Work Plan* in 2006. The *Evaluation of Chemistry and Toxicity of Northern Stream Sediments* was submitted in 2006, and the EPA approved it in 2008, concluding that ecological risks do not exist at the Northern Stream.

In 2008, Beazer submitted a *Confirmatory Sampling Workplan (CS Workplan)* and *CS Workplan Addendum* and this investigation consisted of sampling of eight (8) existing groundwater wells installing two (2) new groundwater wells to assess the groundwater quality in the vicinity of the former Spray Irrigation Field (SWMU 3) and two (2) other former spray fields. In addition, 10 composite surface soil samples were collected to assess the soil quality within two (2) stormwater retention ponds; five (5) composite samples were collected from the retention pond near Outfall No. 005; and five composite samples were collected from the retention pond near Outfall No. 006. The analytical results were presented in the *Confirmation Sampling Report* in 2009, which the EPA approved in 2011.

The 2012 EPA HSWA Permit identified SWMUs 2, 3, 5, 14, and 15 as requiring no further action, while SWMUs 1, 4, 6, 7, 8, 9, 10, 11, 12, 13, 16, and 17 required a Corrective Measures Study (CMS).

Beazer conducted investigation of the Facility for over 20 years and submitted various workplans and reports in accordance with the HSWA Permits. This investigation resulted in collection and analysis of more than 200 soil borings, 65 sediment samples, 18 surface water samples, and 100 groundwater monitoring wells. Beazer closed/removed some of the SWMUs and implemented IM to mitigate the discharge of DNAPL to the Central Ditch. The corrective action history below is a summary of previous/historic investigations and corrective actions taken at each SWMU. A complete summary of the investigation results at each SWMU is provided in the *Complete Phase II RFI* of 2003. For the purpose of convenience, the SWMU

discussion below is divided into the three (3) areas of the Facility: A) the northern area, B) the central area, and C) the southern area.

### **A. Northern Area**

The northern area includes the former wood storage areas such as the Former Spray Irrigation Field (SWMU 3), the North Waste Piles (SWMU 12), and the Northern Stream, as depicted in Figure 2-2. The community of Tie Plant adjoins the property boundary to the northeast and the Illinois Central Railroad forms the western boundary. The Northern Stream within the northern portion of the Facility flows northeast towards the Batupan Bogue.

#### *SWMU 3 – Spray Irrigation Field*

The Former Spray Irrigation Field (SWMU 3) was in use from 1975-1988 and was closed in 1991 under an MDEQ-approved closure plan. The 2008 *Confirmatory Sampling Report* concluded that the groundwater under SWMU 3 was unimpacted. The 2012 HSWA Permit designated SWMU 3 as requiring no further action.

#### *SWMU 12 – North Waste Piles*

The North Waste Piles (SWMU 12) contained construction debris, treated and untreated scrap wood, railroad iron, including scrap metal, rubber tires, and other inert material. The waste was removed. Six (6) soil samples were collected in 1991 to characterize potential soil impacts at SWMU 12. This permit renewal will designate SWMU 12 as requiring no further action at this time.

#### *Northern Stream*

The Northern Stream consists of a small local drainage area that passes the north edge of the Facility. Thirty-seven sediment samples were collected in 1991, 1998, 2000, and 2006 to characterize potential impacts to the stream sediments. Six (6) surface water samples were also collected in 1991. In 2008, the EPA approved the *Evaluation of Chemistry and Toxicity of Northern Stream Sediments* and determined that ecological risk did not exist at the Northern Stream.

### **B. Central Area**

The Central Area was the main location of wood treating operations, and contained 11 SWMUs: the Oil/Water separator (SWMU 1), the closed RCRA Surface Impoundment (SWMU 2), the Boiler (SWMU 4), the Process Cooling Reservoir (SWMU 6), the Container Storage Area (SWMU 7), the Drip Track Area (SWMU 8), the Chemical Unloading Area (SWMU 9), the Underground Storage Tank (SWMU 10), the former Wastewater Treatment System (SWMU 11), the Old Oil/Water Separator (SWMU 16), and the Old South Drip Pad/Track (SWMU 17). The Central Ditch, a surface water stream located in this area, flows northeast towards the Batupan Bogue.

### *SWMU 2 – Closed RCRA Surface Impoundment*

SWMU 2 is a former hazardous waste management unit that was in use from 1975-1988 and was closed in 1988. It is currently regulated under MDEQ's Post-Closure Permit. A *Post-Closure Care Completion Certification Report* for the closed Surface Impoundment regulated by Hazardous Waste Management Permit HW-88-543-01 was submitted to the Mississippi Department of Environmental Quality (MDEQ) on July 2, 2019, and is currently under review.

### *SWMUs 1, 4, 9, and 10 – Central Process Area*

The Central Process Area consisted of pressurized cylinders and storage tanks, and contains SWMUs 1, 4, 9, and 10 (Oil/Water Separator, Boiler, Chemical Unloading Area, and Underground Storage Tank, respectively). These SWMUs have been subject to extensive investigation. A remedy is being proposed to address soil and groundwater contamination in this area.

### *SWMU 6 – Process Cooling Reservoir*

In 1991, 13 soil samples, two (2) sediment samples, and two (2) surface water samples were collected from the Process Cooling Reservoir for characterization. Ultimately, the Reservoir berms were breached, and the area regraded to prevent future ponding. A *Construction Completion Report: Grading at Former Process Cooling Water Pond* was submitted and approved in 2018. No further action is required for SWMU 6.

### *SWMU 7 – Container Storage Area*

This area stored containers for less than 90 days. Two (2) soil samples in 1991 and 12 surface soil samples in 1997, were collected to characterize the soil around the Container Storage Area. No further action is required for SWMU 7.

### *SWMU 8 – Drip Track Area*

Until 1991, the Drip Track Area was unlined and preservatives from newly treated wood would drip onto the soil. In 1991, a concrete catchment system was installed which included lining and building a containment berm for several hundred feet of drip track. Nearly 3,200 cubic yards of soil materials were removed during the drip track reconstruction. A remedy is being proposed for this SWMU.

### *SWMU 11 – Former Wastewater Treatment System*

In 1991, 33 soil samples were collected from the Former Wastewater Treatment System (SWMU 11). This SWMU is comprised of two (2) former impoundments. A former wood disposal area was located just west of this SWMU.

Interim Measures (IM) were implemented at SWMU 11 between 1999-2000 in accordance with a 1999 *Interim Measures Work Plan, SWMU 11*. Interim Measures were

designed to mitigate further discharge of DNAPL into the Central Ditch, and to eliminate potential exposure pathways of constituents in the Central Ditch sediments. The IM activities consisted of: (a) excavating nearly 30,000 cubic yards of impacted sediments from the Central Ditch; (b) relining the ditch with a geosynthetic clay liner, clean import material, and bank armor; (c) consolidating the excavated sediment in the Former Wastewater Treatment System and former wood disposal area, and installing a low-permeability cover with a geosynthetic clay liner over the excavated sediment to reduce the groundwater hydraulic gradient toward the Central Ditch; (d) installing a subsurface vertical containment barrier (430 lineal feet) that extended 15 feet in depth along the north bank of the Central Ditch, an underdrain beneath the relined ditch, and DNAPL recovery wells behind the containment barrier, to passively contain and collect DNAPL and mitigate continuing seeps into the Central Ditch; and (e) performing on-going DNAPL collection.

The EPA approved the *Interim Measures SWMU 11 Documentation Report* in 2003. These IMs are being incorporated into the proposed remedy.

#### *SWMU 16 – Old Oil/Water Separator*

SWMU 16 was located west of, and adjacent to the former wood disposal area. In 1988, this piece of equipment was removed, cleaned, and backfilled. These IMs are being incorporated into the proposed remedy.

#### *SWMU 17 – Old South Drip Pad/Tracks*

Nineteen soil samples were collected in 1991, 1998, and 2000 for the characterization of contaminants at SWMU 17. A remedy is being proposed for this SWMU.

#### *Central Ditch*

The Central Ditch sediments were addressed by the SWMU 11 IM implemented from 1999-2000. The design and implementation of the IM were based upon analytical data for 13 sediment samples and six (6) surface water samples collected in 1991, and 31 sediment samples collected in 1998.

Nearly 5,000 cubic yards of on-site sediments (3-5 feet deep) were excavated from beneath the upstream railroad bridge to the east property boundary. The off-site excavation consisted of removing the impacted sediment (up to five (5) feet deep) from the ditch bottom and from buried stream channels, and from the east property boundary to the Batupan Bogue. Following excavation, clean backfill material (up to three (3) feet deep) was placed in the off-site Central Ditch bottom. Nearly 24,200 cubic yards of sediment were removed from the off-site portion of the Central Ditch. The sediment was placed in a sediment disposal area north of the Central Ditch.

Some portions of the on-site Central Ditch were relined and a DNAPL recovery system was installed. Nine under-drain sumps were installed beneath the ditch. Clean fill material was placed in the remediated Central Ditch. In addition, a sealed-joint, steel sheet pile cutoff wall was

installed to inhibit DNAPL migration to the Central Ditch, and five (5) passive DNAPL recovery wells were installed along the north side of the cutoff wall.

### **C. Southern Area**

The southern area included the wood storage areas, the Boiler Ash Landfill (SWMU 5), the South Waste Piles (SWMU 13), the Temporary Storage of Soil (SWMU 14), and the Two Soil Containment Structures (SWMU 15). Cultivated fields/woodlands lie to the east and the Illinois Central Railroad to the west. An air conditioning manufacturing facility is located west of the railroad tracks at the southern tip.

#### *SWMU 5 – Boiler Ash Landfill*

The Boiler Ash Landfill (SWMU 5) was closed pursuant to a negotiated Order with MDEQ and documented in the reports *Final Report, Groundwater Quality Assessment, Boiler Ash Disposal Area* (1993) and *Supplemental Investigation Addendum to Boiler Ash Landfill Groundwater Quality Assessment* (1994). The EPA HSWA Permit reissued in 2012 required no further action for SWMU 5.

#### *SWMU 13 – South Waste Piles*

The South Waste Piles were removed prior to 1989. In 1991, 13 soil samples were collected to characterize contaminants around SWMU 13. No further action is required for SWMU 13.

#### *SWMUs 14 and 15 – Temporary Storage of Soil and Two Containment Structures*

The Temporary Storage of Soil (SWMU 14) contained soil excavated from around the tank process area. The Two Soil Containment Structures (SWMU 15) contained soil excavated from the Drip Track Area (SWMU 8). All soils and containment structures were removed in the fall of 1996 as documented in the *Removal Documentation Report, Soil Containment Structures*. The EPA HSWA Permit reissued in 2012 required no further action for SWMUs 14 and 15.

## **SITE HYDROGEOLOGY AND GROUNDWATER**

The Facility is located 10 to 15 feet above the floodplain of the Batupan Bogue. The subsurface stratigraphy is defined by six (6) lithologic zones below from the shallow to deep:

- Fill Zone - Thickness ranges from 0 to 10 feet
- Upper Silt Zone - Thickness ranges from 5 to 8 feet
- Upper Sand Zone - Thickness ranges from 5 to 15 feet
- Upper Low-Permeability Zone - Thickness ranges from 0 to 18 feet
- Lower Sand Zone - Thickness ranges from 90 to 165 feet
- Lower Confining Zone - Thickness is at least 150 feet

The fill sand consists of discontinuous lenses of silt, fine sand, and silty clay. This connects with the Upper Silt and Sand Zones.

The Upper Silt and Sand Zones are partially saturated and include areas of perched water on clay, silt lenses, or within former impoundments. The hydraulic conductivity of these zones is about eight (8) feet per day. These zones are unconfined to semi-confined, and groundwater flow is generally northeast toward the Batupan Bogue.

The Upper Low-Permeability Zone has several orders of magnitude lower hydraulic conductivity than the Upper Silt and Sand Zones. The Upper Low-Permeability Zone performs as a local partial confining unit above the Lower Sand Zone. The Lower Sand Zone acts as a confined aquifer and has an estimated average hydraulic conductivity of 36 feet per day. Groundwater flows north and northeast in this zone.

Groundwater beneath the Facility has been characterized and is impacted by constituents such as benzene, pentachlorophenol, and polycyclic aromatic hydrocarbons (PAHs). Two (2) water-bearing zones such as the Upper Sand Zone and Lower Sand Zone are recognized. The areas of major groundwater impacts include the Central Process Area, Former Waste Treatment System, the Drip Track Area, and the Old South Drip Pad/Track; and these impacts attenuate within a short distance of these areas. No further action is recommended for groundwater in other areas/SWMUs.

In 1997 and 2000, selected groundwater wells completed in the Upper and Lower Sand Zones were sampled to characterize the horizontal and vertical extent of constituents in groundwater. In addition, a subset of groundwater wells was sampled for four (4) consecutive quarters in 2009 and 2010 to provide baseline monitored natural attenuation (MNA) data; and two (2) monitoring wells were sampled for an additional three (3) quarters in 2011. Tables 2-1 and 2-2 present the 2009, 2010, and 2011 groundwater characterization data.

#### *Upper Sand Zone*

The constituents in the Upper Sand Zone occurred due to operations in the Central Process Area, Former Wastewater Treatment System, the Drip Track Area, and in the Old South Drip Pad/Track. Historical operations in these areas have resulted in intermingled and interconnected dissolved-phase plumes within this Zone. The distributions of pentachlorophenol, benzene, and PAH plumes (Figures 2-3, 2-4, and 2-5) remain confined within the Facility boundary.

#### *Lower Sand Zone*

Historical operations in the Central Process Area, Former Wastewater Treatment System, Old South Drip Pad/Track Area, and just east of the Drip Track Area have resulted in intermingled and interconnected dissolved-phase plumes within the Lower Sand Zone. The distributions of pentachlorophenol, benzene, and PAH (Figures 2-6, 2-7, and 2-8) remain confined within the Facility boundary.

## CONSTITUENT DISTRIBUTION, MONITORED NATURAL ATTENUATION PROCESS, AND MIGRATION PATHWAYS

In general, source areas are focused on the Central Process Area, the Drip Tracks, the Old South Drip Pad/Track Area, and the Former Wastewater Treatment System. Soil and groundwater impacts are identified below these areas. In addition, DNAPL has primarily been identified below the Former Wastewater Treatment System and Central Process Area. There are overlapping and intermingled dissolved-phase plumes within the Upper Sand Zone and the Lower Sand Zone. The constituents of concern include pentachlorophenol, benzene, PAHs, and dioxins/furans (PCDDs/PCDFs).

PCDDs/PCDFs are byproducts or impurities present in pentachlorophenol. They strongly adsorb to organic soil particles because of their high lipophilicity and low water solubility and exhibit little potential for significant leaching or volatilization. The groundwater wells with pentachlorophenol concentrations that exceed 1,000 to 2,000 micrograms per liter ( $\mu\text{g/L}$ ) are located in the creosote DNAPL area.

Natural attenuation involves naturally occurring physical, chemical, and biological processes that can lessen the mass and mobility of groundwater constituents. The source dissolves into the adjacent groundwater forming a dissolved-phase groundwater plume that migrates downgradient. Plume growth also depends upon the advective rate of groundwater flow. The dissolved-phase constituents can also reduce or decrease in concentration, downgradient of the source due to all or some of the factors such as sorption, dispersion, biodegradation, and oxidation. When the source is reduced or depleted, the groundwater plume begins to recede and subsequently, the concentration of constituents attenuates.

In 1997 and 2000, preliminary natural attenuation groundwater sampling was performed and evaluated, and this was included in the *Complete RFI* of 2003. Pilot studies on the effectiveness of monitored natural attenuation (MNA) were conducted from 2009 through 2011.

Historical operations have resulted in impacts to surface and subsurface soil, groundwater, surface water, and stream sediment. Impacts included part of the Central Process Area, the Old South Drip Pad/Track, the Former Wastewater Treatment System, and the Central Ditch which discharges to Batupan Bogue.

DNAPL has been detected mainly below the Former Wastewater Treatment System and Central Process Area; with fewer detections in the Drip Track Area and in the Old South Drip Pad/Track. In the Former Wastewater Treatment System area, DNAPL has been detected in the Upper Sand and Upper-Low Permeability Zones in perched, thin, coarse layers. The Upper Low-Permeability Zone impedes the downward migration of DNAPL. The migration of DNAPL beneath the Former Wastewater Treatment System is further impeded by the vertical, sealed-joint, steel sheet pile cutoff wall immediately north of the Central Ditch; and the DNAPL recovery wells and the DNAPL underdrain system in the Central Ditch, all installed as part of the IM. As of 2022, more than 7,600 gallons of DNAPL have been recovered from the various sumps and recovery wells in this area; however, for the last four (4) years, the DNAPL has been reduced to residual in most wells. The DNAPL will be a long-term source, as it is not technically

practicable to remove all the DNAPL at the Facility. Despite this long-term source, MNA will be utilized for decreasing the dissolved-phase groundwater plumes in the Upper and Lower Sand Zones. Institutional controls will be prepared and recorded to place prohibitions on certain groundwater use.

## **CORRECTIVE MEASURES STUDY WORKPLAN**

In 2006, Beazer submitted the *Corrective Measures Study Workplan*, providing components of a proposed site-wide remedy. Beazer submitted the *Final CMS Workplan* in response to EPA comments. This plan included a baseline *Monitored Natural Attenuation (MNA) Workplan* for the baseline monitoring needed to establish the occurrence of natural attenuation to support the proposed groundwater remedy for the *CMS*. The EPA provided conditional approval of the *Final CMS Workplan* in 2009. In 2012, the EPA concurred with the inclusion of MNA in the *CMS*.

In 2014, the EPA requested that Beazer prepare and submit the combined *CMS/CMIP*. However, a schedule for preparing the *CMS/CMIP* was not established due to ongoing soil investigations in off-site areas, including the Carver Circle, Koppers Drive, and Bailey Road areas.

In 2021, Beazer submitted the *Revised CMS/CMIP*, and the EPA had some comments. On February 28, 2022, Beazer submitted the *Revised CMS/CMIP, Revision 1* and the EPA approved this document on March 15, 2022.

## **ADDITIONAL SAMPLING**

In 2010, Beazer submitted the *Workplan for Additional Sampling* and later added an Addendum. Beazer conducted surficial off-site soil and drainage way sampling in the Carver Circle community area in 2010. In 2010, the EPA sent letters of analytical results to the residents of the Carver Circle community notifying them that no further action was determined necessary at that time. However, some locations/areas exhibited exceedances of constituents above the EPA Regional Screening Levels. Beazer implemented corrective actions for such locations/areas by removing 24-inches of soil from specific areas and backfilling those areas with clean soil. Such activities are documented in the *Off-Site Soil Replacement Implementation Report* of 2012 and the EPA concurred with no further action. In 2019, Beazer and Koppers submitted the re-evaluation of Carver Circle dioxins and furans soil and drainage way sampling results in the light of current toxicity screening values and the EPA approved the document in 2021. It was determined that no further action was required.

In 2013, an *Additional Off-Site Soil Assessment Workplan* was submitted and Beazer and Koppers conducted the surficial off-site soil sampling for the drainage ways in Simmons Road and Outfall 005. Some locations/areas exhibited exceedances of constituents above the EPA Regional Screening Levels. In accordance with a 2015 *Off-Site Removal Workplan*, Beazer and Koppers implemented corrective actions for the drainage ways in Simmons Road (by removing 24-inches of soil at specific locations) and Outfall 005 (by removing 12-inches of soil at specific locations) and backfilling those locations with clean soil. Twelve (12) inches of soil were also

removed from on-site Pond 005 and Pond 006 and backfilled with clean soil. Such activities are documented in the *Off-Site Soil Replacement Implementation Report* of 2016, and the EPA concurred that no further action was required after the removal actions took place. In 2019, Beazer and Koppers submitted the re-evaluation of the dioxins and furans drainage way samples near Simmons Road and downstream of Outfall 005 and from on-site assessments in light of current toxicity screening values and the EPA approved the document in 2021. It was determined that no further action was required.

In 2016, a *Groundwater Sampling Workplan* was submitted and approved by the EPA to sample groundwater in the vicinity of Outfall 006. The analytical results for groundwater sampled from the two (2) temporary wells were below their respective reporting limits for both wells and the EPA approved the *Outfall 006 Groundwater Sampling Report* in 2018 and concurred that no further action was required.

In 2017, Beazer and Koppers submitted the *Former Process Cooling Water Pond Grading Plan* to eliminate a potential attractive nuisance hazard (retained water) at the Facility and the EPA approved it. This work was implemented at the end of 2017, and the *Construction Completion Report: Grading at Former Process Cooling Water Pond* was submitted in 2018 and the EPA approved it in 2018.

In 2019, Beazer and Koppers submitted a *Workplan for Additional Off-Site Sampling, Koppers Drive and Bailey Road, Grenada, Mississippi*. The plan was approved and implemented in 2020. The analytical results for soil and drainage way samples detected were below the health protective levels and the EPA approved the *Sampling Report* in 2021 and concurred that no further action was required. In mid-2021, the EPA issued Fact Sheet #9 Environmental Investigation of Koppers Drive and Bailey Road Community Area, Grenada, Mississippi, notifying residents of the community and public officials of Grenada, Mississippi about the sampling results and the no further action decision.

## **CORRECTIVE ACTION AND MEDIA CLEANUP OBJECTIVES**

Beazer submitted a site-specific *Human Health Risk Assessment* in the *Complete RFI* of 2003. Then, in 2006, the *Evaluation of Chemistry and Toxicity of Northern Stream Sediments* was submitted. A sensitivity analysis was performed for the findings of the 2003 *Human Health Risk Assessment* and 2009 *CMS Workplan* due to changes in specific default parameters. Residential scenarios are not considered applicable to the Facility as the Facility is currently zoned heavy industrial. The corrective action objectives are based on future commercial/industrial land use. The findings of the *Human Health Risk Assessment* and the sensitivity analysis highlighted that; a) risks associated with exposure to some surface soils in the Process Area that exceed the EPA's acceptable target risk ranges and the EPA's acceptable potential non-cancer Hazard Index, and institutional controls will be needed to prevent unrestricted residential use of the Facility in the future; b) the risks associated with exposure to sediment and surface water result in acceptable risk ranges and an acceptable Hazard Index; c) the risks associated with use of groundwater on-Site exceed the EPA's acceptable target risk ranges and institutional controls are needed to ensure that groundwater on-Site will not be used

as drinking water or irrigation in the future [until such time as risk-based levels and/or maximum contaminant levels (MCLs) are achieved].

Groundwater is not currently used for drinking or any other use within the impacted area, and future use is not likely due to the accessibility of a public water supply. In addition, no current exposure to off-site groundwater exists and no potential future exposure to off-site groundwater is likely to occur, because the Facility and surrounding areas are supplied with municipal drinking water.

The media cleanup objectives for groundwater are the federal drinking water standards under the Safe Drinking Water Act (40 CFR Parts 141/143), which include the MCLs.

The MCLs for the site constituents of concern are:

Benzene	5.0 µg/L
Benzo(a)pyrene	0.2 µg/L
Pentachlorophenol	1.0 µg/L

Currently, the Facility use remains industrial. The media cleanup objectives for soil are to reduce or eliminate the exposure point of contact (exposure pathway) with soil constituents such that potential risks are within EPA's target risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  lifetime excess cancer risk and a Hazard Index less than 1.0 for future commercial/industrial Site use. Currently, as Grenada Solar has purchased the site, the intended reuse of the site is expected to remain industrial (solar power generation) for the foreseeable future. Institutional controls will be put in place to ensure the continued use of the site as commercial/industrial.

## **CORRECTIVE ACTION REMEDY EVALUATION**

Any potential remedy is evaluated using the four (4) threshold criteria:

1) protection of human health and the environment; 2) attainment of media cleanup standards; 3) source control to remove or eliminate, to the extent practicable, further releases of hazardous waste or constituents that might pose threats to human health and the environment; and 4) compliance with all applicable standards for waste management.

Attainment of media cleanup standards does not necessarily mean removal and treatment of all contaminated material above specific contaminant concentrations. Media cleanup standards can be attained by various combinations of removal, treatment, engineering (e.g., an engineered landfill or a cap), and institutional controls. The four threshold criteria are balanced by five criteria:

a) short-term effectiveness; b) long-term reliability and effectiveness; c) reduction of toxicity, mobility, or volume of waste; d) implementability; and e) cost.

The *Revised Corrective Measures Study and Corrective Measures Implementation Plan*, dated February 28, 2022, identified a total of 58 potential corrective measures technologies for soils, groundwater, and DNAPL for the screening process.

## Soils

Of 20 soil process options, Beazer proposed four (4) remedial alternatives for the contaminated soils.

**Alternative S-1 (No action):** The no-action alternative serves as a baseline for comparison to other treatment and containment alternatives. The no-action response does not attempt to contain or treat impacted soil. It provides an alternative that demonstrates the risk posed by the Facility in an unremediated condition. No costs are associated with Alternative S-1.

**Alternative S-2 (Institutional Controls):** This alternative consists of the development and application of institutional controls to prevent future land use for residential development, control site access, and to provide future site worker health and safety protection. The institutional controls proposed in this alternative included access restrictions, deed restrictions, and an environmental covenant. There is no capital cost associated with implementing Alternative S-2. The annual operation and maintenance (O&M) cost is \$2,900, and the present value for Alternative S-2 is \$36,000.

**Alternative S-3 (Containment – Engineered Soil Cover with Institutional Controls):** This alternative requires placement of an engineered cover over impacted soil areas. The cover system would be placed over select portions of the Process Area, encompassing the areas identified in the sensitivity analysis to contribute to risks that exceed EPA's acceptable target risks ranges (Figure 5-1). The construction of this cover system within the Process Area may require minor grading of surface soils to facilitate storm water drainage. The small volumes of soil displaced by surface grading would be placed beneath the cover system.

The engineered cover system would be a six-inch thick section of aggregate or vegetative soil cover. The materials for the cover are locally available and could be placed, graded, and compacted to provide a working surface to support the movement of equipment as well as future activities at the site.

The cover material would perform as an effective surface barrier, preventing any future hypothetical on-site worker exposure to impacted soils. The detailed design of the cover would include grading appropriate for surface water flow and to match existing grade. A long-term O&M plan would require that an ongoing operation, maintenance, and monitoring program be developed to ensure that the integrity of the cover system be inspected and maintained and would include requirements for periodic reporting describing compliance with the cover design.

This would leave impacted soil in-place at the Site; therefore, institutional controls would be implemented at the site. A deed restriction and environmental covenant would be developed to limit future site use to industrial operations. Future worker health and safety training programs would be required to ensure that Site hazards are communicated and that future Site workers are protected. Site access would be restricted. The capital cost associated with implementing Alternative S-3 is \$651,000; the annual O&M cost is \$4,600; and the present value for Alternative S-3 is \$710,000.

**Alternative S-4 (Soil Excavation – On-Site Consolidation with Institutional Controls):** This alternative includes excavating impacted surface soils in select portions of the Process Area shown on Figure 5-1, to a depth of one (1) foot below existing grade. The excavated material would be transported to the soil consolidation area near former SMWU 11, off-loaded, compacted, and shaped. The consolidation area would be covered with a clean backfill as an erosion-control and contact barrier. The capital cost associated with implementing Alternative S-4 is \$1,830,000; the annual O&M cost is \$5,300; and the present value for Alternative S-4 is \$1,900,000.

### Groundwater

Of 38 groundwater/DNAPL remedial options, Beazer proposed four (4) remedial alternatives for the contaminated groundwater/DNAPL.

**Alternative GW-1 (No action):** The no-action alternative serves as a baseline for comparison to other treatment and containment alternatives. No action would include discontinuation of IM monitoring and DNAPL recovery. It is important to recognize that natural attenuation of pentachlorophenol and PAH compounds would occur in the absence of active remediation activities. Baseline MNA sampling has confirmed the occurrence of natural attenuation at the Site. Therefore, natural attenuation of groundwater is a component of the no-action alternative but monitoring the natural attenuation and continued operation of the passive DNAPL collection system is not part of this alternative. No costs are associated with Alternative GW-1.

**Alternative GW-2 (Institutional Controls + DNAPL Collection System):** Alternative GW-2 consists of institutional controls to limit potential exposure to subsurface DNAPL and impacted groundwater and includes continued operation of the IM passive DNAPL collection system (DNAPL recovery wells upgradient of the sheet-pile wall and the Central Ditch underdrain collection system). The capital cost associated with implementing Alternative GW-2 is \$65,000; the annual O&M cost is \$38,000; and the present value for Alternative GW-2 is \$530,000.

**Alternative GW-3 (MNA and Source Control):** MNA and Source Control includes the continued operation of the IM passive DNAPL collection system (DNAPL recovery wells upgradient of the sheet-pile wall and the Central Ditch underdrain collection system) coupled with MNA to remediate groundwater. Remediation technologies proposed for Alternative GW-3 include: (a) on and off-Site MNA; (b) implementing long-term groundwater monitoring programs to document the lateral and vertical migration of Site constituents; and (c) institutional controls for the Site.

Complete removal of subsurface DNAPL is not technically feasible with current technologies. The DNAPL would continue to act as a long-term source to the aqueous-phase plume preventing on-site groundwater from meeting media cleanup objectives. The groundwater flow in the Upper and Lower Sand Zones is the primary transport pathway for site

constituents. Alternative GW-3 would mitigate off-site migration of impacted groundwater and off-site migration of DNAPL.

MNA would be used to continue to document the stability of the aqueous-phase plumes both on- and off-site (Table 8-2, Figure 8-1). Naturally occurring physical, chemical, and biological processes reduce mass and mobility of potential constituents of concern. MNA would involve routine collection and analysis of groundwater samples to track natural attenuation of potential constituents of concern. Analysis of temporal trends in key indicator parameters would help to establish the relative effectiveness of natural attenuation processes.

MNA would be performed to monitor potential lateral and vertical migration of site constituents in groundwater in the Upper and Lower Sand Zones. The monitoring program would be reviewed periodically to confirm that the locations and number of wells in the program effectively monitor the plumes and that the remedies are protective of the environment and human health.

Institutional controls would be implemented at the Site to limit future development and use of the property. It is anticipated that both access restrictions and environmental covenants would be implemented to prohibit groundwater use, thereby eliminating exposure. The capital cost associated with implementing Alternative GW-3 is \$116,000; the annual O&M cost is \$38,000; the periodic costs associated with the MNA monitoring are \$493,000; and the present value for Alternative GW-3 is \$902,000.

**Alternative GW-4 (Enhanced Bioremediation and Source Control):** Alternative GW-4 consists of enhanced bioremediation by the addition of oxygen and continued operation of the IM passive DNAPL collection system (DNAPL recovery wells upgradient of the sheet-pile wall and the Central Ditch underdrain collection system). The capital cost associated with implementing Alternative GW-4 is \$210,000; the annual O&M cost is \$99,000, the periodic costs associated with the MNA monitoring are \$493,000, and the present value for Alternative GW-4 is \$1,740,000.

## **PROPOSED FINAL REMEDY**

Of the four (4) soil and four (4) groundwater remedial alternatives mentioned above, Alternative S-3 and Alternative GW-3 meet all five (5) of the balancing criteria (e.g., short-term effectiveness, long-term reliability and effectiveness, reduction of toxicity, mobility, or volume of waste, implementability, and cost). Therefore, the EPA tentatively selects Alternative S-3: Containment – Engineered Soil Cover with Institutional Controls for contaminated soils, and Alternative GW-3: MNA and Source Control for contaminated groundwater.

The rationale for selecting Alternative S-3: Containment – Engineered Soil Cover (Figure 5-1) with Institutional Controls is as follows:

**Protection of Human Health and the Environment:** Alternative S-3 would be protective of human health and the environment. The proposed engineered cover system would effectively isolate the impacted soils from human contact. This alternative does not

require significant excavation, transportation, and relocation of impacted soils. This alternative would provide more protection than Alternatives S-1 or S-2.

**Ability to Attain Corrective Action Objectives (CAOs) and Media Cleanup**

**Objectives:** Alternative S-3 would attain CAOs for soil and the media cleanup objectives for surface soil. Deeper soil impacts would be left in place, so land use restrictions and an environmental covenant that restricts excavation without a health and safety plan would be a requirement. However, the CAOs and media cleanup objectives would be satisfied by the isolation of the impacted soil from human contact.

**Source Control:** Alternative S-3 would provide source control measures by isolating the impacted soil.

**Compliance with Applicable Standards for Management of Waste:** Alternative S-3 is like Alternatives S-1, S-2, and S-4, in that it would be compliant with both Federal and State waste management standards since no wastes would be generated under this alternative.

**Short-Term Effectiveness:** Alternative S-3 would be effective in the short-term. The minor grading work and placement of aggregate or vegetative soil cover systems would create very little worker or public exposure to impacted soils. Dust control would be implemented during construction to prevent the generation of fugitive dust from the Facility.

**Long-Term Reliability and Effectiveness:** Alternative S-3 would be reliable and effective in the long-term. With proper inspections and maintenance, the proposed cover system would provide a durable, long-lasting cover system, effectively isolating impacted soils from human contact. This alternative would be easily maintained and compatible with potential future site redevelopment.

**Reduction of Toxicity, Mobility and Volume:** Alternative S-3 would provide a reduction in mobility of impacted soils as the proposed cover system would reduce erosion due to wind as well as stormwater runoff. This alternative would not include treatment, so there would be no reduction in waste toxicity or volume.

**Implementability:** Alternative S-3 would be easily implemented at the Site. The cover materials are available locally and could be placed, graded, and compacted to provide a working surface to support the movement of equipment for future redevelopment activities at the site.

The rationale for selecting Alternative GW-3: MNA and Source Control (Table 8-2, Figure 8-1) is as follows:

**Protection of Human Health and Environment:** Groundwater in the immediate vicinity of the Site is not used for public or industrial water supplies. The Site and surrounding area are supplied with municipal drinking water. Hence, the potential for

human consumption or use of shallow groundwater in this area would be low. Therefore, this alternative would be protective of human health and the environment.

**Attain CAOs/Media Cleanup Objectives:** This alternative would achieve the CAOs for groundwater and DNAPL. The extent of the aqueous-phase plumes in the Upper Sand Zone and the Lower Sand Zone would remain stable. Institutional controls would be implemented to mitigate potential exposure to potentially impacted groundwater.

**Source Control:** This alternative would provide some source control to groundwater. The IM barrier wall and passive DNAPL collection system would mitigate off-site migration of DNAPL, while natural attenuation would keep the plume stable as documented by MNA.

**Compliance with Applicable Standards for Waste Management:** Alternative GW-3 would be compliant with Federal and State waste management standards; collected DNAPL would be transported to an approved off-Site disposal facility.

**Short- and Long-Term Reliability and Effectiveness:** Short-term reliability and effectiveness of the IM barrier wall and passive DNAPL collection system is good, and the performance of the system would be expected to continue long-term. The long-term integrity of the barrier wall and underdrain collection system would be projected to be indefinite. The O&M requirements associated with the barrier wall and underdrain collection system would be minimal and consist of periodic monitoring and removal of DNAPL and erosion control.

MNA is an effective and reliable long-term remediation technology for wood treating sites. Natural attenuation has been ongoing at the Facility and is the primary reason for the limited downgradient extent of the aqueous-phase plumes.

**Reduction in Waste Toxicity, Mobility and Volume:** This alternative would provide some reductions in the toxicity, mobility, and volume of the aqueous-phase plumes. Natural attenuation processes would help stabilize the dissolved-phase plumes and would reduce the aqueous-phase toxicity and mobility. The majority of subsurface DNAPL is currently immobile because it is at residual saturation. The volume of DNAPL has been and will continue to be reduced by this alternative through implementation of the IM passive DNAPL recovery system which has removed approximately 7,600 gallons of DNAPL since 1999.

**Implementability:** This alternative could be relatively easily implemented. The on-Site IMs are operational. Developing an environmental covenant for the property could be performed in a relatively short period of time; however, off-Site institutional controls will be proposed by the Facility.

## REFERENCES

- AMEC, 2005. *Addendum to the Complete RFI Risk Assessment and Sediment Toxicity Work Plan for Northern Stream Sediments, Koppers, Inc., Grenada Facility, Grenada, Mississippi*. January 28, 2005.
- AMEC, 2006. *Evaluation of Chemistry and Toxicity of Northern Stream Sediments, Koppers, Inc., Grenada Facility, Grenada, Mississippi*. June 30, 2006.
- Beazer, 2016. *Letter to EPA Region 4 RCRA Cleanup Branch, RE: Response to EPA Comments dated September 7, 2016, Corrective Measures Study and Corrective Measures Implementation Plan, Koppers Inc. Grenada Facility, Grenada, Mississippi, EPA I.D. No. MSD 007 027 543*. December 6, 2016.
- Chester Environmental, 1993. *Final Report, Groundwater Quality Assessment, Boiler Ash Disposal Area, Koppers Industries, Inc., Grenada, Mississippi Facility*. April 1993.
- Dames & Moore, 1992. *Draft Phase II RCRA Facility Investigation, Koppers Industries, Inc., Grenada, Mississippi*. (Volumes I, II, III). June 15, 1992.
- Dames & Moore, 1994. *Supplemental Investigation Addendum to Boiler Ash Landfill Groundwater Quality Assessment, Koppers Industries, Inc., Grenada, Mississippi Facility*. February 16, 1994.
- EPA, 1987. *RCRA Facility Assessment of the Koppers Industries, Inc., Site, Grenada, Mississippi*. United States Environmental Protection Agency (EPA). 1987.
- EPA, 1994. *RCRA Corrective Action Plan, OSWER Directive Number 9902.3-2A*. May 31, 1994.
- EPA, 1998. *Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites, Directive #9200.4-26*, Office of Solid Waste and Emergency Response, April 13, 1998.
- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, OSWER 9355.0 75, EPA 540-R-00-002. July 2000.
- EPA, 2008. *Evaluation of Chemistry and Toxicity of Northern Stream Sediments, Dated July 5, 2006, Koppers/Beazer East, Tie Plant, Mississippi, EPA I.D. No. MSD 007 027 543*. May 19, 2008.
- EPA, 2010. ProUCL Version 4.1 User Guide (Draft). *Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC. EPA/600/R-07/041. May. (<http://www.epa.gov/osp/hstl/tsc/softwaredocs.htm>)
- EPA, 2014. *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors*. OSWER Directive 9200.1-120. February.

- EPA, 2014. *Regional Screening Levels*. May. Available at [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/)
- EPA, 2015. *Letter to Beazer East, Inc., Subject: Corrective Measures Study and Corrective Measures Implementation Plan, Dated January 19, 2015, Koppers Inc. Grenada Facility, Grenada, Mississippi, EPA I.D. No. MSD 007 027 543*. September 21, 2015.
- EPA, 2015. *Letter to Beazer East, Inc., Subject: Response to EPA Comments on Design: Off-Site Soil Removal at DW017 Drainage Way and DW021 Drainage Way, Dated July 17, 2015, Koppers, Inc./Beazer East, Tie Plant, Mississippi, EPA I.D. No. MSD 007 027 543*. July 30, 2015.
- EPA, 2015. *Letter to Beazer East, Inc., Subject: Response to Updated Proposal for Soil Replacement in Onsite Ponds, Dated July 29, 2015, Koppers Inc. Grenada Facility, Grenada, Mississippi*. August 4, 2015.
- EPA, 2016. *Letter to Beazer East, Inc., Subject: Corrective Measures Study and Corrective Measures Implementation Plan, Dated January 19, 2015, Koppers Inc. Grenada Facility, Grenada, Mississippi, EPA I.D. No. MSD 007 027 543*. March 21, 2016.
- EPA, 2016. *Letter to Beazer East, Inc., Subject: (1) Response to EPA's September 21, 2015 Corrective Measures Study and Corrective Measures Implementation Plan, Dated November 24, 2015 and (2) Response to EPA's March 21, 2016 Corrective Measures Study and Corrective Measures Implementation Plan, Dated May 24, 2016, Koppers Inc./Beazer East, Tie Plant, Mississippi, EPA I.D. No. MSD 007 027 543*. September 7, 2016.
- Fluor Daniel GTI, 1997. *Removal Documentation Report, Soil Containment Structures, Koppers Industries, Inc., Grenada, Mississippi Facility*. February 21, 1997.
- GeoTrans, Inc. 2002. *Work Plan to Characterize Soil in the Vicinity of the Former "Creosote Hole", Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi*. June 5, 2002.
- GeoTrans, Inc. 2003. *Results of Soil Characterization, Vicinity of the Former "Creosote Hole", Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi*. April 17, 2003.
- GeoTrans, Inc., 2006. *Corrective Measures Study Workplan, Koppers, Inc. Grenada Facility, Grenada, Mississippi*. August 4, 2006.
- GeoTrans, Inc., 2006. *Revised Corrective Measures Study Workplan, Koppers, Inc. Grenada Facility, Grenada, Mississippi*. December 21, 2006.
- GeoTrans, Inc., 2008. *Confirmatory Sampling Workplan, Koppers, Inc. Grenada Facility, Grenada, Mississippi*. June 12, 2008.

GeoTrans, Inc., 2008. *Confirmatory Sampling Workplan Addendum, Koppers, Inc. Grenada Facility, Grenada, Mississippi.* July 21, 2008.

GeoTrans, Inc., 2010. *Workplan for Additional Sampling, Koppers Inc., Tie Plant Facility, Tie Plant, Mississippi.* February 12, 2010.

GeoTrans, Inc., 2010. *Addendum to the Workplan for Additional Sampling, Koppers Inc., Tie Plant Facility, Tie Plant, Mississippi.* March 17, 2010.

GeoTrans, Inc., 2010. *Final Draft Sampling Report, Additional Sampling, Koppers Inc., Tie Plant Facility, Tie Plant, Mississippi.* December 21, 2010.

GeoTrans, Inc., 2010. *Baseline Monitored Natural Attenuation Sampling Report, Koppers Inc., Grenada Facility, Grenada, Mississippi.* December 10, 2010.

GeoTrans, Inc. and AMEC, 2003. *Complete Phase II RCRA Facility Investigation, Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi.* May 25, 2003.

GeoTrans, Inc. and Groundwater Insight, 2009. *Final Corrective Measures Study Workplan, Koppers, Inc., Grenada Facility, Grenada, Mississippi.* May 2009.

HSI GeoTrans, Inc. and Ogden Environmental and Energy Services, 1998. *Revised Final Phase II RCRA Facility Investigation, Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi.* November 13, 1998.

HSI GeoTrans, Inc., 1999. *Work Plan to Complete Phase II RCRA Facility Investigation, Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi.* August 16, 1999.

HSI GeoTrans, Inc., 1999. *Interim Measures Work Plan, SWMU 11, Koppers Industries/Beazer East Facility, Tie Plant, Mississippi.* January 1999.

HSI GeoTrans, Inc., 2000. *Interim Measures SWMU 11 Documentation Report, Koppers Industries/Beazer East Facility, Tie Plant, Mississippi.* September 29, 2000.

Hydro-Search, Inc., 1996. *RCRA Interim Measure Predesign Investigation Report and Conceptual Design, Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi.* December 16, 1996.

Hydro-Search, Inc., 1997. *RCRA Facility Investigation, Work Plan Addendum, Koppers Industries, Inc., Grenada Facility, Grenada, Mississippi.* January 8, 1997.

Keystone Environmental Resources, Inc. (Keystone), 1989. *Soil and Groundwater Investigation of Solid Waste Management Units, Koppers Industries, Inc. Plant, Grenada, Mississippi.* January 1989.

- Keystone, 1990. *Phase II Work Plan, RCRA Facility Investigation (RFI), Koppers Industries, Inc., Grenada, Mississippi.*
- Keystone, 1991. *Supplemental Work Plan, RCRA Facility Investigation (RFI), Koppers Industries, Inc., Grenada, Mississippi.*
- Koppers, 2008. *Confirmatory Sampling Report, Koppers Inc. Grenada Facility, Grenada, Mississippi.* December 11, 2008.
- Tetra Tech, 2012. *Off-Site Soil Assessment and Replacement Workplan, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* April 20, 2012.
- Tetra Tech, 2012. *Off-Site Soil Replacement Implementation Report, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* November 27, 2012.
- Tetra Tech, 2013. *Letter to EPA Region 4 RCRA Division, Subject: December 19, 2012 Meeting Summary and Transmittal of Additional MNA Sampling Results, Koppers Inc./Beazer East, Inc., Tie Plant, Mississippi,* February 11, 2013.
- Tetra Tech, 2013. *2013 Additional Off-Site Soil Assessment Workplan, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* March 7, 2013.
- Tetra Tech, 2013. *2013 Additional Off-Site Soil Assessment Report, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* September 30, 2013.
- Tetra Tech, 2014. *Work Plan: Off-Site Soil Removal at DW017 Drainage Way and DW021 Drainage Way, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* July 15, 2014.
- Tetra Tech, 2014. *Letter to EPA Region 4 RUST Branch, RE: Response to EPA's August 18, 2014 Comments on the Work Plan: Off-Site Soil Removal at DW017 Drainage Way and DW021 Drainage Way, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi,* September 19, 2014.
- Tetra Tech, 2015. *Corrective Measures Study and Corrective Measures Implementation Plan, Koppers Inc. Grenada Facility, Grenada, Mississippi,* January 19, 2015.
- Tetra Tech, 2015. *Letter to EPA Region 4 RUST Branch, RE: Response to EPA's September 21, 2015 Comments on the Corrective Measures Study and Corrective Measures Implementation Plan, Dated January 19, 2015, Koppers Inc. Grenada Facility, Grenada, Mississippi,* November 24, 2015.
- Tetra Tech, 2015. *Design: Off-Site Soil Removal at DW017 Drainage Way and DW-021 Drainage Way, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi.* March 31, 2015.
- Tetra Tech, 2015. *Updated Proposal for Soil Replacement in Onsite Ponds, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi.* July 29, 2015.

- Tetra Tech, 2016. *Letter to EPA Region 4 RUST Branch, RE: Response to EPA's March 21, 2016 Comments on the Corrective Measures Study and Corrective Measures Implementation Plan, Dated January 19, 2015, Koppers Inc. Grenada Facility, Grenada, Mississippi, May 24, 2016.*
- Tetra Tech, 2016. *Construction Completion Report: Soil Removal at DW017 Drainage Way, DW021 Drainage Way, Pond 005, and Pond 006, Tie Plant, Mississippi. June 6, 2016.*
- Tetra Tech, 2016. *Outfall 006 Groundwater Sampling Work Plan, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi, November 10, 2016.*
- Tetra Tech, 2017. *Former Process Cooling Water Pond Grading Plan, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi. August 17, 2017.*
- Tetra Tech, 2018. *Outfall 006 Groundwater Sampling Report, Koppers Inc. Tie Plant Facility, Tie Plant, Mississippi, April 18, 2018.*
- Tetra Tech, 2018. *Construction Completion Report: Grading at Former Process Cooling Water Pond, Tie Plant, Mississippi. July 11, 2018.*
- Tetra Tech, 2019. *Work Plan for Additional Off-site Sampling, Koppers Drive and Bailey Road, Grenada, Mississippi. August 5, 2019.*
- Tetra Tech, 2020. *2020 Work Plan for Additional Off-site Sampling, Koppers Drive and Bailey Road, Grenada, Mississippi. February 7, 2020.*
- Tetra Tech, 2021. *Sampling Report 2020 Additional Off-site Sampling Koppers Drive and Bailey Road, Grenada, Mississippi. June 15, 2021.*
- Tetra Tech, 2022. *Revised Corrective Measures Study and Corrective Measures Implementation Plan, Revision 1, Grenada, Mississippi. February 28, 2022.*
- van den Berg et al. 2006. *The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors (TEFs) for Dioxins and Dioxin-Like Compounds. Toxicological Sciences 93(2):223-241.*



Well ID	Date Sampled	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)pyrene	Benzo(b)-fluoranthene	Benzo(g,h,i)-perylene	Benzo(k)-fluoranthene	2-Chlorophenol	Chrysene	2,4-Dichlorophenol	Dibenz(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	2,3,4,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	Pentachlorophenol	
		(µg/L)																							
R96-16	September 2009	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 1.1	< 1.1	< 1.1
R96-16	December 2009	< 0.21	< 0.21	0.33	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.1	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.1	< 1.1	< 1.1	< 1.1
R96-16	March 2010	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 1.1	< 1.1	< 1.1
R96-16	June 2010	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 1.0	< 1.0	< 1.0
R96-17	September 2009	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.95	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.95	< 0.95	< 0.95	< 0.95
R96-17	December 2009	< 0.20	< 0.20	0.22	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	< 1.0	< 1.0	< 1.0
R96-17	March 2010	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 1.0	< 1.0	< 1.0
R96-17	June 2010	< 0.20	< 0.20	0.38	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	< 1.0	< 1.0	< 1.0
R97-1A	September 2009	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.95	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.95	< 0.95	< 0.95	< 0.95
R97-1A	December 2009	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 1.2	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 1.2	< 1.2	< 1.2	< 1.2
R97-1A	March 2010	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 1.1	< 1.1	< 1.1
R97-1A	June 2010	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.98	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.98	< 0.98	< 0.98	< 0.98
R97-1B	September 2009	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.98	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.98	< 0.98	< 0.98	< 0.98
R97-1B	December 2009	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 1.0	< 1.0	< 1.0
R97-1B	March 2010	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 0.21	< 1.0	< 1.0	< 1.0	< 1.0
R97-1B	June 2010	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22	< 1.1	< 1.1	< 1.1	< 1.1

Notes:

µg/L = Micrograms per liter

E = Indicates a laboratory estimated value.

J = This validation qualifier indicates the reported concentrations is approximate. See Data Validation memorandum for discussion of why qualifiers were applied.

**Table 2-2**  
**VOC Analytical Results (2009 - 2011)**  
**Revised CMS/CMIP, Rev 1, February 28, 2022**

Well ID	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylene (Total)
		(µg/L)			
<b>R00-2</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R00-2</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R00-2</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R00-2</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-6</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-6</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-6</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-6</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-6 DUP</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-6 DUP</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-6 DUP</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-6 DUP</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-9</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-9</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-9</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-9</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-9C</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-9C</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-9C</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-9C</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-10</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-10</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-10</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-10</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-10B</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-10B</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-10B</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-10B</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-16</b>	September 2009	81	46	76	82
<b>R-16</b>	December 2009	76	91	33	65
<b>R-16</b>	March 2010	21	44	8.4	31
<b>R-16</b>	June 2010	63	90	20	64
<b>R-16B</b>	September 2009	270	200	230	310
<b>R-16B</b>	December 2009	360	150	310	280
<b>R-16B</b>	March 2010	440	350	450	590
<b>R-16B</b>	June 2010	560	360	530	590
<b>R-17</b>	September 2009	36	< 5.0	< 5.0	< 15
<b>R-21</b>	September 2009	100	71	89	120
<b>R-21</b>	December 2009	270	95	150	160

<b>R-21</b>	March 2010	230	160	170	260
<b>R-21</b>	June 2010	320	210	190	270
<b>R-38</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15

Well ID	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylene (Total)
		(µg/L)			
<b>R-38</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-38</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-38</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-38B</b>	September 2009	67	< 5.0	< 5.0	43
<b>R-38B</b>	December 2009	35	< 5.0	< 5.0	32
<b>R-38B</b>	March 2010	75	< 5.0	< 5.0	60
<b>R-38B</b>	June 2010	63	< 5.0	< 5.0	46
<b>R-38B</b>	January 2011	72	< 5.0	< 5.0	61
<b>R-38B</b>	April 2011	62	1.9	1.2	53
<b>R-38B</b>	July 2011	86	< 5.0	< 5.0	70
<b>R-39B</b>	September 2009	5.6	< 5.0	< 5.0	< 15
<b>R-39B</b>	December 2009	6.2	< 5.0	< 5.0	< 15
<b>R-39B</b>	March 2010	5.8	< 5.0	< 5.0	< 15
<b>R-39B</b>	June 2010	5.5	< 5.0	< 5.0	< 15
<b>R-39B</b>	January 2011	< 5.0	< 5.0	< 5.0	< 15
<b>R-39B</b>	April 2011	3.6	< 1	< 1	< 3
<b>R-39B</b>	July 2011	< 5	< 5.0	< 5.0	< 15
<b>R-39C</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-39C</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R-39C</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R-39C</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R96-16</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R96-16</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R96-16</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R96-16</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R96-17</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R96-17</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R96-17</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R96-17</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1A</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1A</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1A</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1A</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1B</b>	September 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1B</b>	December 2009	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1B</b>	March 2010	< 5.0	< 5.0	< 5.0	< 15
<b>R97-1B</b>	June 2010	< 5.0	< 5.0	< 5.0	< 15

Notes:

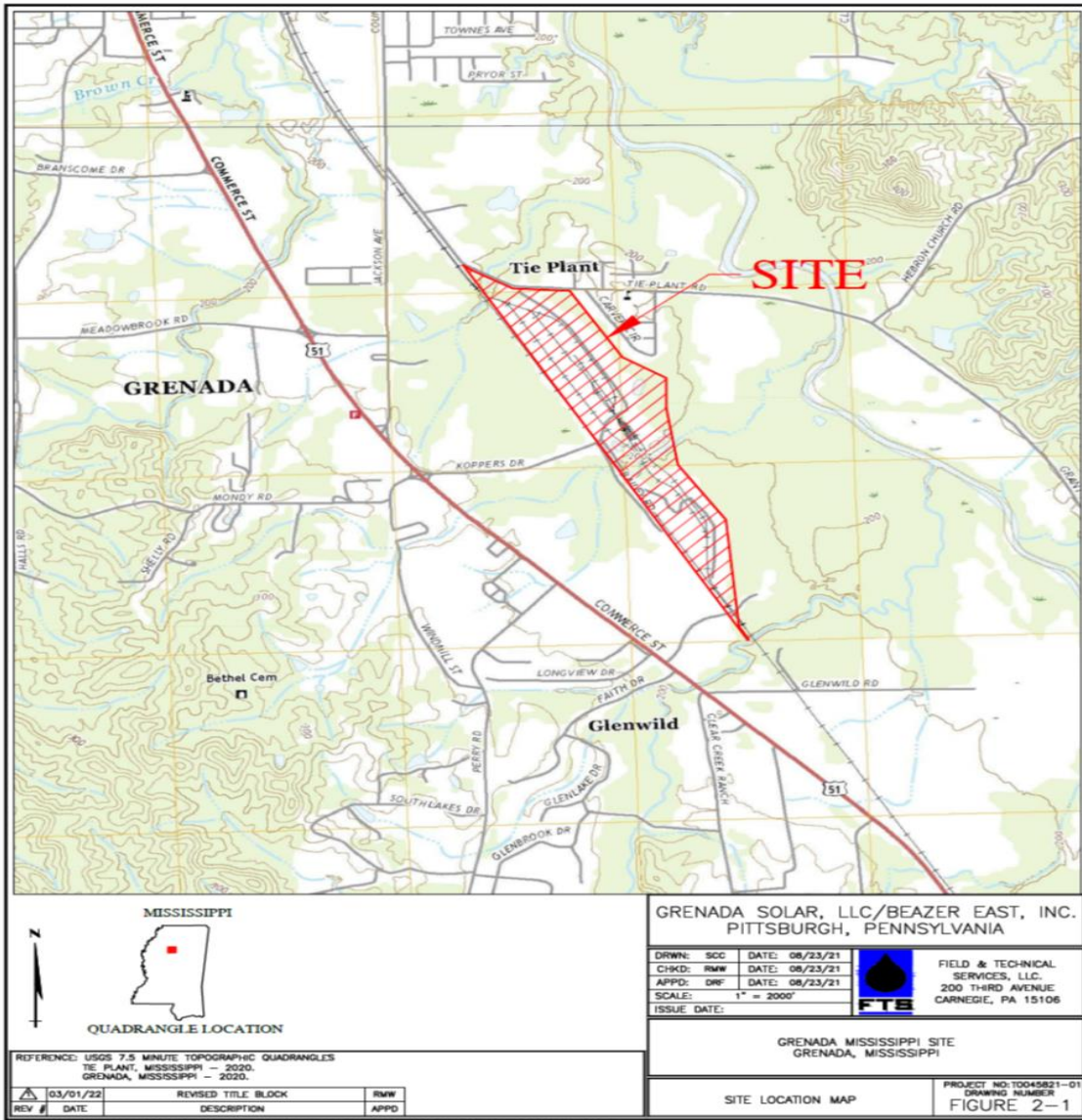
µg/l = Micrograms per liter

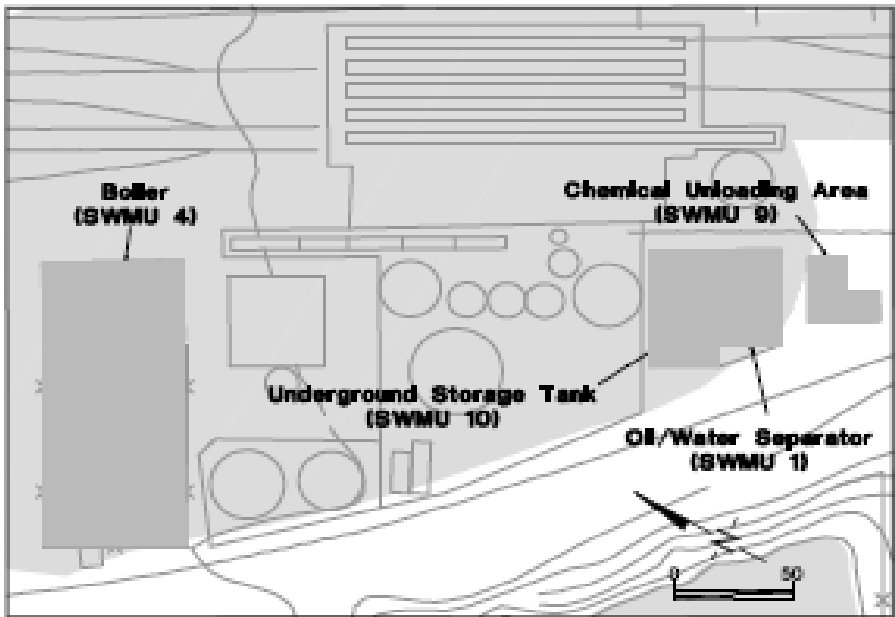
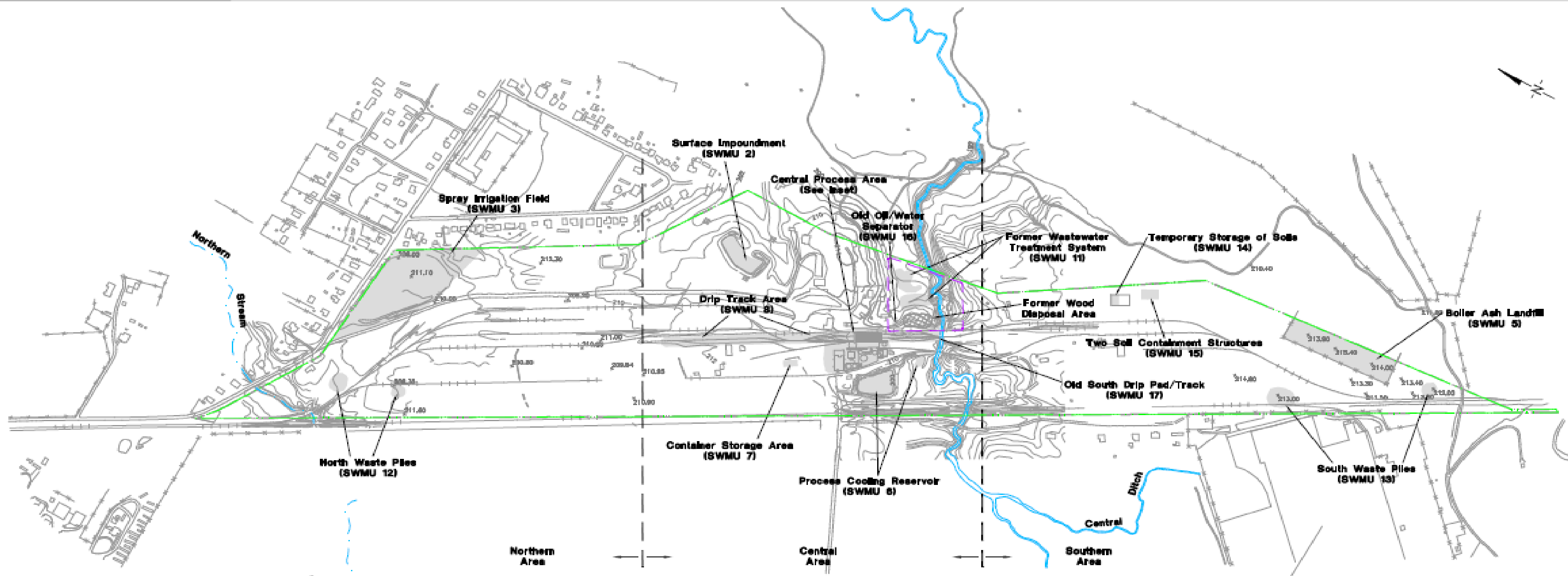
**Table 8-2**

**Long-Term MNA Monitoring  
Revised CMS / CMIP, Rev 1, February 28, 2022**

<b>Monitoring Locations</b>	<b>Parameters</b>	<b>Frequency</b>
<b>Plume Front:</b>	<b>Laboratory Analytes</b>	Year 1-2: semi-annual
R00-2 (LSZ) R-39B (LSZ) R97-1A (USZ) R97-1B (LSZ)		Year 3-5: Annual Year 5: Reassess frequency based on analytical results
<b>Dissolved-Phase Plume:</b>	<b>Laboratory Analytes</b>	Year 1-2: semi-annual
R-16 (USZ) R-38 (USZ) R-38B (LSZ)		Year 3-5: Annual Year 5: Reassess frequency based on analytical results
<b>Source:</b>	<b>Field Measurements</b>	Year 1: Annual
R-21 (USZ) R-16B (LSZ)		Year 5, 10, etc.: Every 5 years
<b>Side-Gradient:</b>	<b>Field Measurements</b>	Year 1-2: semi-annual
R96-16 (USZ) R96-17 (LSZ) R-9 (USZ) R-9C (LSZ) R-6 (USZ)		Year 3-5: Annual Year 5: Reassess frequency based on analytical results
<b>Background:</b>	<b>Field Measurements</b>	Year 1-5: Annual
R-10 (USZ) R-10B (LSZ)		Year 5, 10, etc.: Every 5 years

\* = The long-term MNA wells will be sampled once for toluene, ethylbenzene, and xylenes



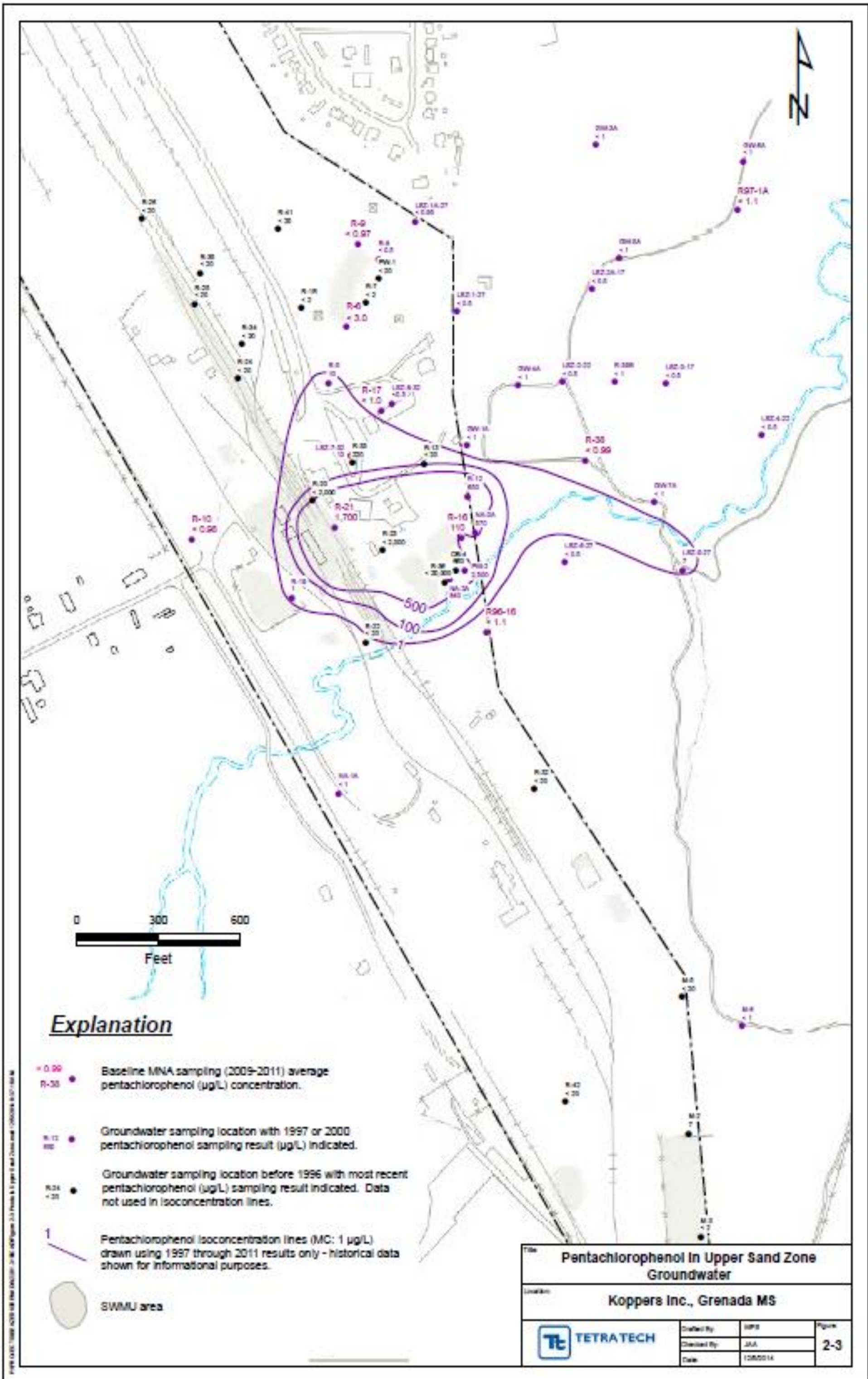


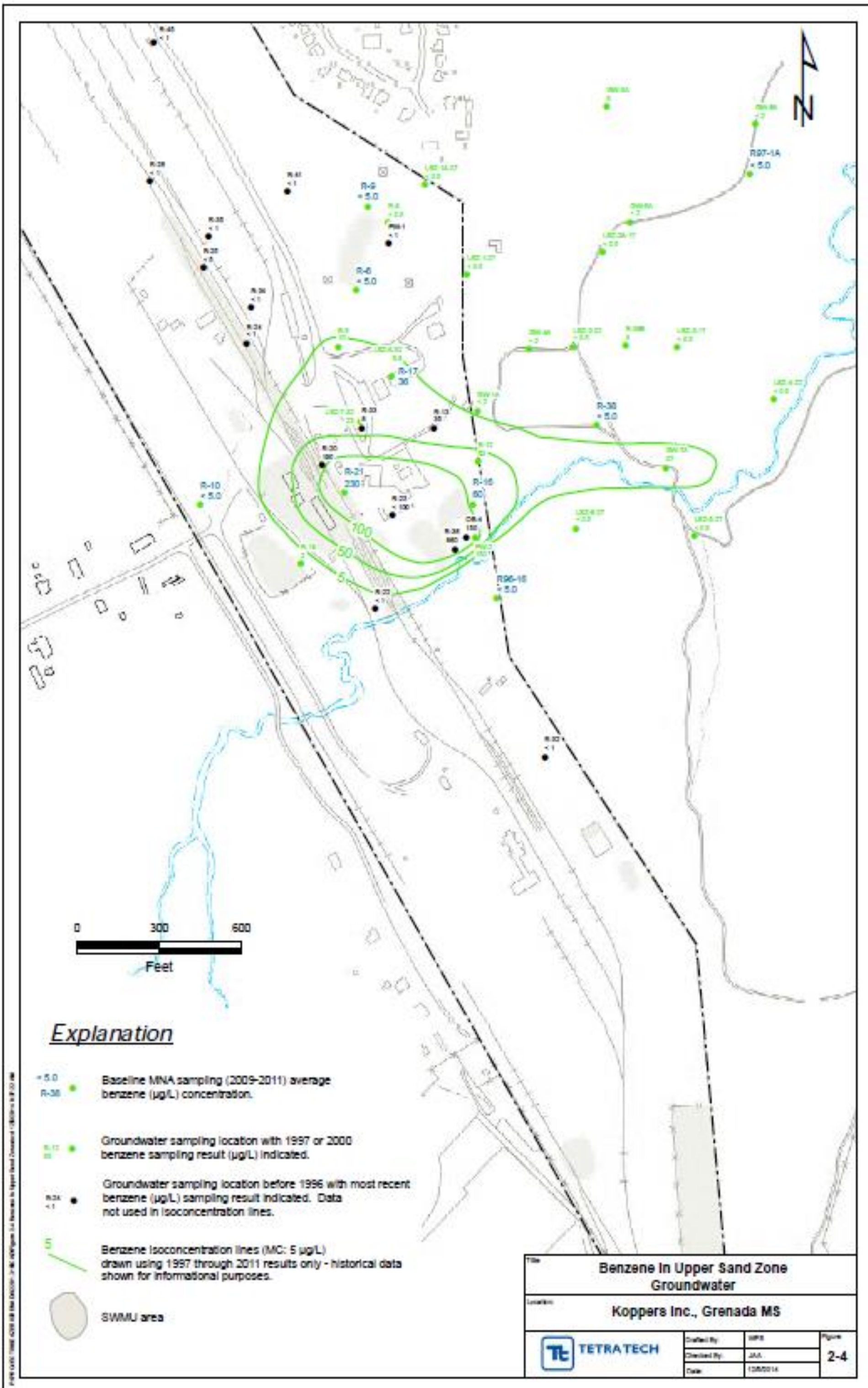
**Inset of Central Process Area (SWMUs 4, 9, and 10)**

- Explanation**
- SWMU area
  - Site Boundary
  - In Study Area (HQ, 1998)
  - General Boundary for Northern, Central, and Southern Area
  - 210.00 Spot elevation, feet, 1988
- Note: Contour interval 2 feet



Site Features	
Koppers Inc., Grenada MS	
TETRA TECH	2-2



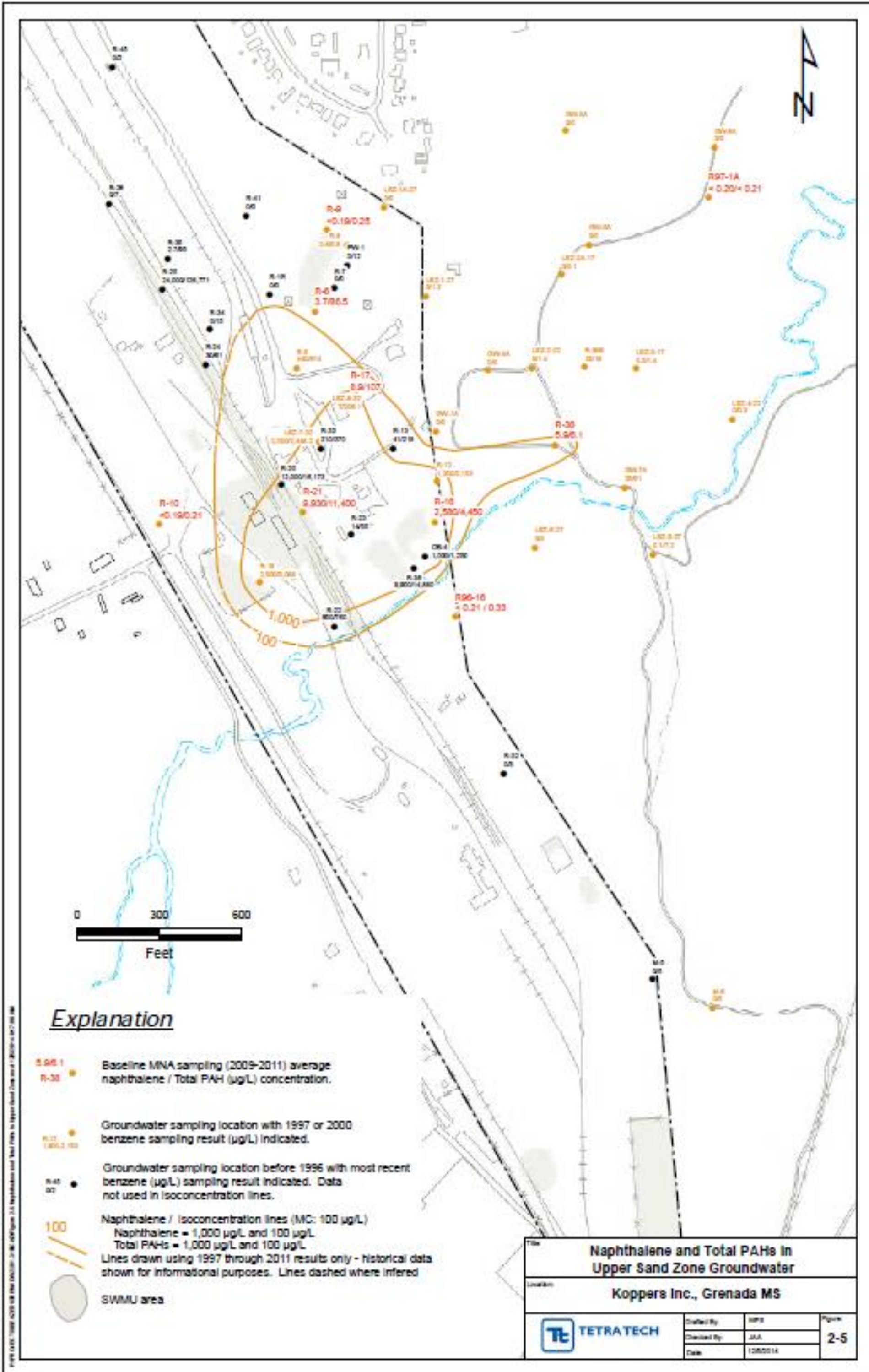


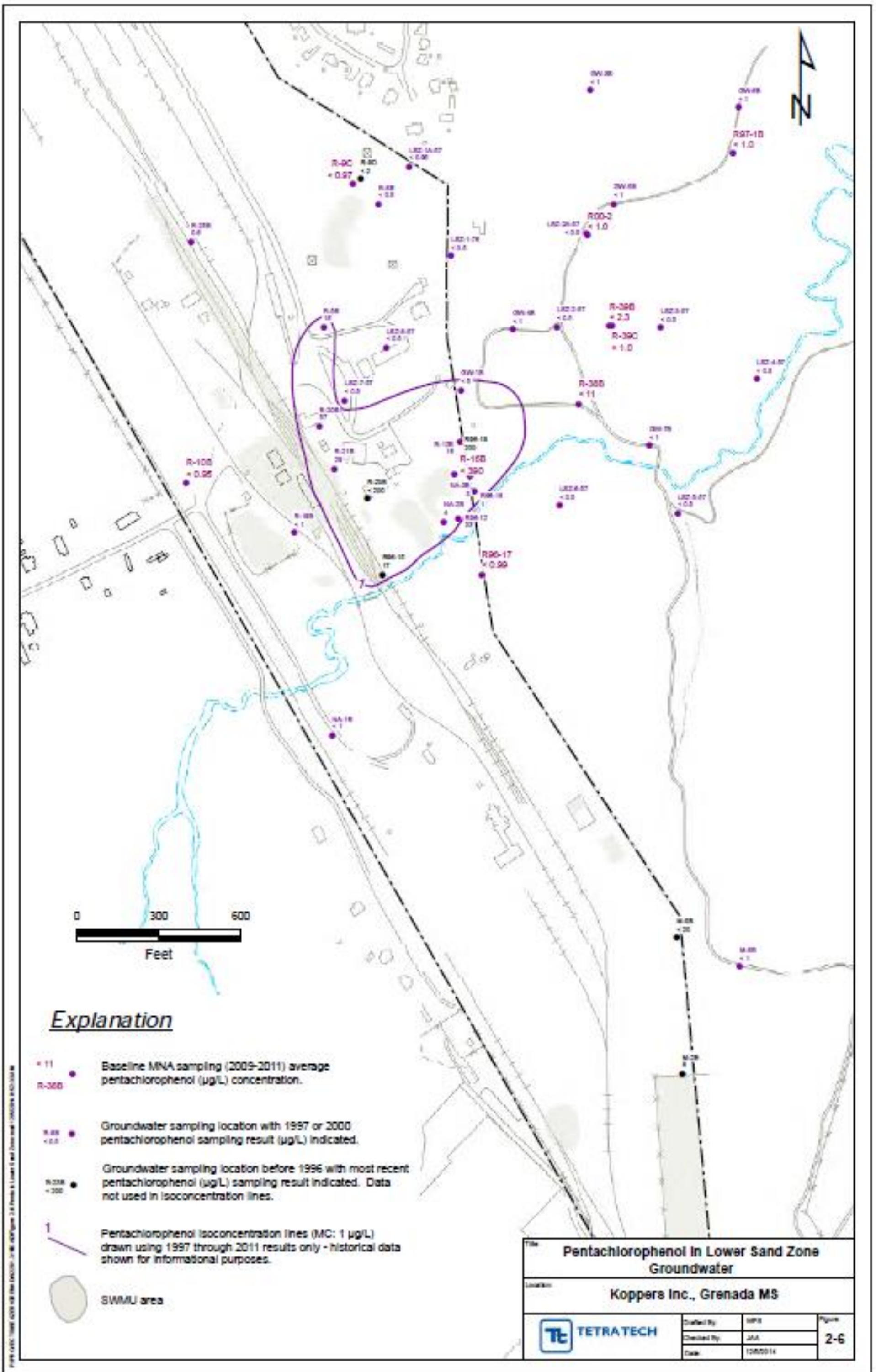
**Explanation**

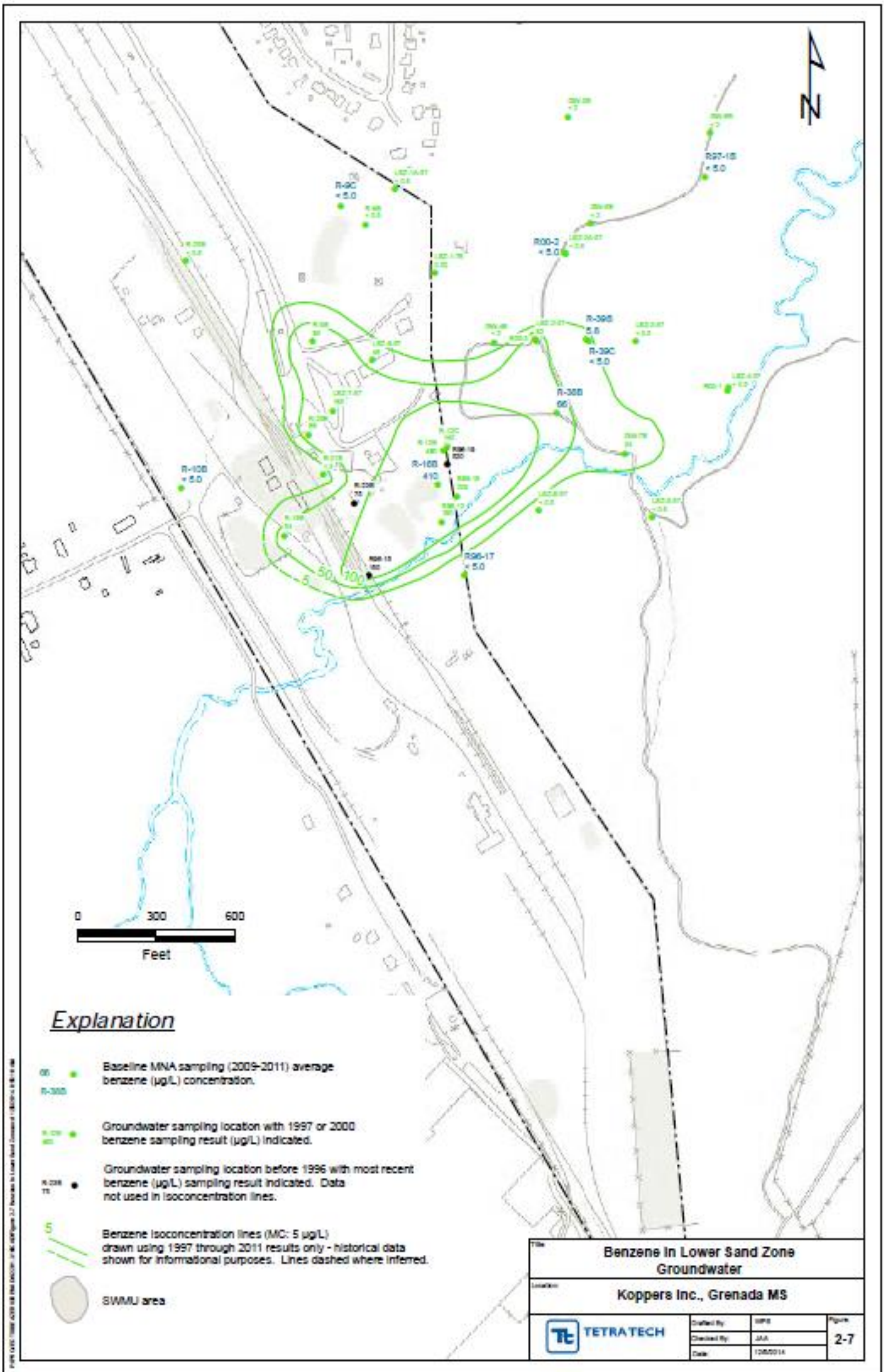
- + 5.0 R-38 Baseline MNA sampling (2009-2011) average benzene (µg/L) concentration.
- 11 22 Groundwater sampling location with 1997 or 2000 benzene sampling result (µg/L) indicated.
- R-24 -1 Groundwater sampling location before 1996 with most recent benzene (µg/L) sampling result indicated. Data not used in isoconcentration lines.
- 50 700 Benzene isoconcentration lines (MC: 5 µg/L) drawn using 1997 through 2011 results only - historical data shown for informational purposes.
- SWMU area

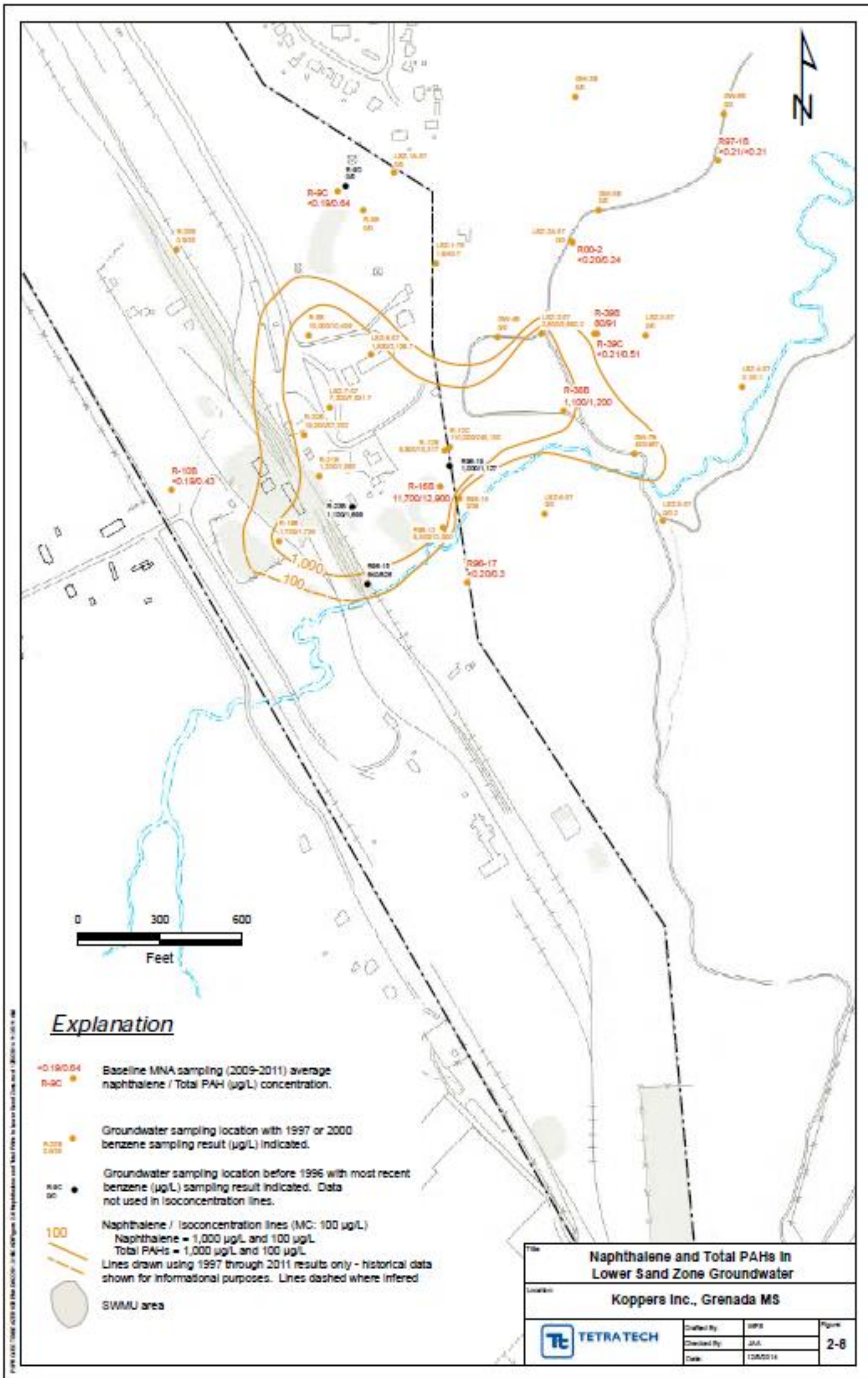
<b>Title</b> Benzene In Upper Sand Zone Groundwater		
<b>Location</b> Koppers Inc., Grenada MS		
	<b>Crafted By</b> WPS	<b>Figure</b> 2-4
	<b>Checked By</b> JAA	
	<b>Date</b> 12/20/14	

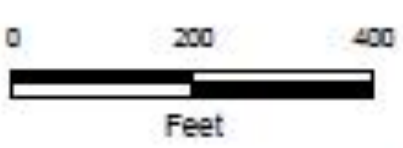
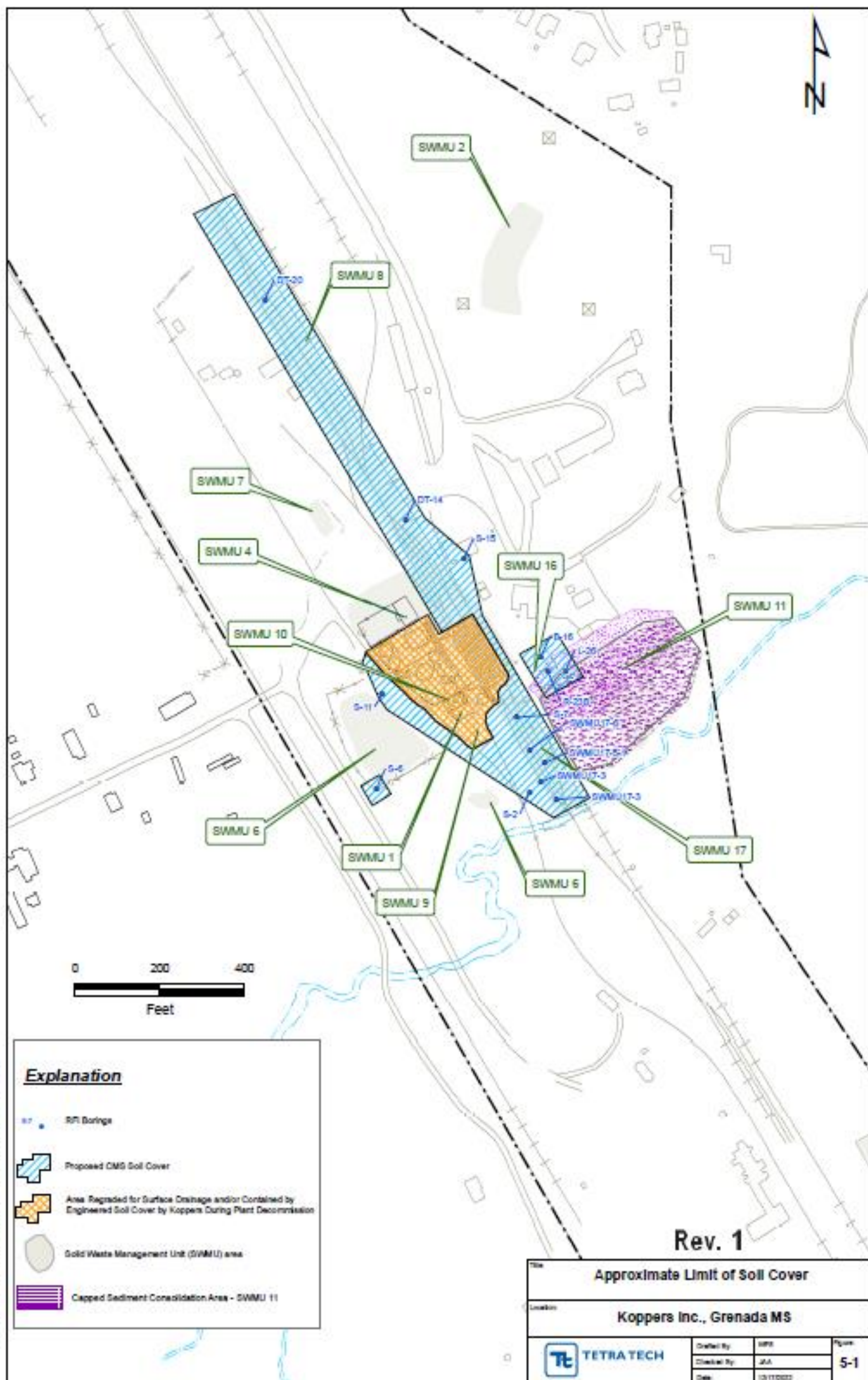
FILE PATH: \\MSD\GIS\MapDocs\2014\Koppers\2014\Koppers\_Benzene\_In\_Upper\_Sand\_Zone\_Groundwater.mxd
















**Explanation**

-  RFI Borings
-  Proposed CMS Soil Cover
-  Area Regraded for Surface Drainage and/or Contained by Engineered Soil Cover by Koppers During Plant Decommission
-  Solid Waste Management Unit (SWMU) area
-  Capped Sediment Consolidation Area - SWMU 11

Rev. 1

Title			
Approximate Limit of Soil Cover			
Location			
Koppers Inc., Grenada MS			
 TETRA TECH	Created By	JPF	Figure
	Checked By	JJA	
	Date	12/11/2022	
			5-1



R97-1B R97-1A

R-9C

R00-2

R-6

R-19B

R-35B

R-38

R-10

R-10B

R-21

R-16B

R-16

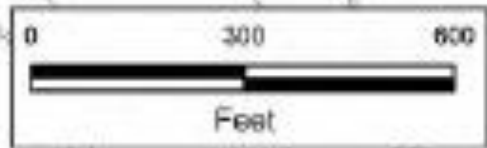
R96-16

R96-17

Note:  
Constituent Isoconcentration Lines for  
Lower Sand Zone Groundwater

**Explanation**

- Final Remedy MNA Monitoring Wells
- Lower Sand Zone Pentachlorophenol Isoconcentration Line (MCL: 1 µg/L)
- - - Lower Sand Zone Benzene Inferred Isoconcentration Line (MCL: 5 µg/L)
- Lower Sand Zone Benzene Isoconcentration Line (MCL: 5 µg/L)
- - - Lower Sand Zone Total PAHs Inferred Isoconcentration Line of 100 µg/L
- Lower Sand Zone Total PAHs Isoconcentration Line of 100 µg/L
- GWML Area



<b>MNA Long-Term Sampling Locations</b>		
Location: <b>Koppers Inc., Genada MS</b>		
	Drawn By: <b>WCO</b>	Page: <b>8-1</b>
	Checked By: <b>JAA</b>	
	Date: <b>12/11/2014</b>	