Cleanup Plan

East 10th Street Site, Marcus Hook, PA

20 May 2021

Revised 21 January 2022

Project No.: 0631317

Environmental Resources Management
75 Valley Stream Parkway
Suite 200
Malvern, PA 19355

www.erm.com

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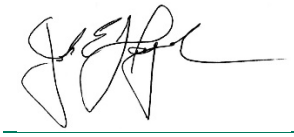
Peter Beyer, P.G.
Project Manager



John Hazard, P.E.
Principal-in-Charge

Environmental Resources Management, Inc.

75 Valley Stream Parkway, Suite 200

Malvern, PA 19355

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ACRONYMS AND ABBREVIATIONS

ACT 2 – PA LAND RECYCLING AND ENVIRONMENTAL REMEDIATION STANDARDS ACT

AOC – ADMINISTRATIVE ORDER BY CONSENT

AUL - ACTIVITY AND USE LIMITATION

BGS – BELOW GROUND SURFACE

BMP – BEST MANAGEMENT PRACTICE

CFR – CODE OF FEDERAL REGULATIONS

COA – CONSENT ORDER AND AGREEMENT

COPC - CONTAMINANT OF POTENTIAL CONCERN

CS_2 – CARBON DISULFIDE

CVOC – CHLORINATED VOLATILE ORGANIC COMPOUNDS

CY – CUBIC YARD

DCE – DICHLOROETHENE

DOT – DEPARTMENT OF TRANSPORTATION

DRBC – DELAWARE RIVER BASIN COMMISSION

EPC – EXPOSURE POINT CONCENTRATION

ERM – ENVIRONMENTAL RESOURCES MANAGEMENT, INC.

E&S – EROSION AND SEDIMENTATION

ESPCP MANUAL - PADEP'S *EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL*

FMC – FMC CORPORATION

HASP – HEALTH AND SAFETY PLAN

HHRA – HUMAN HEALTH RISK ASSESSMENT

HSCA – PADEP'S HAZARDOUS SITES CLEANUP ACT

J&E - JOHNSON & ETTINGER

KCA - KEYSTONE COMMUNITY ALLIANCE

MHBCC – MARCUS HOOK BUSINESS AND COMMERCE CENTER

MHDP – MARCUS HOOK DEVELOPMENT PARK

MG/KG – MILLIGRAM PER KILOGRAM

MSC – MEDIUM SPECIFIC CONCENTRATION

O&M – OPERATIONS AND MAINTENANCE

PADEP – PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAGWIS - PENNSYLVANIA GROUNDWATER INVENTORY SYSTEM

PAH – POLYCYCLIC AROMATIC HYDROCARBON

PCB – POLYCHLORINATED BIPHENYLS

PCE –TETRACHLOROETHENE

PRCP – POST-REMEDIATION CARE PLAN

PIP - PUBLIC INVOLVEMENT PLAN

PPE – PERSONAL PROTECTIVE EQUIPMENT

RCRA – RESOURCE CONSERVATION AND RECOVERY ACT

RI/RA REPORT – REMEDIAL INVESTIGATION/RISK ASSESSMENT REPORT

RIWP – REMEDIAL INVESTIGATION WORK PLAN

R&D – RESEARCH AND DEVELOPMENT

SHS – ACT 2 STATEWIDE HEALTH STANDARDS

SOD - STATEMENT OF DECISION

SSS – SITE-SPECIFIC STANDARDS

SVOC – SEMIVOLATILE ORGANIC COMPOUND

TCB – TRICHLOROBENZENE

TCE –TRICHLOROETHENE

TCL – TARGET COMPOUND LIST

TCLP – TOXICITY CHARACTERISTIC LEACHING PROCEDURE

TSCA – TOXIC SUBSTANCES CONTROL ACT

UCL – UPPER CONFIDENCE LIMIT

UECA – UNIFORM ENVIRONMENTAL COVENANTS ACT

USEPA – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VOC – VOLATILE ORGANIC COMPOUND

WWTP – WASTEWATER TREATMENT PLANT

1. INTRODUCTION

Environmental Resources Management, Inc. (ERM), on behalf of FMC Corporation (FMC), has prepared this Cleanup Plan for the East 10th Street Site in Marcus Hook, Pennsylvania (Site). This plan presents the remedial efforts proposed by FMC to address soil and groundwater conditions pursuant to the Consent Order and Agreement (COA) entered into between the Pennsylvania Department of Environmental Protection (PADEP) and FMC on June 23, 2003. The COA, which was established under the PADEP's Hazardous Sites Cleanup Act (HSCA) Program, prescribes that the remediation of contamination identified by FMC in its site investigation "meet an Act 2 standard or a combination of Act 2 standards." Thus, this Cleanup Plan was developed pursuant to the requirements of the COA and to be consistent with the PA Land Recycling and Environmental Remediation Standards Act (Act 2), 25 Pa. Code Chapter 250 (Land Recycling Program) and the related *Land Recycling Program Technical Guidance Manual* (January 19, 2019).

This Cleanup Plan has been prepared to fulfill FMC's obligation under Paragraph 4(h) of the COA, which states FMC will "submit … a Remediation Plan and implementation schedule to remediate the contamination identified in the Final Site Investigation Report to meet an Act 2 standard or a combination of Act 2 standards." FMC prepared the *Remedial Investigation/Risk Assessment Report, East10th Street Site, Marcus Hook, Pennsylvania* (RI/RA Report, December 2020) to fulfill its obligation under the COA for the Final Site Investigation Report. PADEP approved the RI/RA Report on February 1, 2021. The RI/RA Report was subsequently revised to address comments received by PADEP in a letter dated November 24, 2021 and related follow-up communications, and resubmitted to PADEP by January 23, 2022.

This Cleanup Plan documents the proposed remediation, as well as engineering and administrative controls, necessary to eliminate pathways of concern to affected media as identified in the RI/RA Report.

This Cleanup Plan has been revised to address comments received by PADEP in a letter dated November 24, 2021, additional follow-up communications, and an e-mail dated January 12, 2022. Additionally, modifications were made to address comments provided by United States Environmental Protection Agency (USEPA) in its email correspondences dated August 26, 2021, November 19, 2022, and January 12, 2022. .

2. LIST OF CONTACTS AND PUBLIC INVOLVEMENT

2.1 List of Contacts

FMC and ERM, under contract with FMC, have prepared this Cleanup Plan. The primary point of contact in connection with the Cleanup Plan is Christina Moretti, FMC's Remediation Project Manager. ERM's points of contact are Peter Beyer, P.G. and John Hazard, P.E. The contact information for these individuals are as follows:

Chris Moretti
FMC Corporation
2929 Walnut Street
Philadelphia, PA 19104
Phone – 215-299-6252

Peter Beyer, P.G.
Environmental Resources Management, Inc.
75 Valley Stream Parkway
Malvern, PA 19341
Phone – 484-913-0336

John Hazard, P.E.
Environmental Resources Management, Inc.
75 Valley Stream Parkway
Malvern, PA 19341
Phone – 484-913-0374

2.2 Public Involvement

FMC has and will continue to engage with the community and property owners during the development and implementation of the Cleanup Plan. A public notice regarding submittal of the Notice of Intent to Remediate (NIR) at the E. 10th Street Site was submitted on March 10, 2021. FMC is also implementing a Public Involvement Plan (PIP) to guide communications with the community and property owners regarding overall progress, developments, and issues for investigation and remediation activities conducted by FMC at the Site. FMC has provided property owners with relevant documents, including the RI/RA Report, and has corresponded with property owners to review progress and cleanup plans. Additionally, in accordance with the Act 2 program, and in consultation with the Borough of Marcus Hook Manager, FMC has provided the following:

- Public access at convenient location for document review:
  Mary M. Campbell Marcus Hook Public Library, 10th and Green Streets, Marcus Hook, PA, 19061;
- Designation of a single contact person to address questions from the community:
  Chris Moretti (FMC Project Manager), 215-299-6252, christina.moretti@fmc.com; and
- A location near the Site for public hearings and meetings, upon request from the Borough:
  Borough of Marcus Hook Municipal Building, 1111 Market Street, Marcus Hook, PA, 19061.

Neither FMC nor the Borough have received to date any written comments from the community or property owners regarding the NIR or submittal of this Cleanup Plan.

3. SITE BACKGROUND

3.1 Site Setting and Land Use

The Site is located on East 10th Street in Marcus Hook Borough, which is in the southern portion of Delaware County, Pennsylvania (Figure 1). The Site is approximately 36 acres and is bounded by East 10th Street to the north/northwest, Marcus Hook Creek to the east, and a Conrail rail line to the southeast and southwest (Figure 2). The Delaware River is approximately one-half mile southeast of the Site.

The Site is zoned for mixed/industrial use and is currently used for miscellaneous light industrial/commercial activities. The surrounding land use is predominantly industrial and commercial mixed with residential areas. Properties immediately surrounding the Site include: an oil refinery to the northeast, east and southeast; commercial use to the south, west and northwest; and residential areas to the north and southwest as shown on Figure 2

The Site has been subdivided into 25 smaller parcels, known as “Lots,” as shown on Figure 2, which have been owned and operated by various entities for commercial and industrial purposes. Portions of the former manufacturing building complex remain, as can be seen on Figure 2, including: administration buildings along East 10th Street (Lots 1 through 3); former manufacturing buildings along the northwestern side of the Site (Lots 6, 7, 16, 18); former incinerator building (Lot 13); and portions of the former wastewater treatment plant buildings in the southern portion of the Site (Lot 24). The former buildings in the central portion (Lots 15, 17, 23), southwestern portion (Lots 20 through 22), and eastern portion (Lots 8 through 14) of the Site have been demolished by others after FMC sold the property in 1978. Remnants of the demolished structures, such as foundations, slabs,

basements and corridors, as well as demolition debris remain at most of these lots. Access to the Site is largely unrestricted and signs of trespassing (e.g., dumping, etc.) are evident.

3.2 Historical Site Ownership and Use

The property was reportedly first developed for industrial purposes by American Viscose Corporation between 1900 and 1910. American Viscose Corporation initially operated the Site as a viscose rayon manufacturing plant, changing over to cellophane production in 1946. In 1963, American Viscose Corporation sold the property to FMC, who continued the cellophane manufacturing operations.

FMC ceased its manufacturing operations at the Site in 1977. FMC sold the property to Marcus Hook Development Park (MHDP) in 1978. After purchasing the Site, MHDP conducted salvage operations at the property. In 1986, MHDP sold much of the Site (Lots 1, 2, 3, 8-15, 17, 20-23) to Marcus Hook Business and Commerce Center (MHBCC). In 1992, MHBCC and its principals pleaded guilty to violating federal environmental laws, including illegal disposal and unlawful waste management practices at the Site involving asbestos and PCBs. Since this time, the lots have been owned and operated by various entities for commercial and light industrial purposes. Current owners of site parcels include:

- Keystone Community Alliance, “KCA” (Lots 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 23);
- Omega Wood Recycling (Lot 24);
- Borough of Marcus Hook (Lot 1 across from Lot 24);
- Marcus Hook Community Development Corporation (Lot 22); and
- Marcus Hook Trainer Fire Department (Lots 4 and 5).

Additional information regarding property ownership and activities is presented in the RI/RA Report.

3.3 FMC’s Former Operations

The production of rayon and cellophane at the Site involved: steeping wood pulp (cellulose) in caustic soda (sodium hydroxide); shredding the pulp into “crumbs” and aging the crumbs; treating the crumbs with carbon disulfide (CS_2) under vacuum; dissolving the crumbs in caustic soda (viscose is formed); filtering and de-aerating the viscose; extruding the viscose in a sulfuric acid bath (extruded through slits for cellophane sheets or small diameter holes for rayon fiber/yarn); and finally washing and processing the resulting material (rayon yarn or cellophane sheets) and finishing by using solvents (ethanol, ethyl acetate, tetrahydrofuran, and toluene), plasticizers, or lacquers to coat the material.

Other site support operations included:

- Power generating - the Power House, which was located primarily on Lot 9, was originally coal-fired and later switched to fuel oil fired.
- Acid reclamation - The acid reclaim system was located on Lot 12.
- Incineration – a coal-fired incinerator was located on Lot 13.
- Coal storage – coal was stored on Lots 13 and 14.
- Wastewater treatment - the wastewater treatment plant (WWTP) located on Lot 24 was originally constructed in 1945 by American Viscose Corporation. The WWTP was modified in 1957 to include sludge dewatering and two earthen sludge lagoons. The system was designed to remove metallic hydroxides and organic matter from wastewaters from the Steeping (Lot 15) and Churn and Mix (Lot 17) operations.
- Maintenance and research & development (R&D) – maintenance shops and R&D areas were located in several areas of the Site, including Lots 15 and 18.

Additional information regarding FMC's historical operations is provided in the RI/RA Report.

3.4 Regulatory Background

In February 1991, the USEPA executed three Administrative Orders by Consent (AOC) with FMC, Lassoff Group (a property manager for MHBCC at the time) and MHBCC to conduct removal activities at the Site under the oversight of USEPA. Work performed under the AOCs included removal of asbestos from occupied areas within buildings on the Site, removal of drums and equipment containing PCB wastes from buildings and an investigation of a portion of the property. In 1992, the principals of MHBCC pleaded guilty to violating federal environmental laws, including illegal disposal and unlawful waste management practices at the Site involving asbestos and PCBs

In 1998, PADEP initiated a HSCA response and subsequently orchestrated a phased investigation at the Site to determine if additional response actions were needed to address remaining environmental concerns, including soil and groundwater contamination, buried asbestos, and hazardous substances remaining on-site. PADEP's investigation activities were documented in the *Final Phase I Site Investigation Report* (Foster Wheeler, 2002), and included a prompt interim response removal of certain hazardous materials. Based on the findings of this report, PADEP acted to initiate additional interim response removals and continuation of site investigation activities, as documented in a Statement of Decision (SOD, December 19, 2002).

On June 23, 2003, the COA was entered into between PADEP and FMC. Pursuant to the COA, FMC agreed to implement certain interim response activities, which were presented in the SOD, and site investigation and remediation activities. FMC completed the interim response activities in 2004-2005 consisting of: 1) removing and disposing off-site approximately 5 tons of solids from three substructures (manholes on Lot 10 and Lot 13, and an inlet box/sump type structure on Lot 15); 2) removing and disposing off-site approximately 100 tons of solids removed from the former spray pond (Lot 13); 3) removing and disposing off-site approximately 100 tons of soil from an area on Lot 20; and 4) re-characterizing surface soils in an approximately 10-foot by 100-foot area on Lot 17. FMC documented interim response activities in the *Interim Response Final Report* (ERM, 2006), which was submitted to PADEP in February 2006.

FMC completed additional investigation activities at the Site in accordance with the COA, including the following items specifically identified in Paragraph K of the COA:

- Initiate a deep groundwater study;
- Expand the prior surface water and sediment investigation; and
- Conduct a detailed and thorough study of the CS_2 contamination detected in soil on Lot 19.

FMC completed site investigation activities in accordance with the following PADEP-approved work plans to address the three above listed items: *Phase II Site Investigation Work Plan*, dated March 9, 2004 (ERM, 2004a); *Preliminary Results of Phase II Site Investigation*, dated September 23, 2004 (ERM, 2004b); and *Work Plan for CS_2 Source Area Investigation*, dated September 27, 2005 (ERM, 2005). The investigative activities relating to these work plans were conducted in stages and continued through 2007. These activities included a soil investigation near the former CS_2 storage moat, a soil gas survey adjacent to a building in the vicinity of the former CS_2 storage moat, and a groundwater investigation that included the installation of 14 new wells and sampling of 24 site wells. The findings of these activities were presented in a *Phase II Site Investigation Report* that was submitted to PADEP in September 2007, and revised in January 2008 based on PADEP comments.

FMC continued groundwater monitoring activities and completed additional focused soil investigations at the Site in 2010 in accordance with a scope of work presented in FMC's October 9, 2009 letter to PADEP. Subsequently, FMC performed a comprehensive, site-wide Remedial Investigation (RI) in accordance with the *Remedial Investigation Work Plan* (RIWP), submitted to PADEP on April 28, 2015 (ERM, 2015). The purpose of the RI was to more broadly characterize current site conditions as requested by PADEP since 1) the prior investigation was focused on the three items specifically

identified in the COA, and 2) PADEP informed FMC during a December 2014 meeting that in order to grant an Act 2 release or meet an Act 2 standard, more current soil data would be required to characterize the existing exposure conditions. The scope of work for the RI was developed based upon several correspondences between FMC and PADEP, including a meeting with FMC, PADEP and ERM held on December 12, 2014, and was informed by the results of the prior site investigations. As outlined in the RIWP, the RI included the following tasks to obtain data to supplement the existing site characterization data and to support the completion of the RI/RA Report and a Cleanup Plan:

- Perform comprehensive soil sampling across the Site;
- Vertically delineate the extent of the chlorinated VOC and CS_2 plumes;
- Characterize groundwater in areas that are spatially separated from site monitoring wells;
- Characterize streambed sediments in the Marcus Hook Creek;
- Characterize liquids within subsurface structures such as sewers, manholes, and tunnels; and
- Determine if subsurface structures are contributing to contamination migration.

The above site investigation activities were completed in 2015-2018 and the results are provided in the RI/RA Report. The findings from these activities are summarized below in Section 4.

4. BASIS FOR CLEANUP PLAN

This Cleanup Plan was developed based on the findings and conclusions presented in the RI/RA Report. The sections below provide a summary of the RI findings and the conclusions from the RA; additional detail regarding the investigation and the risk assessment is provided in the RI/RA Report.

4.1 Summary of Remedial Investigation Findings

The investigation included the collection and analysis of about 400 soil samples, 19 site-wide groundwater sampling events (including eight consecutive quarterly events in 2016-2018 for the 40-well monitoring network), sediment sampling in Marcus Hook Creek, and reconnaissance and water sampling in the site building basements and sewer network. The investigation also included a focused investigation of the closed former CS_2 storage moat and vicinity to evaluate whether or not this area was an active source to soil and/or groundwater contamination. Additionally, FMC performed a soil-gas and soil investigation (73 Gore-Sorber® samples and 28 soil borings) to identify whether or not active source(s) remain related to the organic compounds detected in groundwater.

The results of investigations indicate site soils and groundwater contain several inorganic and organic regulated substances above the Act 2 Statewide Health Standards (SHS) non-residential use Medium Specific Concentrations (MSCs); however, the results did not indicate the presence of active on-going sources of contamination. A high-level summary of the results and findings is presented below.

- Surface soils: Over 100 surface soil samples were collected during the initial phase of the site-wide RI, and only 18 samples had reported concentrations above the non-residential direct contact and 34 above soil-to-groundwater MSCs. Regulated substances reported above MSCs included polycyclic aromatic hydrocarbons (PAHs, such as benzo(a)pyrene), several metals (antimony, arsenic, lead, mercury, vanadium), and the polychlorinated biphenyl (PCB) Aroclor-1260. Additional samples were collected to refine the delineation at these locations.
- Subsurface soils: Over 150 subsurface soil samples were collected during the initial phase of the site-wide remedial investigation; none had reported concentrations above non-residential direct contact MSCs, and only 16 samples had reported concentrations above soil-to-groundwater MSCs. Regulated substances reported above soil-to-groundwater MSCs included PAHs, several metals (antimony, arsenic, lead, manganese, mercury, thallium), and 1,2,4-trichlorobenzene (1,2,4-TCB).

- Groundwater: The current site monitoring well network includes 17 overburden and 23 bedrock monitoring wells. Several organic and inorganic regulated substances were detected in one or more monitoring wells at concentrations above their respective non-residential used aquifer MSC, including CS_2, chlorinated organics (e.g., 1,1-dichloroethene, trichloroethene/TCE, perchloroethene/PCE, 1,2,4-TCB), and metals (antimony, arsenic, beryllium, cadmium, cobalt, lead, manganese, nickel, selenium, thallium, vanadium, and zinc). The nature and extent of concentrations suggest more localized and discontinuous areas of impact rather than a large, site-wide plume.
- Source area evaluations: Soil sample and groundwater sample results and trends indicate the likely historical source areas for the volatile organic regulated substances are not active and are not continuing to contribute contaminant mass. The focused soil and soil-gas investigation conducted within the eastern half of the Site did not identify active on-going sources related to organics detected in groundwater. Additionally, the focused investigation conducted in the former CS_2 storage moat area demonstrated that the former storage moat and soils in this area are not acting as an on-going source of groundwater contamination. The investigation in the vicinity of the former CS_2 storage moat area also confirmed that two underground storage tanks and one storage moat structure had been removed and another moat structure and tanks had been closed in-place (emptied and entombed with flyash and concrete).
- Vapor intrusion into buildings: All soil samples within the unsaturated zone were below the soil VI screening levels. Additionally, groundwater was determined not to be a concern based on the presence of a clean groundwater lens within the overburden. However, since limiting VI conditions (i.e., preferential pathways) for future receptors could not be entirely ruled out given utilities on-site, screening against alternate values ($1/10^{th}$ generic soil-to-groundwater MSCs and $1/10^{th}$ groundwater MSCs) was completed, and several volatile organic substances and mercury were carried forward into the human health risk assessment.
- Basements and sewer network: The basements and sewer system pose a potential physical hazard (e.g., areas of subsidence, open manholes), but the water sample results indicate they are not an active source of contamination or a significant contaminant migration pathway.
- Marcus Hook Creek: The surrounding urban/industrial setting and the permitted discharge from the neighboring refinery materially influence the conditions of Marcus Hook Creek. The sample results indicate the presence of organic and inorganic constituents common to urban waterways, and are generally consistent with samples collected from downstream sections of the Creek and the Delaware River. The permitted discharge from the neighboring refinery generates a significant portion of the base flow in Marcus Hook Creek and increases the water temperature to over 90°F based upon in-stream measurement.

The results of the investigation are presented in detail, including figures, tables and laboratory analytical reports, in the RI/RA Report.

4.2 Summary of Pathway Assessment & Baseline Risk Assessment

FMC is applying a combination of Act 2 standards, including SHS and Site-Specific Standards (SSS), to address the regulated substances analyzed for and/or identified in soil and groundwater. Accordingly, FMC completed a quantitative Act 2 baseline risk assessment to evaluate potential risks to human and ecological receptors posed by regulated substances identified in site soil and groundwater.

4.2.1 Constituents of Potential Concern

Regulated substances whose maximum concentrations exceed non-residential groundwater MSCs in overburden groundwater and/or soil MSCs (considering both direct contact and soil to groundwater), or applicable vapor screening levels were carried forward into the human health risk assessment for site-specific risk evaluation. In summary, these include:

Groundwater

- TCE
- PCE
- Benzo(a)pyrene
- Benzo(g,h,i)perylene
- Arsenic
- Antimony
- Cobalt
- Lead
- Nickel
- Thallium
- Zinc
- 1,1-DCE
- 1,2,4-Trichlorobenzene
- Benzo(k)fluoranthene
- bis(2-ethylhexyl)phthalate
- Aluminum
- Chromium
- Iron
- Manganese
- Selenium
- Vanadium

Soil

- Antimony
- Arsenic
- Lead
- Manganese
- Mercury
- Thallium
- Vanadium
- Aroclor-1260
- 1,2,4-Trichlorobenzene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Naphthalene

Additional regulated substances, which did not exceed MSCs, were incorporated for evaluation as potential Contaminants of Potential Concern (COPCs) in the risk assessment based on additional data evaluation against more conservative screening levels (e.g., 1/10th groundwater or generic soil to groundwater MSCs and U.S. EPA Risk Screening Levels, or RSLs) depending on the media/pathway, as presented in the RI/RA Report. These are discussed further in Section 4.2.3 and Section 4.3

The various media/pathways were addressed by either pathway elimination, derivation of site-specific numeric standards, or calculation of baseline risk based on current site data, as summarized below.

4.2.2 Groundwater

The relevant potential exposure pathways to impacted groundwater evaluated in the Human Health Risk Assessment (HHRA, Appendix P of the RI/RA Report) included discharge to surface water, groundwater use (direct contact/ingestion), volatilization to indoor air for future non-residential workers, and volatilization from and direct contact in excavations/trenches for potential future utility/construction workers.

4.2.2.1 Groundwater Use/Direct Contact

The groundwater direct contact pathway was determined to be incomplete for the non-residential adult commercial/industrial workers and trespassers based on the following:

- Groundwater is not currently used by any of the on-site property owners as a potable or non-potable water source.
- Potable water is provided by the Chester Water Authority to residential and non-residential properties in Marcus Hook and Trainer, PA.

- A search of public well records using the Pennsylvania Groundwater Inventory System (PAGWIS) database verified that there are currently no wells used to provide water for potable, agricultural or industrial purposes on or downgradient of the Site (between the Site and the Delaware River).
- The BP Marcus Hook/Monroe Energy Trainer Refinery property downgradient of the Site has a registered activity and use limitation (AUL) established through an environmental covenant which states: “No water supply wells of any kind (including, without limitation, water wells used for drinking, bathing, or other human consumption purposes and water wells used for livestock, farming or irrigation) shall be installed or used on the Property…” The environmental covenant was executed in April 2017.

Institutional controls (e.g., environmental covenant) will be necessary to restrict future potable use of groundwater at the Site until such time that it is determined that groundwater does not pose an unacceptable risk.

For the construction worker and utility worker, the quantitative risk assessment evaluated exposure to groundwater while working in an excavation or trench. The results of the quantitative risk assessment demonstrated that exposure to groundwater for a construction worker or utility work did not pose an unacceptable risk.

4.2.2.2 Discharge to Surface Water

Groundwater at the Site occurs in both the overburden and bedrock, typically at depths of five feet bgs or greater. There are no observed open water bodies or areas of standing water on the Site that are fed by groundwater. Thus, incidental direct contact to surficial groundwater discharge is not a complete pathway.

A portion of the overall groundwater flow likely discharges from along the eastern boundary of the Site to the Marcus Hook Creek. Site-specific numeric values for groundwater discharge to surface water were developed and presented in the RI/RA Report to assess threshold acceptable risk for this pathway for human and ecological receptors. Groundwater discharge modeling (SW Load) and groundwater/surface water mixing modeling (Cormix) was completed to estimate the allowable groundwater discharge that would not cause an exceedance of applicable surface water criteria (i.e., the lower of the PADEP Chapter 16/93 surface water standards and the Delaware River Basin Commission [DRBC] surface water quality criteria).

The attainment groundwater data from the point of compliance wells along the downgradient property boundary indicate that all reported concentrations were in compliance with these standards and no further action is necessary for the groundwater to surface water discharge pathway.

4.2.2.3 Soil-to-Groundwater

Several regulated substances were reported at concentrations above the non-residential soil-to-groundwater MSCs, including antimony, arsenic, lead, manganese, thallium, vanadium, mercury, 1,2,4-TCB, benzo(a)pyrene, naphthalene, and Aroclor-1260. Aroclor-1260 and mercury were not detected in any groundwater sample above their respective MSCs during any of FMC’s groundwater sampling events; therefore, pursuant to 25 Pa. Code §250.308(d), Aroclor-1260 and mercury meet the SHS for soil-to-groundwater through equivalency demonstration.

Many of the remaining substances were not present in groundwater on or downgradient of the Lots where they were reported above soil-to-groundwater MSCs in soil; however, as further confirmation that the soil-to-groundwater pathway is not a concern, site-specific soil-to-groundwater numeric screening levels were also calculated, as described in the RI/RA Report. Site-specific soil-to-groundwater numeric screening levels were derived based on the equations and default input parameters provided in 25 Pa. Code §250.308 and using the site–specific groundwater numeric standard as the target groundwater concentration.

No soil samples had reported concentrations above the soil-to-groundwater site-specific numeric screening levels, further confirming that leaching from soils is not a pathway of concern for the Site.

4.2.3 Risk Calculation for Current and Future Exposure Scenarios

Quantitative assessment of carcinogenic and non-carcinogenic risk for relevant potential site use scenarios were also evaluated. Based on the current and anticipated future land use of the Site, the potential receptors, media and pathways evaluated as part of the risk assessment included:

- Non-residential adult commercial/industrial workers - surface soil (0–2 feet below ground surface [bgs]); potential vapor intrusion to future buildings from soils, overburden groundwater and measured soil vapor
- Adult construction workers - surface and subsurface soil (0-15 feet bgs); overburden groundwater
- Adult utility workers - surface and subsurface soils (0-15 feet bgs); overburden groundwater
- Adolescent and adult trespassers - surface soil (0–2 feet bgs)

A complete evaluation of site-related exposure pathways is presented in the RI/RA Report.

PA Act 2 default exposure factors were generally used, where available, for calculating COPC-specific chronic daily intakes (doses) for the receptors and pathways selected for quantitative evaluation in the HHRA. Because Act 2 defaults are not available for adolescent trespasser or construction/utility worker populations, USEPA recommended values and/or values based on professional judgment were used to estimate chronic daily intakes. Toxicity criteria used in the risk assessment were obtained from the PADEP website. The non-residential worker exposure frequency was calculated based on an evaluation of site-specific weather conditions. A full description of the data screening, exposure factors, and risk calculations utilized are presented in the HHRA, as Appendix P to the RI/RA Report.

4.2.3.1 Scenario Risk Calculations

The quantitative cumulative risk estimates show that there are no non-carcinogenic hazards greater than the acceptable threshold of one (1.0) for any receptor population, except for the construction worker due to the ingestion of metals, including vanadium, in soils. Additionally, the excess cancer risks were within PADEP's acceptable risk range (between one in 10,000 [1E-04] and one in one million [1E-06]) for all receptor populations, except for non-residential workers as a result of Aroclor-1260 concentrations in surface soil (CR = 1.5E-04).

Risk from site-related exposure to lead was evaluated using USEPA's Adult Lead Model (USEPA, 2017). The ALM modeling, including input parameters, are described in Section 4.4 of the HHRA (Appendix P of the RI/RA Report). In summary, potential exposure to the average lead concentration across the Site (1060 mg/kg) results in a 0.1% probability that fetal blood lead level will exceed the target, which is less than the target probability of 5%. Potential risks to infant/younger child trespassers are considered de minimis or non-existent due to the fact that the site is currently non-residential/commercial and will be restricted to this use in the future, children (0 – 6 years old) have not been observed at the Site by FMC representatives during investigation activities, and it is unlikely that children (0 – 6 years old) will have recurring unsupervised access to an industrial/commercial site. Consequently, lead in surface soil was determined to comply with the SSS.

The results indicated that remediation and/or institutional controls may be necessary to mitigate the potential risk to construction workers, which are associated to a significant degree with ingestion of vanadium, in soils. It is noted that the vanadium oral RfD toxicity value cited by PADEP is currently under review, and modification of the oral RfD is forthcoming at an undetermined date. This potential change would affect the non-carcinogenic risk for the construction worker, and as discussed in the uncertainty evaluation in the human health risk assessment (Appendix P to the RI/RA Report), would result in a non-carcinogenic risk within the acceptable risk range for the construction worker (<1.0).

Additionally, remedial action to address Aroclor-1260 in soil may be warranted. An exposure point concentration (EPC) for Aroclor-1260 of 688.5 mg/kg was calculated, which was driven primarily by reported concentrations of Aroclor-1260 in soil in Lot 17. This is an area of the Site where MHBCC reportedly conducted transformer salvage operations subsequent to FMC ownership. Remedial measures to eliminate the direct contact pathway to these soils in Lot 17 (e.g., removal, capping) were identified as an effective way to mitigate this risk. There are also two surface soil samples that were collected in Lot 21 that had elevated Aroclor-1260 concentrations. While removal of these soils is not necessary to mitigate the unacceptable risk, the soils will be included as part of the remedial measures to address U.S. EPA concerns over these two samples representing potential ”hot spots” relative to the remaining data set. This additional excavation area will further reduce the site-wide EPC. To evaluate the residual risk following remediation of soils and predicted compliance of the SSS, a predictive post-remediation residual risk assessment was completed as described in Section 4.3 and Appendix A.

4.2.3.2 Soil Vapor Intrusion

Johnson & Ettinger (J&E) modeling was performed to assess potential vapor intrusion (VI) risk from soil for the non-residential worker scenario. Since a risk assessment was performed for the Site and there is a potential for limiting conditions for future buildings (i.e., preferential pathways from on-site utilities) to exist, sample locations and constituents which exceeded 1/10th the generic soil to groundwater MSCs or 1/10th the groundwater MSCs were identified as potential VI concerns to be assessed via the modeling. The modeling was performed using default input parameters and assumptions, including default building dimensions for future development. It is noted that mercury was identified as a substance of potential VI concern, but since PADEP has not published J&E model input parameters for mercury, mercury was not modeled; rather, it was presumed that any sample location with concentrations above 1/10th the generic mercury soil to groundwater MSC represented a potential VI risk.

No locations in overburden groundwater posed unacceptable VI risk. The modeling shows that there is a potential risk to non-residential commercial/industrial workers from specific soil samples on portions of Lots 4, 11, 12, 17, 22, and 24. As noted above, since J&E modeling was not performed for mercury, there is an assumed potential mercury risk on portions of Lots 4, 8, 9, 10, 11, 12, 13, 17, 19, 20, 21 and 24. Because there are currently no occupied buildings within the PADEP-defined proximity distances (i.e., within 100 feet of soil containing volatile substances exceeding applicable risk screening levels or within 30 feet of utilities serving as preferential pathways traversing those areas) to the identified soil sample locations on these lots, the predicted potential risk pertains to future development and use.

The modeled non-carcinogenic hazard is greater than the acceptable threshold of one (1.0) for non-residential commercial/industrial workers as a result of 1,2,4-TCB (Lot 4) and naphthalene (Lots 11, 12, 22 and 24), and the modeled cancer risk is above the acceptable risk range for 1,4-dichlorobenzene (Lot 17) and naphthalene (Lot 11, 12, 22, 24). Calculated risks for all other receptors are within PADEP’s acceptable limits.

Based upon the conservative J&E modeling conducted (and that assumed for mercury), action is required to either confirm or mitigate the potential vapor intrusion risk to non-residential commercial/industrial workers resulting from 1,2,4-TCB, 1,4-dichlorobenzene, naphthalene and mercury in soil. For instance, to confirm the potential risk, once redevelopment plans are more clearly defined, the J&E modeling could be rerun using actual building dimensions, particularly if the dimensions are larger than the default dimensions (10 meters by 10 meters by 2.4 meters tall), to determine if the predicted potential risk still exists. By way of example, rerunning the J&E model using a warehouse-sized building similar in size to that currently envisioned based on discussions with the anticipated re-developer of a portion of the Site (290 meters by 128 meters by 6 meters tall), the predicted non-carcinogenic and carcinogenic risks drop two to three orders of magnitude and would be within PADEP’s acceptable risk range for locations within that footprint. Alternatively, to mitigate

the potential risk (including that from mercury), a vapor barrier compatible with the substances of potential concern and/or sub-slab depressurization system could be installed as part of future building(s) in these lots.

For purposes of this Cleanup Plan, FMC intends to establish institutional controls to require reassessment using actual building dimensions and/or updated input parameters, additional sampling, and/or installing engineering controls to mitigate potential future VI risk from soils on Lots 4, 8, 9, 10, 11, 12, 13, 17, 19, 20, 21, 22, and 24.

4.3 Remedial Objectives

Based on the results of the RI/RA, the following remedial objectives have been defined for soil and groundwater to mitigate potential risks to current and/or future receptors.

4.3.1 Soil Remedial Objectives

The remedial objectives for site soils include:

1. Mitigate the potential direct contact risk to non-residential/commercial workers related to Aroclor-1260 impacted surface soils to ensure site-wide residual risk is within PADEP's acceptable limits (i.e., 1E-06 to 1E-04 excess cancer risk, and Hazard Quotient $\leq$1).
2. If needed, mitigate the potential unacceptable direct contact (ingestion) risk to construction workers related to soils impacted with metals, including vanadium (see Section 6.2).
3. Address the potential vapor intrusion risk within occupied buildings on portions of lots 4, 8, 9, 10, 11, 12, 13, 17, 19, 20, 21, 22, and 24.
4. Restrict disturbance of and maintain the integrity of the concrete cover that currently exists over the former carbon disulfide storage moat.
5. Assure the remedy remains protective under current and future use scenarios by maintaining non-residential land use for all parcels/Lots comprising the Site.

An evaluation of remedial alternatives to address Remedial Objective 1 is presented in Section 5; the detailed proposed remedy is presented in Section 6. Due to the presence of PCBs, FMC also considered in its evaluation the applicability of USEPA's Toxic Substances Control Act (TSCA) regulations pertaining to the remediation of PCBs. TSCA PCB remediation regulations, as set forth in 40 CFR 761.61, included default ("self implementing") cleanup standards (40 CFR 761.61(a)), performance based standards (40 CFR 761.61(b)), and a risk-based approach (40 CFR 761.61(c)). FMC is proposing to implement a risk-based cleanup, pursuant to 40 CFR 761.61(c), which requires USEPA review and approval.

Administrative controls will be implemented to achieve for Remedial Objectives 2, 3, 4 and 5, as described in Section 6.

4.3.2 Groundwater Remedial Objectives

The remedial objectives for groundwater are:

1. Mitigate the exposure to groundwater that contains regulated substances above the non-residential groundwater MSCs;
2. Verify that the Site-Specific groundwater standards established for protection of surface water quality based on site groundwater discharge have been achieved.

This Remedial Objectives will be met through administrative controls to restrict future human use or consumption of groundwater for all parcels comprising the Site. Also, groundwater sampling will be performed until the point of submittal of the Final Report to verify that the numeric Site-specific groundwater standards protective of discharge to surface water have been achieved. Further details regarding the administrative controls and groundwater monitoring are described in Section 6.

5. SOIL REMEDIAL ALTERNATIVES

In accordance with the requirements under Act 2, FMC has evaluated the following potential remedial alternatives to mitigate the direct contact potential to Aroclor-1260 impacted surface soils to ensure residual risk is within PADEP's acceptable limits (i.e., 1E-06 – 1E-04 excess cancer risk, and Hazard Quotient $\leq$1):

1. No Action
2. Soil Cover with Institutional Controls
3. Focused Excavation and Off-Site Disposal

FMC has evaluated these alternatives with respect to criteria set forth in Section 304(j) of Act 2, 35 P.S. § 6026.304(j), which include the following:

- Long-term risks and effectiveness of the proposed remedy.
- Reduction of the toxicity, mobility or volume of regulated substances.
- Short-term risks and effectiveness of the remedy, including the short-term risks that may be posed to the community, workers or the environment during implementation of the remedy and the effectiveness and reliability of protective measures to address short-term risks.
- The ease or difficulty of implementing the proposed remedy, such as commercially available remedial measures and degree of difficulty associated with constructing the remedy.
- The cost of the remediation measure, including capital costs, and operation and maintenance (O&M) costs.
- The incremental health and economic benefits by comparing those benefits to the incremental health and economic costs associated with implementation of remedial measures.

Based on the evaluation of the alternatives against the above criteria, Alternative 3 – Focused Excavation and Off-Site Disposal is the recommended alternative. A description of the remedial alternatives that were considered and the evaluation of these alternatives are provided below.

5.1 No Action

This alternative would involve taking no further actions to address soils with elevated concentrations of Aroclor-1260. While this alternative would be easily implemented, would have no or minimal costs, and no short-term risks associated with implementation, it would not meet the remedial objective of mitigating the direct contact risk posed by the Aroclor-1260 impacted surface soils. Therefore, FMC eliminated the No Action alternative from further consideration.

5.2 Soil Cover with Institutional Controls

This alternative would involve installing a 2-foot soil cover over Aroclor-1260 impacted soils in Lot 17 to eliminate the potential direct contact pathway. A similar cover would be placed over Aroclor-1260 impacted soils in Lot 21, to address comments received from EPA. The soil cover would be composed of 18-inches of cover soil, which would be placed, graded and compacted for long-term stability, and 6-inches of topsoil, which would be seeded to establish vegetative cover to limit erosion. An alternative cover material (e.g., asphalt, concrete) could be used in lieu of soil. A deed notice identifying the areas where the cover and affected material remains, and restricting the disturbance of the cover and the underlying soil, would be included with the deed for the property and filed with the Delaware County recorder of deeds. Fencing and signage may also be required to restrict access and to comply with TSCA requirements. Routine post-construction O&M activities for the cover would include periodic inspection and repair of erosion or other damage to the cover.

This remedial alternative would meet the remedial objective of mitigating the direct contact exposure pathway associated with the affected material, as the affected soil posing risk under the non-residential worker scenario would be at depths of greater than two feet below ground surface. This alternative would be relatively easy to implement and would be reasonably cost effective, both in terms of capital cost and O&M costs. The short-term risks associated with implementation, such as increased vehicle traffic and increased potential for dust emissions during grading activities, would be relatively minor and manageable with conventional controls (e.g., water spray for dust suppression).

The cover alternative presents some longer-term risk concerns because the impacted soils remain in place and could be exposed if the cover was compromised in the future, such as through site development activities. Additionally, because the cover needs to remain into perpetuity, it could reduce the area available to the owner for future redevelopment depending on the specifics of the re-development plans.

5.3 Focused Excavation and Off-Site Disposal

A focused excavation and off-site disposal alternative would involve excavating Aroclor-1260 impacted surface soil (0-2 feet bgs) from portions of Lot 17 and disposing of the soil off-site at an appropriately permitted treatment/disposal facility. Aroclor-1260 impacted surface soils in Lot 21 would also be excavated and disposed of off-site, to address EPA comments.

Waste profiling and disposal facility acceptance could be completed prior to excavation to facilitate direct loading of trucks, or soils could be excavated and staged while awaiting waste profiling and disposal facility acceptance. Post-excavation samples would be collected in accordance with Act 2 protocols and incorporated into the post-remediation residual risk calculations. The excavation would be backfilled with 2 feet of clean soil or dense graded aggregate depending upon the desired final surface condition. Soil backfill would be seeded to provide long-term erosion control; dense graded aggregate backfill would not require seeding. Soil backfill would be characterized to confirm that it is suitable clean fill and dense graded aggregate would be certified clean/virgin from the quarry source. If soil backfill is used, the characterization sample data would be used in post-remediation residual risk calculations, and if dense graded aggregate is used, a presumed concentration of 0.1 mg/kg of Aroclor 1260 will be conservatively used since aggregate will be from a virgin source and aggregate is not readily sampled and analyzed for environmental characterization.

This remedial alternative would meet the remedial objective of mitigating direct contact risk by physically removing the impacted material and disposing of it off-site. This alternative is implementable using conventional, readily available construction equipment (e.g., dozers, excavators and dump trucks). The short-term risks associated with implementation, such as increased vehicle traffic and increased potential for dust emissions during excavation and grading activities, would be manageable using conventional means (e.g., water spray to control dust).

The capital cost for this alternative can be moderately high due to the off-site transportation and disposal costs, but the O&M costs would be low. Short-term post-construction O&M activities would include periodic inspections of the revegetated areas until stabilized, followed by removal of erosion and sedimentation controls. No long-term O&M or use restrictions for the area would be necessary.

The excavation and off-site disposal remedial alternative is implementable, has manageable short-term risks, and would achieve the remedial objective by physically removing the impacted material. FMC has therefore selected this as the remedial alternative for Site soils. A more detailed evaluation of this alternative is presented below.

5.4 Selected Remedy Evaluation

The selected remedy is focused excavation and off-site disposal of surface soils from portions of Lot 17 as necessary to reduce site-wide residual risk from Aroclor-1260 to acceptable levels. FMC will also excavate and dispose of off-site Aroclor-1260 impacted surface soils from a portion of Lot 21, to address comments received from EPA. The remedial alternative is designed to eliminate the direct

contact exposure pathway to Arocor-1260 and to ensure site-wide residual risk is within PADEP's acceptable limits (i.e., 1E-06 – 1E-04 excess cancer risk, and Hazard Quotient ≤1). Deed controls required to address other potential exposure pathways to soil and groundwater are discussed in Section 6.2.

5.4.1 Remedy Overview

The limits of excavation include surface soils (0-2 feet bgs) from the two areas on Lot 17, as shown on Figure 3, and the area on Lot 21, as shown on Figure 4. The limits of excavation on Lot 17 include soils characterized by samples L17-SB-16B, L17-SB-13B, L17-SB-12, L17-SB-10, L17-SB-09, L17-SB-08, L17-SB-04, and L17-SB-02; the limits of excavation on Lot 21 include soils characterized by samples L21-SB-06, L21-SB-08 and L21-SB-11. The limits of excavation extend laterally from these sample locations to the nearest sample that attains the direct contact MSC or to an existing structure such as a utility tunnel, foundation or footer.

The excavation dimensions for the two areas in Lot 17 are approximately 4,270 sq. ft, and 460 sq. ft. Based upon these dimensions and a 2-foot excavation depth, a total of approximately 315 cubic yards (cy) of soil will be excavated and disposed of off-site (an estimated 290 cy from the northern area and 25 cy from the southern area). The excavation dimensions for the area in Lot 21 is approximately 1,090 sq. ft.), with an estimated volume of about 80 cy.

In accordance with the TSCA regulations (40 CFR 761.61(a)(5)(i)(B)), the impacted soil can be disposed of at a permitted hazardous waste (RCRA Subtitle C) or nonhazardous waste (RCRA Subtitle D) landfill, depending upon PCB concentration. This remedial alternative is readily implementable using conventional construction equipment.

5.4.2 Long-Term Risks

The long-term risks posed by PCBs in soil at the Site would be significantly reduced because the most significantly impacted soil will be permanently removed from the Site and there will be no potential future exposure concern.

To evaluate the degree of residual long-term risk following remediation of certain PCB-impacted surface soil within Lot 17 and Lot 21, FMC completed a predictive residual risk assessment (Appendix A) utilizing the same assumptions and procedures as those in the HHRA presented as Appendix P to the RI/RA Report. For this residual risk assessment, FMC presumed that the surface soils within the areas characterized by samples L17-SB-16B, L17-SB-13B, L17-SB-12, L17-SB-10, L17-SB-09, L17-SB-08, L17-SB-07, L17-SB-04, and L17-SB-02 (see Figure 3) and L21-SB-06, L21-SB-08 and L21-SB-11 (see Figure 4) would be excavated and disposed of off-site.

It is noted that although the calculated unacceptable direct contact risk for the non-residential worker is based upon exposure to surface soils (0-2 feet below grade), and the proposed remediation will remove the entire 0-2 foot soil depth interval and replace it with 2 feet of clean backfill, FMC will collect post-excavation soil samples in accordance with Act 2 protocols. The post-excavation sample results will be incorporated into the post-remediation residual risk that will be used to confirm attainment for the non-residential worker. Backfill concentrations (determined through sampling or documented quality or certification information provided by the supplier) will also be included in the data set for the residual risk calculations. A number of representative backfill data points equal to the number of characterization samples previously collected within the areas to be excavated (12) will be substituted into the post-excavation data set.

The site-wide EPC (i.e., 95% UCL for Aroclor-1260) for surface soil (0-2 feet) was recalculated presuming post-excavation soil sample Aroclor-1260 concentrations from the 0-2 foot interval will be below 46 mg/kg and the clean fill soil or dense graded aggregate has an Aroclor-1260 concentration of 0.1 mg/kg. The resultant site-wide EPC is 8.99 mg/kg, which results in a corresponding cumulative carcinogenic risk of 5.7 E-06 for the commercial/industrial worker, which is within PADEP's acceptable limit. Therefore, remediation of soil from the three targeted areas illustrated on Figures 3 and 4 is

achievable and should effectively mitigate the potential risk from direct exposure to soils at the Site for the future non-residential worker. Final residual risk calculations will be provided in the Act 2 Final Report utilizing the actual post-excavation sampling results relevant for the depth at which each randomly-determined post excavation sample is collected.

5.4.3 Short-Term Risks

The short-term risks associated with implementing this remedial alternative are primarily associated with air-borne dust, erosion, and vehicle and heavy equipment operation. All these short-term risks can, due to the relatively shallow and small sizes of the excavations, be effectively managed and controlled during the construction work using measures such as dust controls, maintaining appropriate erosion and sedimentation controls, and implementing an appropriate Health and Safety Plan. Dust action levels can be derived based on toxicity information for Aroclor-1260 and actively monitored during the work execution to ensure workers are not exposed to unsafe levels of regulated substances during the course of work execution. Public access to the work area will be restricted with temporary fencing or other suitable barriers and signage.

Unintended migration of impacted soil outside of the work area due to erosion or during loading and/or transport is a potential concern if not managed properly. Best management practices (BMPs), such as erosion controls (e.g., compost filter socks), rock construction entrances, vehicle decontamination, and properly covering truck beds, can be used to mitigate this concern.

Due to the existing commercial and industrial activities surrounding the Site, heavy truck traffic is common in the area, and the truck traffic added by the remediation should not cause undue nuisance to the community. Based upon the approximate total excavation volume (400 cy), 18-20 truckloads (assuming 20-22 cy/truckload) will be required to transport the soil to the landfill, and similar number of truckloads will be required to deliver clean fill to the Site. Assuming the work is completed in one week, this volume would result in only about 7-8 additional trucks per day.

5.4.4 Costs & Benefits

While the capital cost may be comparatively high due to the off-site disposal cost, the expected long-term O&M costs are negligible, as there will be no engineering controls requiring maintenance. The absence of engineering controls (e.g., cap) and associated land use restrictions also permits greater redevelopment flexibility for the property owner.

Overall, the health and economic benefits (e.g., risk reduction, redevelopment potential) associated with the implementation of this remedy offset the potential short-term risks and costs.

6. CLEANUP DESIGN AND RELATED ACTIVITIES

This section presents the planned remedial elements for the Site, including active remedial activities for the soils on Lots 17 and 21, planned administrative controls (e.g., land use limitations), and approach to demonstrate attainment of the selected standards.

6.1 Soil Remediation - Lots 17 and 21 Surface Soil Excavation & Off-Site Disposal

The selected excavation and off-site disposal remedy will entail the following major tasks:

- Planning and preparation – property owner coordination and access permission; health and safety planning; remediation contractor procurement; identifying clean backfill source; and obtaining waste disposal approvals.

- Site preparation – mobilizing and setting up site facilities and access controls; protecting existing structures; and installing erosion and sediment controls.
- Soil excavation and loading – laying out excavation limits; excavating soil to the predefined limits; loading trucks for off-site transport; and collection of post-excavation samples
- Backfilling and restoration – placing, grading and compacting backfill; seeding and mulching; and demobilization.

These tasks are described in further detail below.

6.1.1 Planning and Preparation

6.1.1.1 Property Owner Coordination and Access Permission

KCA owns Lots 17 and 21, as well as the adjacent Lots 2, 6, 7, 15, 16, 18, 20, and 23 to or through which FMC may need access during the remediation. FMC is actively coordinating with KCA regarding the remediation and access to KCA's property to implement the remediation. FMC has obtained KCA's written agreement regarding permission to access their property to perform the remediation (Appendix C). FMC understands that KCA intends to sell its property to Duke Realty; FMC will obtain a written access agreement with Duke Realty prior to implementation of the Cleanup Plan.

As noted in Section 2 of this Cleanup Plan, FMC is also communicating with the other property owners, the Borough of Marcus Hook representatives, and the community so they are aware of scope and schedule for the cleanup work.

6.1.1.2 Site-Specific Health and Safety

The Site Health and Safety Plan (HASP) will be updated to include the potential physical, chemical and biological hazards associated with the soil remediation. The HASP will conform to applicable federal, state, and local laws, regulations and ordinances, including 29 CFR 1910.120. On-site personnel participating in the soil remediation work will be required to comply with HASP throughout performance of work. The HASP will provide detail regarding items such as, but not limited to, personal protective equipment (PPE), monitoring requirements, training requirements, dust management (monitoring, action levels, and controls), decontamination procedures, etc.

6.1.1.3 Remediation Contractor Procurement

Upon PADEP and USEPA approval of this Cleanup Plan, bids will be solicited from qualified environmental remediation contractors. The scope of work will include soil excavation, transportation, disposal, backfilling, and necessary related support activities. As part of the scope of work, the selected remediation contractor will need to identify a source of clean fill as defined by PADEP's Management of Fill Policy.

6.1.1.4 Subsurface Utility Clearance and Mark-out

Based upon a review of historical site sewer plans and drawings, there appears to be sewers and tunnels that run near or through the currently proposed excavation areas. It appears that most of these features are deeper than 2 ft bgs, but there are some segments or sections that may be shallower and could be near the bottom of the excavation. In addition, there may be former building slabs or structures present within or near the excavation area. Therefore, a geophysical survey will be performed of the proposed excavation areas in an effort to locate and mark-out the utilities and remnant building structures, and verify through geophysical means the depth to the features to the extent practicable. FMC will coordinate with the property owner to confirm which, if any, of the sewers need to be retained and protected.

6.1.1.5 Waste Profiling

To facilitate direct/live loading of excavated soil into the trucks for off-site transport and disposal, waste disposal profiling and acceptance will be completed prior to mobilization.

In accordance with TSCA PCB bulk remediation waste disposal requirements (40 CFR 761.61(a)(5)(i)(B)(2)), "Unless sampled and analyzed for disposal according to the procedures set out in §§761.283, 761.286, and 761.292, the bulk PCB remediation waste shall be assumed to contain ≥ 50 ppm PCBs." Soils with PCB concentration equal to or greater than 50 mg/kg must be disposed of in a hazardous waste landfill (RCRA Subtitle C landfill); soils that contain less than 50 mg/kg PCBs may be disposed of in a non-hazardous waste landfill (RCRA Subtitle D landfill).

Based upon the RI sample results, it is anticipated that much of the excavated soil will have PCB concentrations at or greater than 50 mg/kg. Therefore, it is assumed all excavated soils will have 50 mg/kg PCBs or greater, and will be disposed of at a permitted hazardous waste landfill.

The candidate disposal facility(ies) will be contacted to confirm if they require additional data to support waste profiling and approval process, and if so, the necessary number of samples and required suite of analyses.

6.1.2 Site Preparation

The remediation activities will be relatively short in duration and confined to Lots 17 and 21 and adjoining lots. FMC currently maintains a site trailer with temporary utilities and facilities along the border of Lot 16 and 17, and additional infrastructure is not anticipated for this work.

Equipment and materials will likely be staged on or near Lot 17. Materials and equipment will be stored and secured within the work area at the end of each work day and will not unduly disrupt other tenants' activities at the Site. The remedial contractor will be responsible for providing security of its equipment and materials.

6.1.2.1 Access

Access to the work area will be controlled using the existing chain-link fence and temporary barriers (e.g., Jersey barriers, temporary fencing). Vehicles will access the work area via on-site paved roads, and temporary gravel access roads, if necessary.

6.1.2.2 Protection of Existing Vegetation and Structures

Vegetation and surface features will be cleared where necessary to complete soil remediation. FMC will coordinate with the property owner regarding other vegetation and/or other features near the work zone that will require protection during the work (e.g., fencing, sewer inlets/manholes).

6.1.2.3 Soil Erosion and Sediment Pollution Control

The current proposed area of excavation is approximately 5,280 square feet, and the overall area of earth disturbance is approximately 33,600 square feet. Pursuant to Pennsylvania's erosion and sediment (E&S) control regulations (PA Code Title 25 Chapter 102), earth disturbance less than 1.0 acre do not require a National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges Associated with Construction Activities. Earth disturbances of 5,000 square feet or greater require a written E&S plan. Additionally, since the earth disturbance is greater than 5,000 square feet, but less than one (1) acre, a modified storm water management site plan will need to be prepared per Borough of Marcus Hook Storm Water Management Ordinance (Chapter 174.6).

To the extent practicable earth disturbance activities will be implemented in accordance with the following:

- Minimize the extent and duration of the earth disturbance.
- Maximize protection of existing drainage features and vegetation.

- Minimize soil compaction.
- Implement and maintain E&S best management practices (BMPs)

The extent and duration of earth disturbance will be relatively minor in consideration of the small amount of excavation (approximately 400 cy) and backfill required; FMC anticipates that the earth disturbance activities should be completed in about one week.

E&S BMPs will be installed in accordance with PADEP's *Erosion and Sediment Pollution Control Program Manual* (ESPCP Manual, March 2012). Sediment filter logs or compost filter socks will be installed along the downgradient slopes of both excavation areas, as indicated on the engineering drawings (Appendix B), as well in front of any nearby sewer inlets. A rock construction entrance and a temporary decontamination pad will be installed at the entrance to the work area, also as indicated in Appendix B. Details for the installation and maintenance of the filter socks/tubes, rock construction entrance, and decontamination pad are also provided on the engineering drawings in Appendix B.

It is anticipated that excavated soils will be live loaded into trucks for off-site transport and disposal and backfill material will be placed directly at the excavation, thereby eliminating the need for stockpiles. However, if stockpiles are used, controls, such as filter socks/tubes, hay bales and/or tarps, will be used to mitigate uncontrolled migration of excavated soils and/or backfill materials, as appropriate.

Excavations will be backfilled with a dense graded aggregate (e.g., PA DOT 2A Modified aggregate) or clean fill soil. If the excavation is backfilled with soil, the surface will be seeded and mulched, in accordance with the ESPCP Manual; if the excavation is backfilled with aggregate, seeding will not be necessary.

6.1.3 Excavation, Loading & Transport

The limits of excavation will be field staked based upon the RI samples, as shown on the engineering drawings in Appendix B.

Soil will be excavated to the lateral limits and to a depth of 2 ft bgs. Remnant building structures, such as slabs and footers, and large debris will not be excavated for off-site disposal. The excavations will be field measured to verify they fully extend to the design limits and will then be surveyed by a professional land surveyor licensed in Pennsylvania.

Excavated soil will be loaded directly into the trucks for off-site transport and disposal. To prevent truck tires from contacting potentially impacted soils, trucks will not be permitted to drive directly on soils within the excavation area. A temporary truck loading area may be created using gravel, planks or similar to accommodate the trucks near the excavation area. Dust will be monitored and controlled by keeping the soil and work areas sufficiently moist to prevent visible dust from migrating beyond the work zone.

Soil will be transported by licensed, permitted waste haulers. All loads will be accompanied by proper waste manifest documentation. All trucks will be fully tarped, placarded as required, and visually inspected for site soils on tires and the external truck bed and body before departing the Site. If site soils are visible on tires or the external truck bed/body, the truck will be decontaminated in the decontamination pad using dry techniques (e.g., brush, shovel for treads) to the extent practical, and wet techniques (e.g., pressure washer) if needed. Decontamination residues will be collected and consolidated with the soils for off-site disposal.

As noted above, FMC anticipates that most of the excavated soil will have PCB concentrations at or greater than 50 mg/kg. Therefore, unless testing demonstrates otherwise, all excavated soil is planned for disposal at a hazardous waste landfill. Based upon the currently proposed excavation limits, approximately 400 cy of soil will be excavated and transported off-site for disposal. This volume of soil will require about 18-20 dump trailer loads (assuming 20-22 cy/load).

6.1.4 Post-Excavation Sampling

Post-excavation soil samples will be collected following excavation to the limits shown on the engineering drawings (Appendix B). The post-excavation soil samples will be collected in accordance with Act 2 protocols, as follows:

- The sample area will encompass the entire exposed post-excavation surface, and will include both the base and the sidewalls of the excavation;
- The number of samples for each remediated area will be determined by the volume of soil removed per PADEP's requirements (Title 25 Pa Code 250.703(d)). Based upon the currently established areas of excavation, 12 post-excavation samples will be collected from the larger remediation area and eight post-excavation samples will be collected from each of the two smaller remediation areas (i.e., a total of 28 post-excavation soil samples); and
- The sample locations within the entire post-excavation surface will randomly be selected using PADEP's systematic random sample approach. PADEP's Microsoft Excel-based tool to generate random sample locations will be utilized;

Samples will be analyzed for Aroclor 1260 via SW-846 8082A.

The post-excavation soil sample results will be incorporated into the post-remediation residual risk assessment, which will be used to verify that the identified potential human health risk has been adequately mitigated. The dataset for the post-remediation residual risk assessment will include all the Site characterization samples, less the samples that were from soil excavated as part of the remediation, and will also include the post-excavation samples and the data representing three samples of the clean, imported backfill based on laboratory sampling or information provided as certifications by the supplier.

Post-excavation samples will be incorporated into the data sets for the appropriate risk scenarios based on depth as follows:

- Samples from less than 2 feet depth (i.e., sidewall samples) will be incorporated into the commercial worker, utility worker and construction worker scenarios; and
- Samples from greater than 2 feet depth (i.e., excavation floor samples) will be incorporated into the utility worker and construction worker scenarios.

This approach is in accordance with Act 2 protocols and is appropriate to support the TSCA risk-based closure in that it will provide a statistically relevant sample population to support the site-wide post-remediation residual risk assessment to demonstrate that the identified potential human health risk has been adequately mitigated. USEPA has indicated concurrence with the approach above to satisfy demonstration of TSCA risk-based closure requirements via email correspondence on January 12, 2022.

6.1.5 Final Restoration and Demobilization

As noted above, excavations will be backfilled with a dense graded aggregate (e.g., PA DOT 2A Modified aggregate) or clean fill soil. If the excavation is backfilled with soil, the surface will be seeded and mulched, in accordance with the ESPCP Manual. The E&S controls (e.g., filter socks/tubes) will remain until vegetation is established, at which point they will be removed. If the excavation is backfilled with aggregate, seeding will not be necessary, and the filter socks/tubes will be removed following backfilling.

Other temporary construction support features, including the rock construction entrance, decontamination pad, and truck loading pad will be removed. Stone from these features will either be removed from the Site or will be placed and graded into the surrounding areas (e.g., access roads) if acceptable to the property owner.

6.2 Institutional Controls & Cooperation of Third Parties

FMC developed the soil cleanup plan based upon the results of the comprehensive RI/RA, which considered the current and future non-residential use of the Site. To ensure that the remedy will remain protective of human health and the environment, institutional controls in the form of deed notices and restrictions will be recorded with or made a part of the deeds for the site parcels (Lots) under the provisions of the Uniform Environmental Covenants Act (UECA). These institutional controls will include:

1. Deed controls for each parcel (a.k.a. Lot) at the Site restricting the land use to non-residential uses as defined in PA Land Recycling and Environmental Remediation Standards Act (Act 2);
2. Potential deed controls requiring construction workers who may be exposed (direct contact via ingestion) to metals impacted soils to utilize health and safety practices to mitigate exposure to soils that may pose a potential unacceptable non-carcinogenic risk. As discussed in Section 4.2.3.1, the risk to construction workers is attributable to a significant degree from vanadium in soils. The applicable toxicity information referenced by PADEP for vanadium is currently under review, and this potential change may reduce the calculated risk levels for the future construction worker to within acceptable ranges. Thus, a final determination as to the need for a deed control relating to metals exposure, including vanadium, in soil will be made during the residual risk assessment to be completed as part of the Act 2 Final Report. The deed control will specify the utilization of appropriate Occupational Safety and Health Administration (OSHA) training and use of appropriate personnel protective equipment (PPE) when handling Site soils to mitigate potential ingestion of the soils. These requirements would be provided in a Health and Safety Plan developed relative to work specifically in these areas. The deed controls may also provide that the potential risk may be reassessed in the future using updated/current risk assessment input parameters (e.g., updated vanadium oral reference dose) and/or sampling data to determine the necessity for training and PPE.
3. Deed controls for Lots 4, 8, 9, 10, 11, 12, 13, 17, 19, 20, 21, 22, and 24 requiring, in the event of planned future building installation or occupancy within 100-feet of the subject sample locations, reassessment of potential vapor intrusion risk using actual building dimensions, updated modeling inputs, or further sampling data, and/or installation of engineering controls compatible with constituents of potential concern to mitigate potential future vapor intrusion risk;
4. Deed controls for each Lot at the Site preventing the installation of on-site groundwater production wells and restricting human use or consumption of groundwater; and
5. Deed controls, along with a Post-Remediation Care Plan, for Lot 19 to restrict the disturbance of the former carbon disulfide storage moat and the associated concrete cover, and to require the inspection and maintenance of the concrete cover.

FMC has consulted and coordinated with the current and anticipated future property owners regarding the proposed cleanup plan and required deed notices on their respective property deeds. Additionally, FMC has advised the property owners that site soils do contain regulated substances, and proper health and safety procedures and controls (e.g., PPE) should be considered during site soil handling. In addition, FMC has advised the property owners that they will need to determine whether other laws and regulations apply to their intended handling and management of site soils (e.g., PADEP's Management of Fill Policy). Documentation of third party cooperation is provided in Appendix C and draft deed notice language is presented in Appendix D. Proposed language for the potential deed notice related to limiting exposure via ingestion to metals in soil, including vanadium, will be provided in the Final Report, once it has been determined if such a notice is needed. The finalized deed notices/UECA covenants will be provided following PADEP approval of the Final Report, as per current PADEP requirements.

FMC has and will continue to consult and coordinate with the Borough of Marcus Hook representatives to keep them and the community apprised of project status and cleanup plans and provide them the opportunity to provide input.

6.3 Post Remediation Care

As required under PA Code Section 250.410(b)(5), documentation of proposed post-remediation care requirements should be included in a Cleanup Plan. These are provided below to address each of the engineering and institutional controls anticipated to be necessary to address media and pathways of concern following completion of the remedial activities.

- At the completion of the Lots 17 and 21 soil remediation activities, the remediation area will be left in a stabilized condition and post-remediation care of those areas will not be required; is ultimately necessary, verify recent or pending construction that may involve soil excavation and evaluate adherence to the construction worker OSHA training and PPE requirements, as appropriate;
- identify the presence of new or newly occupied buildings and verify adherence to the VI assessment requirements, as appropriate;
- verify conformance with groundwater use restrictions (i.e., no groundwater production wells have been installed, and there is no human consumption or use of groundwater); and
- visually assess and document the integrity of the concrete cover over the former carbon disulfide moat.

- Reporting of nonattainment - The PRCP will include reporting procedures to notify the appropriate stakeholders (FMC, the property owner and PADEP) of any instance of nonattainment of the institutional and/or engineering controls.
- Correcting nonattainment – The PRCP will include reporting procedures to notify the appropriate stakeholders (FMC, the property owner and PADEP) of measures to correct nonattainment conditions, or proposed changes. Notification will include the proposed approach and schedule to correct the nonattainment, and following implementation, a confirmation of attainment or if nonattainment conditions persist following actions to correct nonattainment.
- Recordkeeping – The PRCP will include details on where related records will be maintained. It is currently anticipated that the records for the above activities will be maintained either on-site and/or at the responsible party's (FMC's or respective property owners') offices.
- Schedule - Annual inspection and verification of institutional and engineering controls will be performed. Identified instances of nonattainment will be promptly reported in writing to the appropriate stakeholders (property owner, FMC and PADEP), and measures to correct the nonattainment will be develop and implemented as promptly as possible considering the nature of the nonattainment and associated corrective measures.

Groundwater attainment and post-remediation monitoring is addressed below in Section 6.4.

6.4 Groundwater Attainment

The groundwater direct contact pathway is currently incomplete and the institutional controls will prevent future direct contact by restricting use of site groundwater for potable and non-potable purposes. Site-specific groundwater standards were developed based upon the groundwater discharge to surface pathway and applicable surface water standards. Act 2 requires groundwater sampling to document attainment of the site-specific standard for groundwater.

As presented in the PADEP-approved RI/RA Report, the results from the eight consecutive quarters of groundwater monitoring, completed from May 2016 to April 2018, has effectively demonstrated

attainment of the Site-Specific Standard. Due to potential increasing trends at one well (MW-JS), FMC continued groundwater sampling on a semi-annual basis to verify stable and decreasing trends and further document attainment of the groundwater site-specific standard at the point of compliance wells. The results of the semi-annual sampling completed from 2018 through 2021 indicate decreasing trends at MW-JS and further demonstrate attainment at the point of compliance wells.

One additional round of groundwater samples was collected in December 2021 from the entire on-site monitoring well network. Samples will be analyzed for a similar list of parameters as was performed during the RI (i.e., VOCs, SVOCs, PCBs, and metals). The purpose of this sampling event will be to further document attainment of the Site-Specific Standard. FMC will prepare and submit to PADEP a waiver request pursuant to 25 Pa Code §250.704(d) to document consistency with the 2016-2018 data and confirm that no additional attainment sampling is required. Pending completion of this submittal, FMC is proposing that long-term groundwater monitoring will not be necessary as part of post-remediation care requirements.

6.5 Schedule

An overall schedule for implementing the Cleanup Plan is presented below. The schedule is dependent upon obtaining all necessary reviews, approvals, and acceptances from PADEP, USEPA and the property owners in a timely manner.

Activity	Anticipated Timing
Planning, Prep & Contractor Procurement	Spring 2022
Lots 17 & 21 Soil Remediation	Summer 2022
Groundwater Monitoring & Reporting	Dec 2021-Feb 2022
Submit the Final Report	Fall 2022
Finalize & Record Institutional Controls	Winter 2022

7. REPORTING

An Act 2 Final Report will be prepared that documents the remedial activities completed at the Site, along with the demonstration of attainment of the combination of the Act 2 standards, including the final post-remediation residual risk assessment and results of the final groundwater monitoring event. The Final Report will include figures, photographs, and disposal documentation for excavated soil, as well as documentation of the final deed notices and the Post-Remediation Care Plan.

8. REFERENCES

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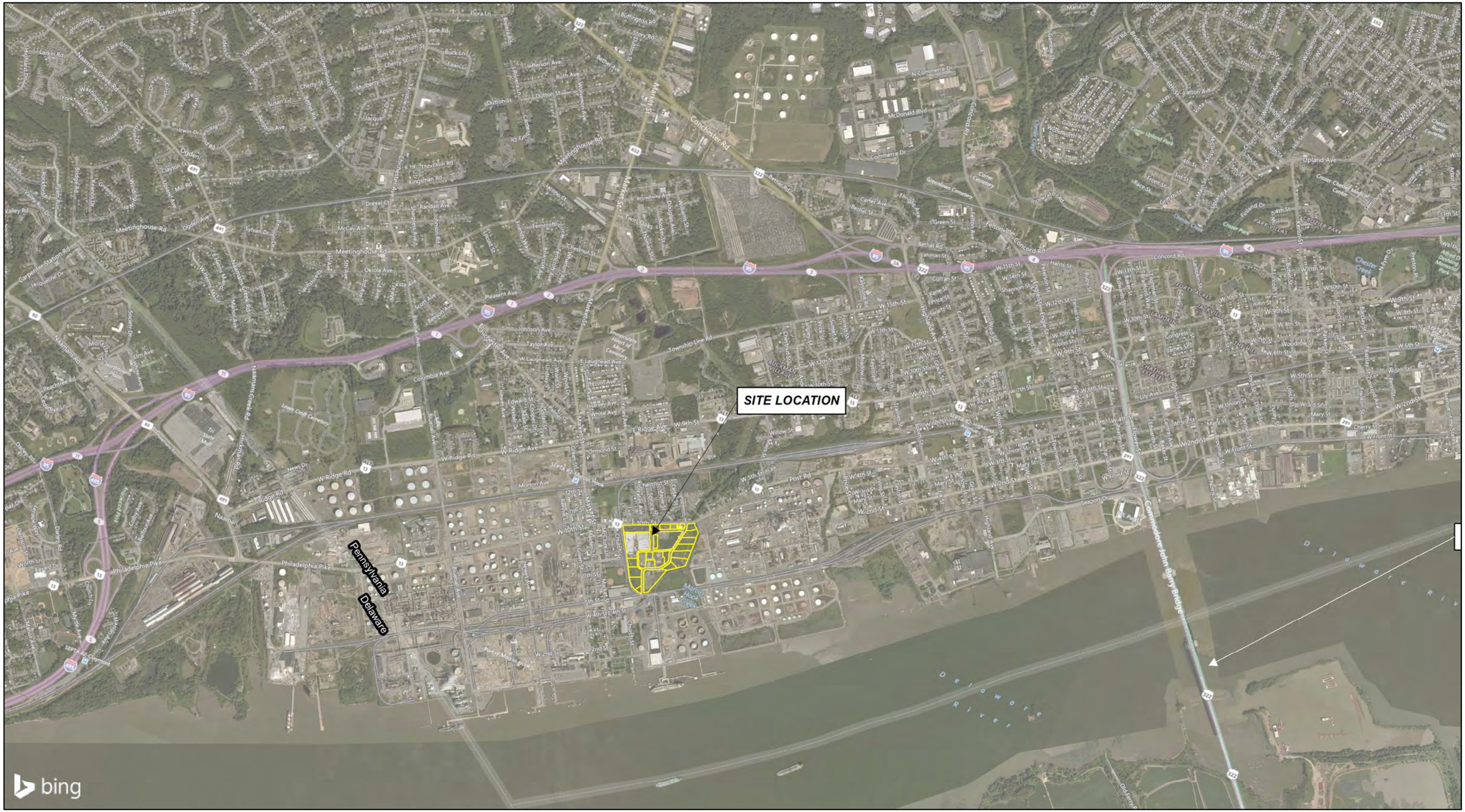
United States Environmental Protection Agency (USEPA). 2017. Adult Lead Model. https://www.epa.gov/sites/production/files/2017-07/alm_update_with_2009-2014_nhanes_pbbo_and_gsdi_06202017.xlsx



Environmental Resources Management, Inc.
Philadelphia Office
484-913-0300
January 28, 2015

N
W E
S

Scale in Feet
0 2,250 4,500
Feet

Source: Delaware County, PA

Legend

Tax Parcel Boundary

FIGURE 1
Site Vicinity Map
East 10th Street, Marcus Hook, PA
Delaware County, PA

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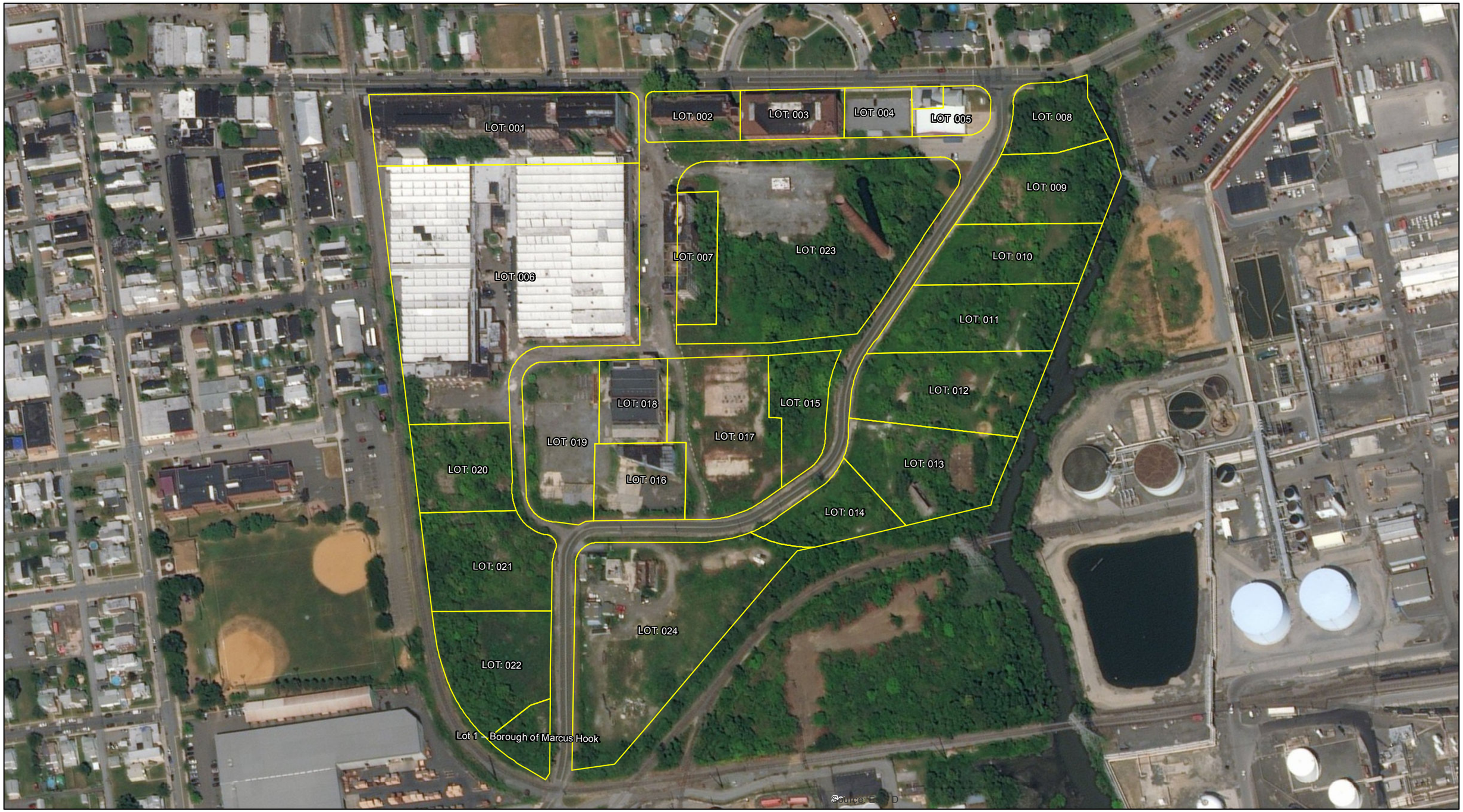


Environmental Resources Management, Inc.
Philadelphia Office
484-913-0300
November 20, 2017

Scale
1 inch = 200 feet
0 100 200 400
Feet

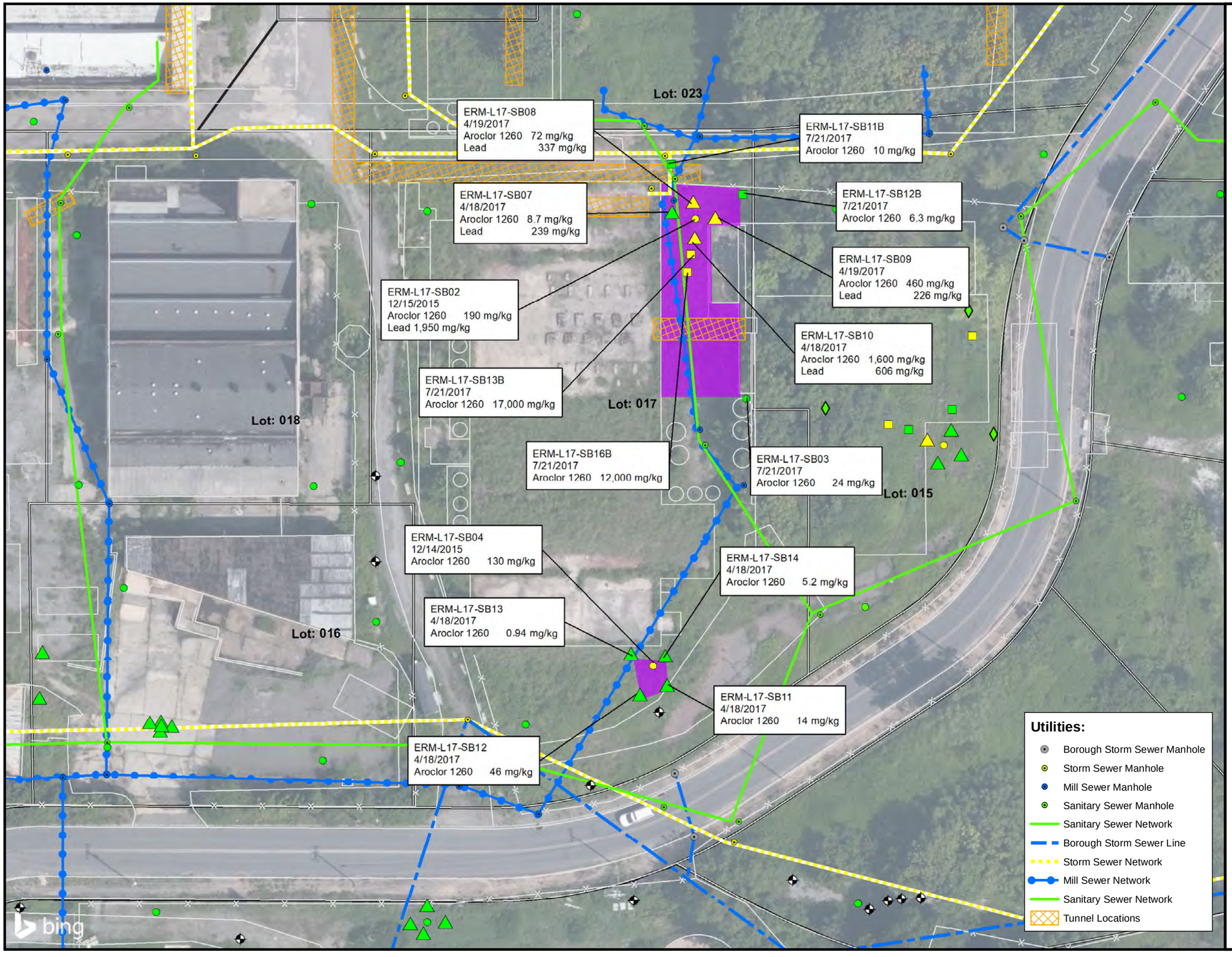
Source: Delaware County, PA

Legend

Tax Parcel Boundary

FIGURE 2
Lot Location Plan
East 10th Street Site
Marcus Hook, PA

J:\Projects\FMC-MarcusHook_MXD\FMC_Parcels_MarcusHook_20171120.mxd - 1/30/2018|SRV



Legend

Soil Results (0-2 ft)

- Soil Sample Location (2015-2016) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Soil Sample Location (2015-2016) - Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (July 2017) - Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (July 2017) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (April 2017) - Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (April 2017) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (October 2017)-Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Monitor Well
- Historical Manufacturing Building Footprint
- Approximate Surface Soil (0-2 ft bgs) Excavation Area
- Parcel Boundary

FIGURE 3
LOT 17-Surface Soil
Excavation Areas
East 10th Street Site
Marcus Hook, Pennsylvania

ERM

J:\Projects\FMC-MarcusHook_MXD\Lot Exceedence Figures\REVISED_20220111\FIGURE3-Lot17-SurfaceSoilExcavationAreas_20220113.mxd - steven.vickey - 1/13/2022

ERM-L21-SB06
12/14/15
Aroclor 1260 99 mg/kg

ERM-L21-SB09
4/18/17
Aroclor 1260 12 mg/kg

ERM-L21-SB10
4/18/17
Aroclor 1260 5.9 mg/kg

ERM-L21-SB12
7/21/17
Aroclor 1260 0.05 mg/kg

ERM-L21-SB07
4/18/17
Aroclor 1260 32 mg/kg

ERM-L21-SB11
7/21/17
Aroclor 1260 450 mg/kg

ERM-L21-SB08
4/18/17
Aroclor 1260 450 mg/kg

bing

Legend

Soil Results (0-2 ft)

- Soil Sample Location (2015-2016) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Soil Sample Location (2015-2016) - Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (July 2017) - Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (July 2017) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
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- Step-Out Soil Sample Location (April 2017) - Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Step-Out Soil Sample Location (October 2017)-Did Not Exceed Direct Contact Soil MSCs or Site-Specific Soil to Groundwater Screening Value
- Monitor Well
- Historical Manufacturing Building Footprint
- Approximate Surface Soil (0-2 ft bgs) Excavation Area
- Parcel Boundary

Utilities:

- Borough Storm Sewer Manhole
- Storm Sewer Manhole
- Mill Sewer Manhole
- Sanitary Sewer Manhole
- Sanitary Sewer Network
- Borough Storm Sewer Line
- Storm Sewer Network
- Mill Sewer Network
- Sanitary Sewer Network

FIGURE 4
LOT 21-Surface Soil
Excavation Areas
East 10th Street Site
Marcus Hook, Pennsylvania

ERM

J:\Projects\FMC-MarcusHook_MXD\Lot Exceedence Figures\REVISED_20220111\FIGURE4-Lot21-SurfaceSoilExcavationAreas_20220114.mxd - steven.vickey - 1/13/2022

APPENDIX A PREDICTIVE POST-REMEDIATION RESIDUAL RISK ASSESSMENT

PREDICTIVE POST-REMEDIATION RESIDUAL HUMAN HEALTH RISK ASSESSMENT

To evaluate the degree of residual long-term risk following proposed remediation activities as outlined in the Cleanup Plan for the E. 10th Street Site, FMC completed a predictive residual human health risk assessment (PR HHRA) for future commercial/industrial worker exposure. This PR HHRA retains the same exposure assumptions and procedures as those used in the HHRA presented as Appendix P to the Remedial Investigation (RI)/Risk Assessment (RA) Report (RI HHRA), with the exception of utilizing a revised exposure point concentration (EPC) for soil that is representative of anticipated post-remediation soil conditions. The exposure conditions were based on current site use and anticipated future site use plans. The anticipated future site uses are assumed to be non-residential operations, consistent with those envisioned by the majority property owner's (Keystone Community Alliance) and its prospective purchaser's (Duke Realty) current development plans. Keystone Community Alliance has recently consolidated additional parcels to their prior holdings and is coordinating with the Borough of Marcus Hook to amend the zoning ordinance to facilitate future development and use for a majority of the Site parcels as a large warehousing facility.

As presented in the RI HHRA, the media of concern for commercial/industrial workers included surface soil (0 – 2 feet bgs) with respect to direct contact, and surface and subsurface soil (0 – 15 feet bgs), overburden groundwater and soil gas with respect to vapor intrusion (VI) into indoor air. Based on the screening evaluation provided in the RI HHRA, the constituents of potential concern (COPC) in each media and associated exposure pathways were identified, as presented in Table 1:

Table 1: Commercial/Industrial Worker COPCs, Media, and Exposure Pathways

Medium	COPC(s)	Exposure Pathway(s)
Surface Soil (0-2')	• antimony • Aroclor 1260 • arsenic • benzo(a)anthracene • benzo(a)pyrene • benzo(b)fluoranthene • benzo(k)fluoranthenelead • mercury • vanadium	Ingestion, inhalation
Surface and Subsurface Soil (0-15')	• 1,1-dichloroethene • 1,2,4-trichlorobenzene • 1,4-dichlorobenzene • dichloroethyl ether • methylene chloride • naphthalene • phenol • mercury	Inhalation (vapor intrusion - indoor air)
Overburden Groundwater	• 1,1-dichloroethane • 1,1-dichloroethene • 1,2,4-trichlorobenzene • 1,4-dichlorobenzene • cis-1,2-dichloroethene • ethylene glycol • p-cresol • tetrachloroethene • trichloroethene • vinyl chloride • mercury	Inhalation (vapor intrusion - indoor air)
Soil Vapor	• 1,2,4-trichlorobenzene • trichloroethene	Inhalation (vapor intrusion - indoor air)

In the HHRA, several exposure scenarios were considered, including non-residential workers, construction workers, utility workers, and trespassers. The cumulative carcinogenic and non-carcinogenic risk was calculated for each of these exposure scenarios and COPCs, except for lead which was evaluated through the application of the Adult Lead Model. The ALM modeling, including input parameters, is described in Section 4.4 of the HHRA (Appendix P of the RI/RA Report). It was determined that risk from lead in soil meets acceptable thresholds and that carcinogenic risks and non-carcinogenic risks associated with the direct contact with soil were within acceptable ranges for the construction worker, utility worker, and trespasser scenarios. Potential lead risks to infant/younger child trespassers are considered de minimis or non-existent due to the fact that the site is currently non-residential/commercial and will be restricted to this use in the future, children (0 – 6 years old) have not been observed at the Site by FMC representatives during investigation activities, and it is unlikely that children (0 – 6 years old) will have recurring unsupervised access to an industrial/commercial site.

For the non-residential worker, the site-wide exposure point concentration for Aroclor 1260 resulted in a predicted carcinogenic risk slightly above PADEP's acceptable range (i.e,, >1E-04). In addition, for the non-residential worker, the HHRA identified several locations with potential future vapor intrusion risks associated with volatile organic concentrations in soil, which was based upon Johnson & Ettinger (J&E) modelling using conservative default model input parameters.

1.1 Residual Risk Calculations

For this PR HHRA, FMC presumed that the surface soils having the highest concentration of Aroclor 1260 in Lot 17 and Lot 21 will be excavated and disposed of off-site, and the excavation backfilled with clean fill. As noted in the Cleanup Plan, this excavation encompasses two areas in Lot 17 and one area in Lot 21. The area on Lot 21 was not required for excavation as per the needs for risk reduction to meet Act 2 standards, but was added in response to USEPA's comments regarding samples ERM-L21-SB08 and ERM-L21-SB11 as potential hot-spots. The Lot 21 area was added to satisfy requirements for a risk-based closure under USEPA's TSCA regulations. As discussed in the Cleanup Plan, the limits of excavations extend laterally from these sample locations to the nearest sample that attains the direct contact MSC or to an existing structure such as a utility tunnel, foundation or footer. The excavations will result in the removal of the following sample locations within three discrete excavation areas[1]:

Table 2: Lot 17 and Lot 21 Samples Subject to Excavation

Lot 17 Sample ID	Aroclor 1260 Concentration (mg/kg)	Lot 21 Sample ID	Aroclor 1260 Concentration (mg/kg)
ERM-L17-SB13B	17000	ERM-L21-SB08	450
ERM-L17-SB16B	12000	ERM-L21-SB11	450
ERM-L17-SB10	1600	ERM-L21-SB06	99
ERM-L17-SB09	460		
ERM-L17-SB02	190		
ERM-L17-SB04	130		
ERM-L17-SB08	72		

[1] Two locations in Lot 17 (SB-12, SB-07) are do not exceed the Direct Contact Non-Residential Medium Specific Concentration (DC NR MSC) (46 mg/kg), but are being removed due to their proximity to locations having Aroclor 1260 exceedances.

ERM-L17-SB12	46
ERM-L-17-SB07	8.7

To estimate the post-remedial residual risk following excavation and backfilling, the site-wide EPC for Aroclor 1260 (i.e., 95% upper confidence limit on the mean [95% UCL]) in surface soil (0-2 feet below grade) was recalculated using ProUCL® v5.1 to represent predicted residual post-remedial soil conditions. The predicted residual site-wide EPC for surface soil presumes that clean fill replacing the areas previously represented by the 12 excavated samples will have non-detectable concentrations of Aroclor 1260, represented as a concentration at a reporting limit of 0.1 mg/kg for UCL calculation purposes[2]. In addition, post-excavation samples from sidewalls (less than 2-foot depth) will be included in the residual risk data set for the commercial/industrial workers. Although actual post-excavation sample locations will be randomly determined and the number of sidewall samples could vary, it is assumed that up to six shallow post-excavation samples will be collected from the sidewalls of the excavated areas in total. For the purposes of calculating the residual site-wide EPC, it is assumed that the concentration of Aroclor 1260 in the six post-excavation samples would be equal to the PADEP medium specific concentration (MSC) of 46 mg/kg. The predicted residual site-wide EPC in this scenario is 8.99 mg/kg. The ProUCL® outputs showing the calculation of these UCLs is provided in Attachment 1. For convenience, the full listing of the Aroclor 1260 data set is also provided in Attachment 1. A map of site-wide Arcolor 1260 sampling results is also provided as Figure 1.

The predicted residual site-wide EPCs for surface soil was used to calculate the potential residual risk to future on-site commercial/industrial workers in consideration of both the proposed remediation and institutional controls, using the same exposure assumptions and procedures as documented in the RI HHRA, including inputs for ingestion and inhalation. The risk calculations do not consider dermal exposure to soil and groundwater for the non-residential worker consistent with the RI HHRA and as per PADEP guidelines. The predicted residual site-wide carcinogenic risk[3] for Aroclor 1260 under this scenario is 1.7E-06 for the commercial/industrial worker, and the predicted cumulative site-wide carcinogenic risk is 5.7E-06[4], which is within PADEP's acceptable cancer risk limit[5]. The risk calculation spreadsheets showing the calculation of predicted residual post-remedial risks are provided in Attachment 2.

In order to quantify potential cumulative risks under the predicted residual soil conditions for the on-site commercial/industrial worker, the risk values for all COPCs that exceeded relevant screening levels, as documented in the in the RI HHRA, are provided in Table 3 through Table 3d below. These tables show the identical risk values as presented in the RI HHRA with the exception of those for Aroclor 1260, which now reflect direct contact risks associated with residual soil conditions. In a cumulative risk assessment (both in the RI HHRA and this PR HHRA), it is conservatively assumed that potential soil direct contact risks are additive to the VI risks from groundwater (Table 3a), soil (Table 3b), and soil gas (Table 3c). Table 3d provides a summary of the cumulative risk estimates under the predicted residual soil conditions for on-site commercial/industrial workers.

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[2] This is not a regulatory level, but rather a limit set by FMC with respect to acceptable sources of clean fill brought to the Site. This may reflect either clean borrow soil or virgin dense graded aggregate from a virgin/quarry source.

[3] Non-carcinogenic risks are not reported because PCBs are associated with cancer risk only.

[4] Assumes that the shallow soil EPCs for all other COPCs remain the same as that calculated for pre-remedial conditions as presented in the RI HHRA.

[5] Pursuant to 25 Pa. Code § 250.402, cancer risk should not exceed an excess upper-bound lifetime risk of between one in 10,000 (1E-04) and one in one million (1E-06). The cumulative excess risk to exposed populations, including sensitive subgroups, may not be greater than 1 in 10,000 (1E-04).

Table 3. Risk Characterization for Non-Residential Commercial/Industrial Workers (0 - 2 feet soil) Under Predicted Residual Post-Remedial Soil Conditions

Analyte	$HQ_{ingestion}$	$HQ_{inhalation}$	$CR_{ingestion}$	$CR_{inhalation}$
Soil (0 – 2 feet)				
Aroclor 1260	- -	- -	*1.7E-06*	4.5E-12
Antimony	5.8E-02	- -	- -	- -
Arsenic	1.6E-02	1.7E-05	2.5E-06	3.8E-10
benzo(a)anthracene	- -	- -	3.0E-07	2.5E-12
benzo(a)pyrene	3.3E-03	2.6E-05	3.5E-07	1.1E-11
benzo(b)fluoranthene	- -	- -	5.4E-07	2.6E-12
benzo(k)fluoranthene	- -	- -	2.5E-07	1.2E-12
Mercury	7.5E-03	2.1E-07	- -	- -
Vanadium	9.1E-01	3.4E-05	--	--
Exposure Pathway Total:	9.9E-01	7.7E-05	5.7E-06	4.1E-10
Exposure Medium Total:	9.9E-01		5.7E-06	

Notes:
Risk calculation sheets for Aroclor 1260 under predicted residual conditions are provided in Attachment 2. Vanadium risk calculations are provided in Attachment 6 to the RI/RA.

Table 3a. Risk Characterization for Non-Residential Commercial/Industrial Workers (Overburden groundwater - vapor intrusion)

Analyte	Monitoring Well Exceedance	$HQ_{inhalation}$	$CR_{inhalation}$
Ethylene glycol	MW-10 North	4.8E-06	--
1,2,4-trichlorobenzene	MW-DS	2.9E-02	--
1,4-dichlorobenzene	MW-DS	8.8E-06	2.8E-08
p-Cresol	MW-08	1.4E-06	--
1,1-dichloroethane	MW-JS	5.5E-05	1.6E-08
1,1-dichloroethene	MW-BS	7.8E-05	--
	MW-CS	2.1E-04	--
	MW-DS	1.6E-04	--
	MW-JS	5.4E-04	--
	MW-NS	5.1E-05	--
Cis-1,2-dichloroethene[1]	MW-DS	--	--
Tetrachloroethene	Lot 14 MW-06	1.0E-04	3.7E-10
	MW-DS	8.0E-03	3.0E-08

Analyte	Monitoring Well Exceedance	$HQ_{inhalation}$	$CR_{inhalation}$
	MW-JS	5.9E-04	2.2E-09
Trichloroethene	Lot 14 MW-06	1.7E-03	4.8E-09
	MW-DS	5.3E-02	1.5E-07
	MW-JS	1.6E-02	4.5E-08
Vinyl Chloride	MW-JS	5.0E-05	1.6E-08

Notes:
Johnson & Ettinger (J&E) Model risk calculation sheets are provided in Attachment 4 to the RI/RA.

[1] The PADEP J&E model does not include cis-1,2-DCE, so quantitative risk could not be calculated. Given the low observed groundwater concentration, this is not considered a significant data gap.

Table 3b. Risk Characterization for Non-Residential Commercial/Industrial Workers (Soil - Vapor Intrusion)

Analyte	Soil Boring Exceedance Location	$HQ_{inhalation}$	$CR_{inhalation}$
1,1-dichloroethene	Lot 12 SB-05	7.0E-01	--
1,2,4-trichlorobenzene	Lot 4 SB-02	***1.4E+00***	--
	Lot 13 SB-04	1.2E-01	--
1,4-dichlorobenzene	Lot 17 SB-02	4.3E-02	***1.3E-04***
Dichloroethyl ether	Lot 19 SB-04	--	6.5E-07
Methylene Chloride	Lot 11 SB-03	4.0E-03	8.7E-09
	Lot 18 SB-03	1.7E-03	3.6E-09
Naphthalene	Lot 11 SB-03	***2.6E+00***	9.5E-05
	Lot 12 SB-04	***1.9E+00***	6.8E-05
	Lot 22 SB-06	***7.6E+00***	***2.8E-04***
	Lot 24 SB-07	***1.4E+00***	5.2E-05
Phenol	Lot 24 SB-07	3.2E-03	--

Notes:
J&E Model risk calculation sheets are provided in Attachment 4 to the RI/RA.

Table 3c. Risk Characterization for Non-Residential Commercial/Industrial Workers (Soil Gas - Vapor Intrusion)

Analyte	$HQ_{inhalation}$	$CR_{inhalation}$
1,2,4-trichlorobenzene	2.8E-04	--
trichloroethene	1.1E-03	3.0E-09

Notes:
J&E Model risk calculation sheets are provided in Attachment 4 to the RI/RA.

Table 3d. Risk Characterization for Non-Residential Commercial/Industrial Workers (Cumulative)

Analyte	$HQ_{ingestion}$	$HQ_{inhalation}$	$CR_{ingestion}$	$CR_{inhalation}$
Soil (0 – 2 feet)				
Aroclor 1260	- -	- -	*1.7E-06*	4.5E-12
Antimony	5.8E-02	- -	- -	- -
Arsenic	1.6E-02	1.7E-05	2.5E-06	3.8E-10
benzo(a)anthracene	- -	- -	3.0E-07	2.5E-12
benzo(a)pyrene	3.3E-03	2.6E-05	3.5E-07	1.1E-11
benzo(b)fluoranthene	- -	- -	5.4E-07	2.6E-12
benzo(k)fluoranthene	- -	- -	2.5E-07	1.2E-12
Mercury	7.5E-03	2.1E-07	- -	- -
Vanadium	9.1E-01	3.4E-05	--	--
Exposure Pathway Total:	9.9E-01	7.7E-05	5.7E-06	4.1E-10
Exposure Medium Total:	9.9E-01		5.7E-06	
Overburden Groundwater VI (COPC Maximum)				
Ethylene glycol	--	4.8E-06	--	--
1,2,4-trichlorobenzene	--	2.9E-02	--	
1,4-dichlorobenzene	--	8.8E-06	--	2.8E-08
p-Cresol	--	1.4E-06	--	--
1,1-dichloroethane	--	5.5E-05	--	1.6E-08
1,1-dichloroethene	--	5.4E-04	--	--
Tetrachloroethene	--	8.0E-03	--	3.0E-08
Trichloroethene	--	5.3E-02	--	1.5E-07
Vinyl Chloride	--	5.0E-05	--	1.6E-08
Exposure Pathway Total:	--	9.1E-02		2.4E-07
Exposure Medium Total:	9.1E-02		2.4E-07	
Soil VI (COPC Maximum)				
1,1-dichloroethene	--	7.0E-01	--	--
1,2,4-trichlorobenzene	--	***1.4E+00***	--	--
1,4-dichlorobenzene	--	4.3E-02	--	***1.3E-04***

Analyte	$HQ_{ingestion}$	$HQ_{inhalation}$	$CR_{ingestion}$	$CR_{inhalation}$
dichloroethyl ether	--	--	--	6.5E-07
Naphthalene	--	***7.6E+00***	--	***2.8E-04***
Methylene Chloride	--	4.0E-03	--	8.7E-09
Phenol	--	3.2E-03	--	--
Exposure Pathway Total:	--	***9.7E+00***	--	***4.1E-04***
Exposure Medium Total:	***9.7E+00***		***4.1E-04***	
Soil Gas VI (COPC Maximum)				
1,2,4-trichlorobenzene	--	2.8E-04	--	--
Trichloroethene	--	1.1E-03	--	3.0E-09
Exposure Pathway Total:	--	1.4E-03	--	3.0E-09
Exposure Medium Total:	1.4E-03		3.0E-09	
Receptor Total:	***1.1E+01***		***4.2E-04***	

Notes:
Summing of the inhalation risks from vapor intrusion for the same COPC in soil, overburden groundwater and soil gas may represent double-counting in some cases. However, since the groundwater and soil vapor VI pathway present negligible risks, this is not considered significant.

1.2 Residual Risk Results Summary

The PR HHRA risk estimates show that the predicted post-remediation conditions following the proposed remedial activities and implementation of institutional controls, the overall non-residential worker cancer risk for direct contact with soils is within the acceptable risk range (1E-06 to 1E-04) following the proposed removal of the soil on Lot 17 and Lot 21.

For vapor intrusion, the HHRA identified through conservative J&E modeling potential future risks associated with volatile organic concentrations in certain soil samples collected from Lots 4, 11, 12, 17, 22, and 24 (refer to Table 3b). These samples are beyond the PADEP-specified proximity distances (i.e., there are currently no routinely occupied portions of buildings within 100 feet of these soil sample locations or within 30 feet of utilities serving as potential preferential pathways traversing those areas); however, there is a potential VI risk from soil for future buildings or occupancy within 100 feet from these sample locations. As shown on Table 3b, the non-carcinogenic hazard potential is estimated to be greater than the acceptable threshold of one (1.0) for non-residential commercial/industrial workers as a result of 1,2,4-trichlorobenzene and naphthalene in soil, and that cancer risk potential is estimated to be greater than the acceptable risk range for 1,4-dichlorobenzene and naphthalene in soil. Although J&E modeling is currently not possible for mercury, it is also conservatively considered a potential VI risk given that concentrations exceed the relevant PADEP screening value of $1/10^{th}$ the soil to groundwater MSC.

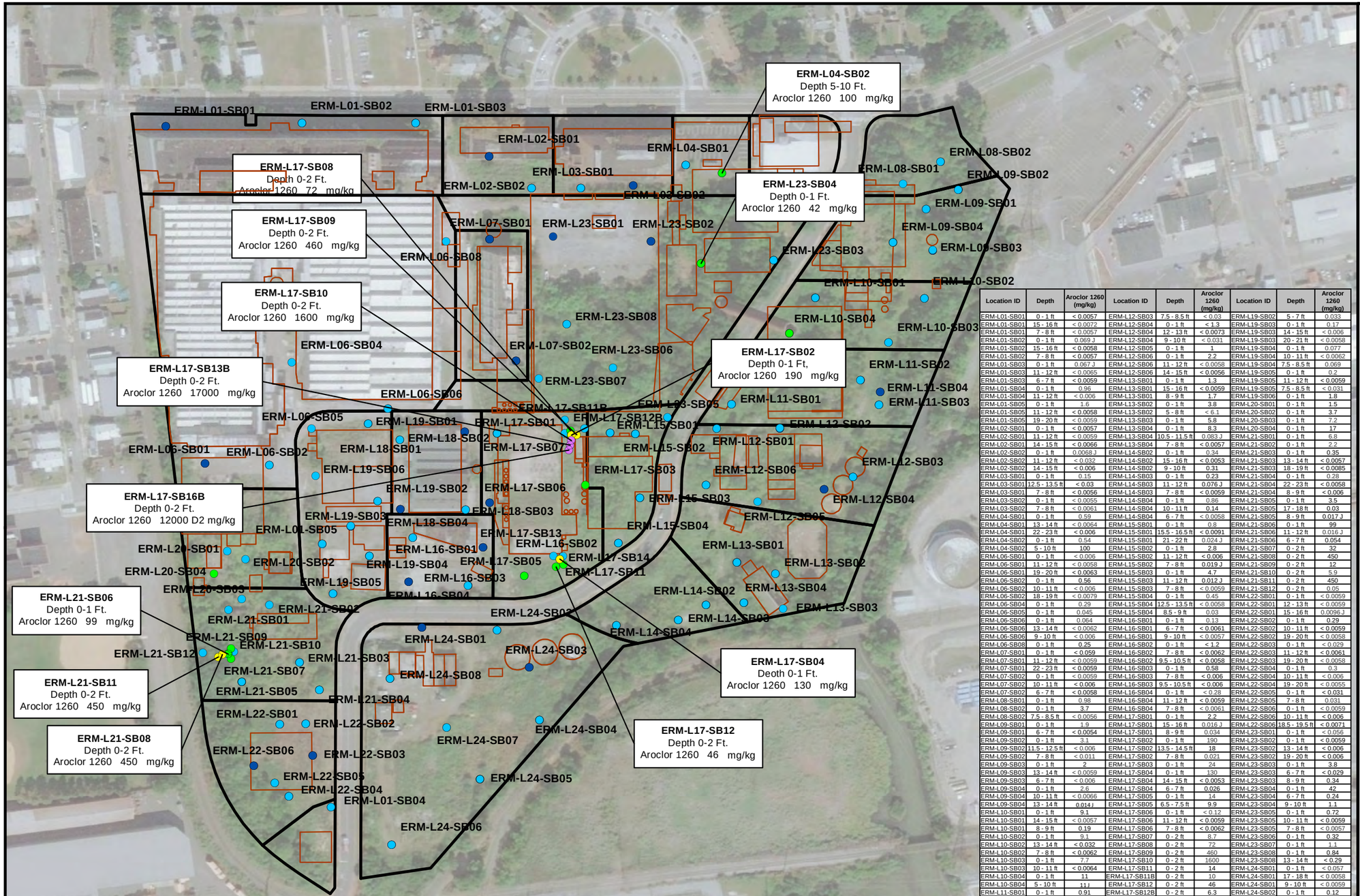
As discussed in the RI/RA Report, the J&E model is based on default building dimensions for the PADEP version of the model (10 meters length x 10 meters width x 2.44 meters height), and is not reflective of the large warehouse Keystone Community Alliance/Duke Realty currently is planning to build. Larger structures in general result in a lower calculated potential VI risk in the J&E model. By way of example,

re-running the J&E model using a warehouse-sized building similar in size to that currently envisioned by Keystone Community Alliance/Duke Realty (290 meters length x 128 meters width x 6 meters height), the predicted non-carcinogenic and carcinogenic risk is reduced two to three orders of magnitude and would be within PADEP's acceptable risk range for locations within that footprint.

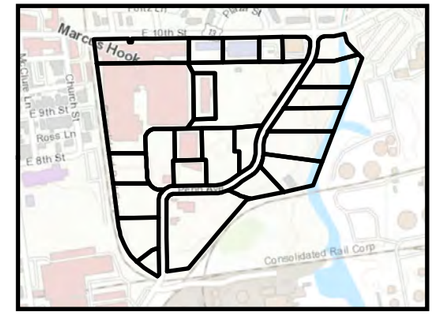
The modeled soil VI pathway risk to non-residential commercial/industrial workers resulting from 1,2,4-TCB, 1,4-dichlorobenzene and naphthalene in soil, as well as the risk assumed for mercury, is proposed to be addressed by institutional controls. This will include re-assessment of soil risk through modeling using the actual building dimensions for structures built on or in proximity to areas containing volatile substances in soil above applicable screening levels, completion of further sampling to assess actual VI concentrations and risk, and/or installation of soil vapor mitigation systems for the portions of buildings within these areas.

1.3 Conclusion

The combination of institutional controls to mitigate potential VI risk, and the remediation of Aroclor 1260 in soil in Lot 17 and Lot 21 to mitigate direct contact risk, will effectively mitigate all potential risk to acceptable levels for future non-residential workers at the Site. Therefore, the post-remediation residual risk for all applicable receptors (i.e., non-residential worker, construction worker, utility worker, and trespasser) and pathways will be within PADEP's acceptable risk range.



Location ID	Depth	Aroclor 1260 (mg/kg)	Location ID	Depth	Aroclor 1260 (mg/kg)	Location ID	Depth	Aroclor 1260 (mg/kg)
ERM-L01-SB01	0 - 1 ft	< 0.0057	ERM-L12-SB03	7.5 - 8.5 ft	< 0.03	ERM-L19-SB02	5 - 7 ft	0.033
ERM-L01-SB01	15 - 16 ft	< 0.0072	ERM-L12-SB04	0 - 1 ft	< 1.3	ERM-L19-SB03	0 - 1 ft	0.17
ERM-L01-SB01	7 - 8 ft	< 0.0057	ERM-L12-SB04	12 - 13 ft	< 0.0073	ERM-L19-SB03	14 - 15 ft	< 0.006
ERM-L01-SB02	0 - 1 ft	0.069 J	ERM-L12-SB04	9 - 10 ft	< 0.031	ERM-L19-SB03	20 - 21 ft	< 0.0058
ERM-L01-SB02	15 - 16 ft	< 0.0058	ERM-L12-SB05	0 - 1 ft	1	ERM-L19-SB04	0 - 1 ft	0.077
ERM-L01-SB02	7 - 8 ft	< 0.0057	ERM-L12-SB06	0 - 1 ft	2.2	ERM-L19-SB04	10 - 11 ft	< 0.0062
ERM-L01-SB03	0 - 1 ft	0.067 J	ERM-L12-SB06	11 - 12 ft	< 0.0058	ERM-L19-SB04	7.5 - 8.5 ft	0.069
ERM-L01-SB03	11 - 12 ft	< 0.0065	ERM-L12-SB06	14 - 15 ft	< 0.0056	ERM-L19-SB05	0 - 1 ft	0.2
ERM-L01-SB03	6 - 7 ft	< 0.0059	ERM-L13-SB01	0 - 1 ft	1.3	ERM-L19-SB05	11 - 12 ft	< 0.0059
ERM-L01-SB04	0 - 1 ft	0.96	ERM-L13-SB01	15 - 16 ft	< 0.0059	ERM-L19-SB05	7.5 - 8.5 ft	< 0.031
ERM-L01-SB04	11 - 12 ft	< 0.006	ERM-L13-SB01	8 - 9 ft	1.7	ERM-L19-SB06	0 - 1 ft	1.8
ERM-L01-SB05	0 - 1 ft	1.6	ERM-L13-SB02	0 - 1 ft	3.8	ERM-L20-SB01	0 - 1 ft	1.5
ERM-L01-SB05	11 - 12 ft	< 0.0058	ERM-L13-SB02	5 - 8 ft	< 6.1	ERM-L20-SB02	0 - 1 ft	3.7
ERM-L01-SB05	19 - 20 ft	< 0.0059	ERM-L13-SB03	0 - 1 ft	5.8	ERM-L20-SB03	0 - 1 ft	7.2
ERM-L02-SB01	0 - 1 ft	< 0.0057	ERM-L13-SB04	0 - 1 ft	8.3	ERM-L20-SB04	0 - 1 ft	17
ERM-L02-SB01	11 - 12 ft	< 0.0059	ERM-L13-SB04	10.5 - 11.5 ft	0.083 J	ERM-L21-SB01	0 - 1 ft	6.8
ERM-L02-SB01	14 - 15 ft	< 0.0066	ERM-L13-SB04	7 - 8 ft	< 0.0057	ERM-L21-SB02	0 - 1 ft	2.2
ERM-L02-SB02	0 - 1 ft	0.0068 J	ERM-L14-SB02	0 - 1 ft	0.34	ERM-L21-SB03	0 - 1 ft	0.35
ERM-L02-SB02	11 - 12 ft	< 0.032	ERM-L14-SB02	15 - 16 ft	< 0.0053	ERM-L21-SB03	13 - 14 ft	< 0.0057
ERM-L02-SB02	14 - 15 ft	< 0.006	ERM-L14-SB02	9 - 10 ft	0.31	ERM-L21-SB03	18 - 19 ft	< 0.0085
ERM-L03-SB01	0 - 1 ft	0.15	ERM-L14-SB03	0 - 1 ft	0.23	ERM-L21-SB04	0 - 1 ft	0.28
ERM-L03-SB01	12.5 - 13.5 ft	< 0.03	ERM-L14-SB03	11 - 12 ft	0.076 J	ERM-L21-SB04	22 - 23 ft	< 0.0058
ERM-L03-SB01	7 - 8 ft	< 0.0066	ERM-L14-SB04	6 - 7 ft	< 0.0059	ERM-L21-SB04	8 - 9 ft	< 0.006
ERM-L03-SB02	0 - 1 ft	< 0.0055	ERM-L14-SB04	0 - 1 ft	0.86	ERM-L21-SB05	0 - 1 ft	3.5
ERM-L03-SB02	7 - 8 ft	< 0.0061	ERM-L14-SB04	10 - 11 ft	0.14	ERM-L21-SB05	17 - 18 ft	0.03
ERM-L04-SB01	0 - 1 ft	0.59	ERM-L14-SB04	6 - 7 ft	< 0.0058	ERM-L21-SB05	8 - 9 ft	0.017 J
ERM-L04-SB01	13 - 14 ft	< 0.0064	ERM-L15-SB01	0 - 1 ft	0.8	ERM-L21-SB06	0 - 1 ft	99
ERM-L04-SB01	22 - 23 ft	< 0.006	ERM-L15-SB01	15.5 - 16.5 ft	< 0.0091	ERM-L21-SB06	11 - 12 ft	0.016 J
ERM-L04-SB01	0 - 1 ft	0.54	ERM-L15-SB01	21 - 22 ft	0.024 J	ERM-L21-SB06	6 - 7 ft	0.054
ERM-L04-SB02	5 - 10 ft	100	ERM-L15-SB02	0 - 1 ft	2.8	ERM-L21-SB07	0 - 2 ft	32
ERM-L06-SB01	0 - 1 ft	< 0.006	ERM-L15-SB02	11 - 12 ft	< 0.006	ERM-L21-SB08	0 - 2 ft	450
ERM-L06-SB01	11 - 12 ft	< 0.0058	ERM-L15-SB02	7 - 8 ft	0.019 J	ERM-L21-SB09	0 - 2 ft	12
ERM-L06-SB01	19 - 20 ft	< 0.0063	ERM-L15-SB03	0 - 1 ft	4.7	ERM-L21-SB10	0 - 2 ft	5.9
ERM-L06-SB02	0 - 1 ft	0.56	ERM-L15-SB03	11 - 12 ft	0.012 J	ERM-L21-SB11	0 - 2 ft	450
ERM-L06-SB02	10 - 11 ft	< 0.006	ERM-L15-SB03	7 - 8 ft	< 0.0059	ERM-L21-SB12	0 - 2 ft	0.05
ERM-L06-SB02	18 - 19 ft	< 0.0079	ERM-L15-SB04	0 - 1 ft	0.45	ERM-L22-SB01	0 - 1 ft	< 0.0059
ERM-L06-SB04	0 - 1 ft	0.29	ERM-L15-SB04	12.5 - 13.5 ft	< 0.0058	ERM-L22-SB01	12 - 13 ft	< 0.0059
ERM-L06-SB05	0 - 1 ft	0.045	ERM-L15-SB04	8.5 - 9 ft	0.03	ERM-L22-SB01	15 - 16 ft	0.0096 J
ERM-L06-SB06	0 - 1 ft	0.064	ERM-L16-SB01	0 - 1 ft	0.13	ERM-L22-SB02	0 - 1 ft	0.29
ERM-L06-SB06	13 - 14 ft	< 0.0062	ERM-L16-SB01	6 - 7 ft	< 0.0061	ERM-L22-SB02	10 - 11 ft	< 0.0059
ERM-L06-SB06	9 - 10 ft	< 0.006	ERM-L16-SB01	9 - 10 ft	< 0.0057	ERM-L22-SB02	19 - 20 ft	< 0.0058
ERM-L06-SB09	0 - 1 ft	0.25	ERM-L16-SB02	0 - 1 ft	< 1.2	ERM-L22-SB03	0 - 1 ft	< 0.029
ERM-L07-SB01	0 - 1 ft	< 0.059	ERM-L16-SB02	7 - 8 ft	< 0.0062	ERM-L22-SB03	11 - 12 ft	< 0.0061
ERM-L07-SB01	11 - 12 ft	< 0.0059	ERM-L16-SB02	9.5 - 10.5 ft	< 0.0058	ERM-L22-SB03	19 - 20 ft	< 0.0058
ERM-L07-SB01	22 - 23 ft	< 0.0059	ERM-L16-SB03	0 - 1 ft	0.58	ERM-L22-SB04	0 - 1 ft	0.3
ERM-L07-SB02	0 - 1 ft	< 0.0059	ERM-L16-SB03	7 - 8 ft	< 0.006	ERM-L22-SB04	10 - 11 ft	< 0.006
ERM-L07-SB02	10 - 11 ft	< 0.006	ERM-L16-SB03	9.5 - 10.5 ft	< 0.006	ERM-L22-SB04	19 - 20 ft	< 0.0055
ERM-L07-SB02	6 - 7 ft	< 0.0058	ERM-L16-SB04	0 - 1 ft	< 0.28	ERM-L22-SB05	0 - 1 ft	< 0.031
ERM-L08-SB01	0 - 1 ft	0.98	ERM-L16-SB04	11 - 12 ft	< 0.0059	ERM-L22-SB05	7 - 8 ft	0.031
ERM-L08-SB02	0 - 1 ft	3.7	ERM-L16-SB04	7 - 8 ft	< 0.0061	ERM-L22-SB06	0 - 1 ft	< 0.0059
ERM-L08-SB02	7.5 - 8.5 ft	< 0.0056	ERM-L17-SB01	0 - 1 ft	2.2	ERM-L22-SB06	10 - 11 ft	< 0.006
ERM-L09-SB01	0 - 1 ft	1.9	ERM-L17-SB01	15 - 16 ft	0.016 J	ERM-L22-SB06	18.5 - 19.5 ft	< 0.0071
ERM-L09-SB01	6 - 7 ft	< 0.0054	ERM-L17-SB01	8 - 9 ft	0.034	ERM-L23-SB01	0 - 1 ft	< 0.056
ERM-L09-SB02	0 - 1 ft	3.1	ERM-L17-SB02	0 - 1 ft	190	ERM-L23-SB02	0 - 1 ft	< 0.0059
ERM-L09-SB02	11.5 - 12.5 ft	< 0.006	ERM-L17-SB02	13.5 - 14.5 ft	18	ERM-L23-SB02	13 - 14 ft	< 0.006
ERM-L09-SB02	7 - 8 ft	< 0.011	ERM-L17-SB02	7 - 8 ft	0.021	ERM-L23-SB02	19 - 20 ft	< 0.006
ERM-L09-SB03	0 - 1 ft	2	ERM-L17-SB03	0 - 1 ft	24	ERM-L23-SB03	0 - 1 ft	3.8
ERM-L09-SB03	13 - 14 ft	< 0.0059	ERM-L17-SB04	0 - 1 ft	130	ERM-L23-SB03	6 - 7 ft	< 0.029
ERM-L09-SB03	6 - 7 ft	< 0.006	ERM-L17-SB04	14 - 15 ft	< 0.0053	ERM-L23-SB03	8 - 9 ft	0.34
ERM-L09-SB04	0 - 1 ft	2.6	ERM-L17-SB04	6 - 7 ft	0.026	ERM-L23-SB04	0 - 1 ft	42
ERM-L09-SB04	10 - 11 ft	< 0.0066	ERM-L17-SB05	0 - 1 ft	14	ERM-L23-SB04	6 - 7 ft	0.24
ERM-L09-SB04	13 - 14 ft	0.014 J	ERM-L17-SB05	6.5 - 7.5 ft	9.9	ERM-L23-SB04	9 - 10 ft	1.1
ERM-L10-SB01	0 - 1 ft	9.1	ERM-L17-SB06	0 - 1 ft	< 0.12	ERM-L23-SB05	0 - 1 ft	0.72
ERM-L10-SB01	14 - 15 ft	< 0.0057	ERM-L17-SB06	11 - 12 ft	< 0.0059	ERM-L23-SB05	10 - 11 ft	< 0.0059
ERM-L10-SB01	8 - 9 ft	0.19	ERM-L17-SB06	7 - 8 ft	< 0.0062	ERM-L23-SB05	7 - 8 ft	< 0.0057
ERM-L10-SB02	0 - 1 ft	9.1	ERM-L17-SB07	0 - 2 ft	8.7	ERM-L23-SB06	0 - 1 ft	0.32
ERM-L10-SB02	13 - 14 ft	< 0.032	ERM-L17-SB08	0 - 2 ft	72	ERM-L23-SB07	0 - 1 ft	1.1
ERM-L10-SB02	7 - 8 ft	< 0.0062	ERM-L17-SB09	0 - 2 ft	460	ERM-L23-SB08	0 - 1 ft	0.84
ERM-L10-SB03	0 - 1 ft	7.7	ERM-L17-SB10	0 - 2 ft	1600	ERM-L23-SB08	13 - 14 ft	< 0.29
ERM-L10-SB03	10 - 11 ft	< 0.0064	ERM-L17-SB11	0 - 2 ft	14	ERM-L24-SB01	0 - 1 ft	< 0.057
ERM-L10-SB04	0 - 1 ft	11	ERM-L17-SB11B	0 - 2 ft	10	ERM-L24-SB01	17 - 18 ft	< 0.0058
ERM-L10-SB04	5 - 10 ft	11 J	ERM-L17-SB12	0 - 2 ft	46	ERM-L24-SB01	9 - 10 ft	< 0.0059
ERM-L11-SB01	0 - 1 ft	0.91	ERM-L17-SB12B	0 - 2 ft	6.3	ERM-L24-SB02	0 - 1 ft	0.12
ERM-L11-SB01	11 - 12 ft	< 0.0061	ERM-L17-SB13	0 - 2 ft	0.94	ERM-L24-SB02	12.5 - 13.5 ft	< 0.0061
ERM-L11-SB01	8 - 9 ft	< 0.006	ERM-L17-SB13B	0 - 2 ft	17000	ERM-L24-SB02	17 - 18 ft	< 0.0057
ERM-L11-SB02	0 - 1 ft	0.49	ERM-L17-SB14	0 - 2 ft	5.2	ERM-L24-SB03	0 - 1 ft	< 0.0056
ERM-L11-SB02	13 - 14 ft	< 0.0055	ERM-L17-SB16B	0 - 2 ft	12000	ERM-L24-SB03	11 - 12 ft	< 0.0064
ERM-L11-SB02	7 - 8 ft	< 0.006	ERM-L18-SB01	0 - 1 ft	0.16	ERM-L24-SB03	7 - 8 ft	< 0.0059
ERM-L11-SB03	0 - 1 ft	< 0.03	ERM-L18-SB01	5 - 6 ft	0.008 J	ERM-L24-SB04	0 - 1 ft	0.0093 J
ERM-L11-SB03	12.5 - 13.5 ft	< 0.0061	ERM-L18-SB02	0 - 1 ft	< 0.059	ERM-L24-SB04	19 - 20 ft	< 0.0055
ERM-L11-SB03	8 - 9 ft	< 0.0062	ERM-L18-SB02	6 - 7 ft	< 0.0058	ERM-L24-SB04	6 - 7 ft	0.15
ERM-L11-SB04	0 - 1 ft	< 0.0064	ERM-L18-SB02	8 - 9 ft	< 0.006	ERM-L24-SB05	0 - 1 ft	0.071
ERM-L11-SB04	13.5 - 14.5 ft	< 0.0059	ERM-L18-SB03	0 - 1 ft	1.3	ERM-L24-SB05	11 - 12 ft	0.042
ERM-L11-SB04	8 - 9 ft	0.32	ERM-L18-SB03	10 - 11 ft	< 0.0059	ERM-L24-SB05	15 - 16 ft	0.032
ERM-L12-SB01	0 - 1 ft	0.65	ERM-L18-SB03	7 - 8 ft	< 0.006	ERM-L24-SB06	0 - 1 ft	0.034
ERM-L12-SB01	5.5 - 6.5 ft	< 0.0062	ERM-L18-SB04	0 - 1 ft	< 0.29	ERM-L24-SB06	17 - 18 ft	< 0.0056
ERM-L12-SB01	9 - 10 ft	< 0.0058	ERM-L18-SB04	15 - 16 ft	< 0.0057	ERM-L24-SB06	5 - 7 ft	< 0.034
ERM-L12-SB02	0 - 1 ft	2.4	ERM-L18-SB04	9 - 10 ft	< 0.006	ERM-L24-SB07	0 - 1 ft	0.067
ERM-L12-SB02	11 - 12 ft	< 0.0062	ERM-L19-SB01	0 - 1 ft	2	ERM-L24-SB07	8 - 9 ft	< 0.0064
ERM-L12-SB02	6 - 7 ft	< 0.0066	ERM-L19-SB01	7 - 8 ft	< 0.0055	ERM-L24-SB08	0 - 1 ft	0.036
ERM-L12-SB03	0 - 1 ft	< 0.03	ERM-L19-SB01	9 - 10 ft	0.35	ERM-L24-SB08	15 - 16 ft	0.028
ERM-L12-SB03	11 - 12 ft	0.0069 J	ERM-L19-SB02	0 - 1 ft	0.052 J	ERM-L24-SB08	21 - 22 ft	< 0.0059



Legend

Aroclor 1260 mg/kg:

- Non-Detect
- 0 - 10 mg/kg
- 10 - 100 mg/kg
- 100 - 1,000 mg/kg
- > 1,000 mg/kg
- Historical Building/Feature
- Parcel Boundary

NOTES:

1. < - Result non-detect at indicated detection limit
2. J - Result is between the method detection limit and quantification limit, and is estimated
3. ERM-L04-SB02 = Soil Sample ID for Soil Boring #2 on Lot #4
4. 5-10 Ft. = Depth Below Ground Surface
5. Aroclor 1260 100 = PCB Aroclor 1260 Analytical Results = 100 mg/kg
6. PCB Aroclor Results are in mg/kg

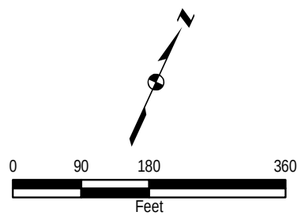


FIGURE 1

Site-Wide Aroclor 1260 Results in Soil
E. 10th Street Site
Marcus Hook, Pennsylvania

ERM

J:\Projects\FMC-MarcusHook_MXD\PCBS\FIGURE1-PCBSBreaker1mgkg_HistoricFootprint__20210930.mxd - steven.vickery - 10/13/2021

ATTACHMENT 1 POST-REMEDIATION AROCLOR 1260 DATASET AND UCL CALCULATIONS

Predicted Post-Remediation Aroclor 1260 Site-Wide Shallow Soil Dataset
East 10th Street Site, Marcus Hook, Pennsylvania

SYS_LOC_CODE	SAMPLE_DATE	START_DEPTH	END_DEPTH	DEPTH_UNIT	CHEMICAL_NAME	concentration	REPORT_RESULT_UNIT	d_concentration
ERM-L17-SB13B	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB16B	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB10	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB09	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB02	Clean Fill	0	1	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB04	Clean Fill	0	1	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB08	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB12	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L21-SB08	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L21-SB11	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
ERM-L21-SB06	Clean Fill	0	1	ft	Aroclor 1260	100	ug/kg	1
ERM-L17-SB07	Clean Fill	0	2	ft	Aroclor 1260	100	ug/kg	1
Post-ex1	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
Post-ex2	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
Post-ex3	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
Post-ex4	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
Post-ex5	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
Post-ex6	Sidewall	0	2	ft	Aroclor 1260	46000	ug/kg	1
ERM-L23-SB04	12/22/2015	0	1	ft	Aroclor 1260	42000	ug/kg	1
ERM-L21-SB07	4/18/2017	0	2	ft	Aroclor 1260	32000	ug/kg	1
ERM-L17-SB03	12/14/2015	0	1	ft	Aroclor 1260	24000	ug/kg	1
ERM-L20-SB04	12/14/2015	0	1	ft	Aroclor 1260	17000	ug/kg	1
ERM-L17-SB05	12/14/2015	0	1	ft	Aroclor 1260	14000	ug/kg	1
ERM-L17-SB11	4/18/2017	0	2	ft	Aroclor 1260	14000	ug/kg	1
ERM-L21-SB09	4/18/2017	0	2	ft	Aroclor 1260	12000	ug/kg	1
ERM-L10-SB04	12/16/2015	0	1	ft	Aroclor 1260	11000	ug/kg	1
ERM-L17-SB11B	7/21/2017	0	2	ft	Aroclor 1260	10000	ug/kg	1
ERM-L10-SB01	12/15/2015	0	1	ft	Aroclor 1260	9100	ug/kg	1
ERM-L10-SB02	12/15/2015	0	1	ft	Aroclor 1260	9100	ug/kg	1
ERM-L13-SB04	12/22/2015	0	1	ft	Aroclor 1260	8300	ug/kg	1
ERM-L10-SB03	12/15/2015	0	1	ft	Aroclor 1260	7700	ug/kg	1
ERM-L20-SB03	12/14/2015	0	1	ft	Aroclor 1260	7200	ug/kg	1
ERM-L21-SB01	12/14/2015	0	1	ft	Aroclor 1260	6800	ug/kg	1
ERM-L17-SB12B	7/21/2017	0	2	ft	Aroclor 1260	6300	ug/kg	1
ERM-L21-SB10	4/18/2017	0	2	ft	Aroclor 1260	5900	ug/kg	1
ERM-L13-SB03	12/22/2015	0	1	ft	Aroclor 1260	5800	ug/kg	1
ERM-L17-SB14	4/18/2017	0	2	ft	Aroclor 1260	5200	ug/kg	1
ERM-L15-SB03	12/14/2015	0	1	ft	Aroclor 1260	4700	ug/kg	1
ERM-L13-SB02	12/22/2015	0	1	ft	Aroclor 1260	3800	ug/kg	1
ERM-L23-SB03	12/22/2015	0	1	ft	Aroclor 1260	3800	ug/kg	1
ERM-L08-SB02	12/15/2015	0	1	ft	Aroclor 1260	3700	ug/kg	1
ERM-L20-SB02	12/14/2015	0	1	ft	Aroclor 1260	3700	ug/kg	1
ERM-L21-SB05	12/14/2015	0	1	ft	Aroclor 1260	3500	ug/kg	1
ERM-L09-SB02	12/15/2015	0	1	ft	Aroclor 1260	3100	ug/kg	1
ERM-L15-SB02	12/15/2015	0	1	ft	Aroclor 1260	2800	ug/kg	1
ERM-L09-SB04	12/16/2015	0	1	ft	Aroclor 1260	2600	ug/kg	1
ERM-L12-SB02	12/22/2015	0	1	ft	Aroclor 1260	2400	ug/kg	1
ERM-L12-SB06	12/22/2015	0	1	ft	Aroclor 1260	2200	ug/kg	1
ERM-L17-SB01	12/14/2015	0	1	ft	Aroclor 1260	2200	ug/kg	1
ERM-L21-SB02	12/14/2015	0	1	ft	Aroclor 1260	2200	ug/kg	1
ERM-L09-SB03	12/16/2015	0	1	ft	Aroclor 1260	2000	ug/kg	1
ERM-L19-SB01	3/3/2016	0	1	ft	Aroclor 1260	2000	ug/kg	1
ERM-L09-SB01	12/16/2015	0	1	ft	Aroclor 1260	1900	ug/kg	1
ERM-L19-SB06	3/3/2016	0	1	ft	Aroclor 1260	1800	ug/kg	1
ERM-L01-SB05	10/14/2015	0	1	ft	Aroclor 1260	1600	ug/kg	1
ERM-L20-SB01	12/14/2015	0	1	ft	Aroclor 1260	1500	ug/kg	1
ERM-L12-SB04	12/22/2015	0	1	ft	Aroclor 1260	1300	ug/kg	0
ERM-L13-SB01	12/22/2015	0	1	ft	Aroclor 1260	1300	ug/kg	1
ERM-L18-SB03	3/4/2016	0	1	ft	Aroclor 1260	1300	ug/kg	1
ERM-L16-SB02	3/3/2016	0	1	ft	Aroclor 1260	1200	ug/kg	0
ERM-L23-SB07	12/21/2015	0	1	ft	Aroclor 1260	1100	ug/kg	1
ERM-L12-SB05	12/22/2015	0	1	ft	Aroclor 1260	1000	ug/kg	1
ERM-L08-SB01	12/15/2015	0	1	ft	Aroclor 1260	980	ug/kg	1
ERM-L01-SB04	10/14/2015	0	1	ft	Aroclor 1260	960	ug/kg	1
ERM-L17-SB13	4/18/2017	0	2	ft	Aroclor 1260	940	ug/kg	1
ERM-L11-SB01	12/22/2015	0	1	ft	Aroclor 1260	910	ug/kg	1
ERM-L14-SB04	12/16/2015	0	1	ft	Aroclor 1260	860	ug/kg	1

Predicted Post-Remediation Aroclor 1260 Site-Wide Shallow Soil Dataset
East 10th Street Site, Marcus Hook, Pennsylvania

SYS_LOC_CODE	SAMPLE_DATE	START_DEPTH	END_DEPTH	DEPTH_UNIT	CHEMICAL_NAME	concentration	REPORT_RESULT_UNIT	d_concentration
ERM-L23-SB08	12/21/2015	0	1	ft	Aroclor 1260	840	ug/kg	1
ERM-L15-SB01	12/15/2015	0	1	ft	Aroclor 1260	800	ug/kg	1
ERM-L23-SB05	12/22/2015	0	1	ft	Aroclor 1260	720	ug/kg	1
ERM-L12-SB01	12/22/2015	0	1	ft	Aroclor 1260	650	ug/kg	1
ERM-L04-SB01	10/15/2015	0	1	ft	Aroclor 1260	590	ug/kg	1
ERM-L16-SB03	3/3/2016	0	1	ft	Aroclor 1260	580	ug/kg	1
ERM-L06-SB02	12/17/2015	0	1	ft	Aroclor 1260	560	ug/kg	1
ERM-L04-SB02	10/15/2015	0	1	ft	Aroclor 1260	540	ug/kg	1
ERM-L11-SB02	12/16/2015	0	1	ft	Aroclor 1260	490	ug/kg	1
ERM-L15-SB04	12/14/2015	0	1	ft	Aroclor 1260	450	ug/kg	1
ERM-L21-SB03	12/14/2015	0	1	ft	Aroclor 1260	350	ug/kg	1
ERM-L14-SB02	12/16/2015	0	1	ft	Aroclor 1260	340	ug/kg	1
ERM-L23-SB06	12/21/2015	0	1	ft	Aroclor 1260	320	ug/kg	1
ERM-L22-SB04	10/14/2015	0	1	ft	Aroclor 1260	300	ug/kg	1
ERM-L06-SB04	12/17/2015	0	1	ft	Aroclor 1260	290	ug/kg	1
ERM-L18-SB04	3/3/2016	0	1	ft	Aroclor 1260	290	ug/kg	0
ERM-L22-SB02	10/14/2015	0	1	ft	Aroclor 1260	290	ug/kg	1
ERM-L16-SB04	3/3/2016	0	1	ft	Aroclor 1260	280	ug/kg	0
ERM-L21-SB04	12/14/2015	0	1	ft	Aroclor 1260	280	ug/kg	1
ERM-L06-SB08	12/17/2015	0	1	ft	Aroclor 1260	250	ug/kg	1
ERM-L14-SB03	12/16/2015	0	1	ft	Aroclor 1260	230	ug/kg	1
ERM-L19-SB05	3/3/2016	0	1	ft	Aroclor 1260	200	ug/kg	1
ERM-L19-SB03	3/3/2016	0	1	ft	Aroclor 1260	170	ug/kg	1
ERM-L18-SB01	3/3/2016	0	1	ft	Aroclor 1260	160	ug/kg	1
ERM-L03-SB01	12/17/2015	0	1	ft	Aroclor 1260	150	ug/kg	1
ERM-L16-SB01	3/3/2016	0	1	ft	Aroclor 1260	130	ug/kg	1
ERM-L17-SB06	12/14/2015	0	1	ft	Aroclor 1260	120	ug/kg	0
ERM-L24-SB02	10/14/2015	0	1	ft	Aroclor 1260	120	ug/kg	1
ERM-L19-SB04	3/3/2016	0	1	ft	Aroclor 1260	77	ug/kg	1
ERM-L24-SB05	10/15/2015	0	1	ft	Aroclor 1260	71	ug/kg	1
ERM-L01-SB02	12/17/2015	0	1	ft	Aroclor 1260	69	ug/kg	1
ERM-L01-SB03	12/17/2015	0	1	ft	Aroclor 1260	67	ug/kg	1
ERM-L24-SB07	10/15/2015	0	1	ft	Aroclor 1260	67	ug/kg	1
ERM-L06-SB06	12/17/2015	0	1	ft	Aroclor 1260	64	ug/kg	1
ERM-L07-SB01	12/17/2015	0	1	ft	Aroclor 1260	59	ug/kg	0
ERM-L18-SB02	3/3/2016	0	1	ft	Aroclor 1260	59	ug/kg	0
ERM-L24-SB01	10/14/2015	0	1	ft	Aroclor 1260	57	ug/kg	0
ERM-L23-SB01	12/21/2015	0	1	ft	Aroclor 1260	56	ug/kg	0
ERM-L19-SB02	3/3/2016	0	1	ft	Aroclor 1260	52	ug/kg	1
ERM-L21-SB12	7/21/2017	0	2	ft	Aroclor 1260	50	ug/kg	1
ERM-L06-SB05	12/17/2015	0	1	ft	Aroclor 1260	45	ug/kg	1
ERM-L24-SB08	10/19/2015	0	1	ft	Aroclor 1260	36	ug/kg	1
ERM-L24-SB06	10/15/2015	0	1	ft	Aroclor 1260	34	ug/kg	1
ERM-L22-SB05	10/14/2015	0	1	ft	Aroclor 1260	31	ug/kg	0
ERM-L11-SB03	12/22/2015	0	1	ft	Aroclor 1260	30	ug/kg	0
ERM-L12-SB03	12/22/2015	0	1	ft	Aroclor 1260	30	ug/kg	0
ERM-L22-SB03	10/14/2015	0	1	ft	Aroclor 1260	29	ug/kg	0
ERM-L24-SB04	10/15/2015	0	1	ft	Aroclor 1260	9.3	ug/kg	1
ERM-L02-SB02	12/17/2015	0	1	ft	Aroclor 1260	6.8	ug/kg	1
ERM-L11-SB04	12/22/2015	0	1	ft	Aroclor 1260	6.4	ug/kg	0
ERM-L06-SB01	12/17/2015	0	1	ft	Aroclor 1260	6	ug/kg	0
ERM-L07-SB02	12/23/2015	0	1	ft	Aroclor 1260	5.9	ug/kg	0
ERM-L22-SB01	10/14/2015	0	1	ft	Aroclor 1260	5.9	ug/kg	0
ERM-L22-SB06	10/14/2015	0	1	ft	Aroclor 1260	5.9	ug/kg	0
ERM-L23-SB02	12/21/2015	0	1	ft	Aroclor 1260	5.9	ug/kg	0
ERM-L01-SB01	12/17/2015	0	1	ft	Aroclor 1260	5.7	ug/kg	0
ERM-L02-SB01	12/17/2015	0	1	ft	Aroclor 1260	5.7	ug/kg	0
ERM-L24-SB03	10/15/2015	0	1	ft	Aroclor 1260	5.6	ug/kg	0
ERM-L03-SB02	12/17/2015	0	1	ft	Aroclor 1260	5.5	ug/kg	0

1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3			User Selected Options									
4			Date/Time of Computation	ProUCL 5.11/13/2022 12:17:46 PM								
5			From File	Aroclor1260_shallow_all_INPUT-postex.xls								
6			Full Precision	OFF								
7			Confidence Coefficient	95%								
8			Number of Bootstrap Operations	2000								
9												
10	**concentration**											
11												
12	**General Statistics**											
13				Total Number of Observations	126			Number of Distinct Observations	90			
14				Number of Detects	103			Number of Non-Detects	23			
15				Number of Distinct Detects	77			Number of Distinct Non-Detects	17			
16				Minimum Detect	6.8			Minimum Non-Detect	5.5			
17				Maximum Detect	46000			Maximum Non-Detect	1300			
18				Variance Detects	1.407E+8			Percent Non-Detects	18.25%			
19				Mean Detects	5785			SD Detects	11863			
20				Median Detects	910			CV Detects	2.051			
21				Skewness Detects	2.722			Kurtosis Detects	6.4			
22				Mean of Logged Detects	6.81			SD of Logged Detects	2.125			
23												
24	**Normal GOF Test on Detects Only**											
25				Shapiro Wilk Test Statistic	0.514			**Normal GOF Test on Detected Observations Only**				
26				5% Shapiro Wilk P Value	0			Detected Data Not Normal at 5% Significance Level				
27				Lilliefors Test Statistic	0.314			**Lilliefors GOF Test**				
28				5% Lilliefors Critical Value	0.0876			Detected Data Not Normal at 5% Significance Level				
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32				KM Mean	4736			KM Standard Error of Mean	976			
33				KM SD	10903			95% KM (BCA) UCL	6464			
34				95% KM (t) UCL	6353			95% KM (Percentile Bootstrap) UCL	6339			
35				95% KM (z) UCL	6341			95% KM Bootstrap t UCL	6685			
36				90% KM Chebyshev UCL	7664			95% KM Chebyshev UCL	8990			
37				97.5% KM Chebyshev UCL	10831			99% KM Chebyshev UCL	14447			
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40				A-D Test Statistic	3.801			**Anderson-Darling GOF Test**				
41				5% A-D Critical Value	0.853			Detected Data Not Gamma Distributed at 5% Significance Level				
42				K-S Test Statistic	0.138			**Kolmogorov-Smirnov GOF**				
43				5% K-S Critical Value	0.0955			Detected Data Not Gamma Distributed at 5% Significance Level				
44	**Detected Data Not Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47				k hat (MLE)	0.361			k star (bias corrected MLE)	0.357			
48				Theta hat (MLE)	16023			Theta star (bias corrected MLE)	16205			
49				nu hat (MLE)	74.38			nu star (bias corrected)	73.55			
50				Mean (detects)	5785							
51												

	A	B	C	D	E	F	G	H	I	J	K	L
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	4729	
59					Maximum	46000				Median	400	
60					SD	10949				CV	2.315	
61					k hat (MLE)	0.197				k star (bias corrected MLE)	0.198	
62					Theta hat (MLE)	23955				Theta star (bias corrected MLE)	23884	
63					nu hat (MLE)	49.75				nu star (bias corrected)	49.9	
64					Adjusted Level of Significance (β)	0.0481						
65					Approximate Chi Square Value (49.90, α)	34.68				Adjusted Chi Square Value (49.90, β)	34.53	
66					95% Gamma Approximate UCL (use when n>=50)	6805				95% Gamma Adjusted UCL (use when n<50)	6834	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	4736				SD (KM)	10903	
70					Variance (KM)	1.189E+8				SE of Mean (KM)	976	
71					k hat (KM)	0.189				k star (KM)	0.189	
72					nu hat (KM)	47.54				nu star (KM)	47.75	
73					theta hat (KM)	25100				theta star (KM)	24995	
74					80% gamma percentile (KM)	6058				90% gamma percentile (KM)	14310	
75					95% gamma percentile (KM)	24740				99% gamma percentile (KM)	53715	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (47.75, α)	32.89				Adjusted Chi Square Value (47.75, β)	32.74	
79					95% Gamma Approximate KM-UCL (use when n>=50)	6875				95% Gamma Adjusted KM-UCL (use when n<50)	6905	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Approximate Test Statistic	0.955				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk P Value	0.00652				Detected Data Not Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.093				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.0876				Detected Data Not Lognormal at 5% Significance Level		
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	4734				Mean in Log Scale	6.045	
90					SD in Original Scale	10947				SD in Log Scale	2.55	
91					95% t UCL (assumes normality of ROS data)	6350				95% Percentile Bootstrap UCL	6386	
92					95% BCA Bootstrap UCL	6759				95% Bootstrap t UCL	6637	
93					95% H-UCL (Log ROS)	26715						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	5.98				KM Geo Mean	395.3	
97					KM SD (logged)	2.645				95% Critical H Value (KM-Log)	4.054	
98					KM Standard Error of Mean (logged)	0.239				95% H-UCL (KM -Log)	34122	
99					KM SD (logged)	2.645				95% Critical H Value (KM-Log)	4.054	
100					KM Standard Error of Mean (logged)	0.239						
101												
102	**DL/2 Statistics**											

	A	B	C	D	E	F	G	H	I	J	K	L
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	4744					Mean in Log Scale	6.058
105					SD in Original Scale	10943					SD in Log Scale	2.605
106					95% t UCL (Assumes normality)	6359					95% H-Stat UCL	32307
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Data do not follow a Discernible Distribution at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					95% KM (Chebyshev) UCL	8990						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

ATTACHMENT 2 POST-REMEDIATION RESIDUAL RISK CALCULATIONS

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil (Surface)
Exposure Medium:	Soil
Exposure Point:	Soil (0-2')

Chemical of Potential Concern	Soil EPC [1] mg/kg	PADEP Particulate Transport Factor [2] (mg/kg)(mg/m^3)	Particulates in Air Concentration [3] (mg/m^3)	PADEP Volatile Transport Factor [4] (mg/kg)(mg/m^3)	Volatiles in Air Concentration [5] (mg/m^3)	Sum of Particulates plus Volatiles EPCs (mg/m^3)
Aroclor-1260	8.99E+00	1.00E+10	9.0E-10	NV	NV	9.0E-10
Antimony	8.69E+01	1.00E+10	8.7E-09	NV	NV	8.7E-09
Arsenic	1.77E+01	1.00E+10	1.8E-09	NV	NV	1.8E-09
benzo(a)anthracene	4.45E+00	1.00E+10	4.5E-10	NV	NV	4.5E-10
benzo(a)pyrene	3.73E+00	1.00E+10	3.7E-10	NV	NV	3.7E-10
benzo(b)fluoranthene	4.72E+00	1.00E+10	4.7E-10	NV	NV	4.7E-10
benzo(k)fluoranthene	2.16E+00	1.00E+10	2.2E-10	NV	NV	2.2E-10
Mercury	4.54E+00	1.00E+10	4.5E-10	NV	NV	4.5E-10
Vanadium	2.39E+02	1.00E+10	2.4E-08	NV	NV	2.4E-08

(1) Exposure Point Concentration (EPC) equals the 95% Upper Confidence Limit (UCL) on the mean concentration calculated by ProUCL

(2) Particulate Transport Factor (TF) = 1×10^{10} m^3/kg (PADEP default)

(3) Particulates in Air Concentration = Soil EPC / Particulate TF

(4) Volatile Transport Factor (TF) is chemical-specific, calculated by PADEP

(5) Volatiles in Air Concentration = Soil EPC / Volatilization TF

NV = PADEP TF value not available/applicat

VALUES USED FOR DAILY INTAKE CALCULATIONS

East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil (Surface)
Exposure Medium:	Soil
Exposure Point:	Soil (0-2')
Receptor Population:	Commercial Worker
Receptor Age:	Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSoil	Chemical Concentration in Soil	mg/kg soil	Chemical-Specific	See Risk Calculation Sheets	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR_{soil}	Ingestion Rate of Soil	mg soil/day	50	PADEP non-residential default	CSoil x IR_{soil} x CF x FI x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	0.000001	--	
	FI	Fraction Ingested from Contaminated Source	--	1	PADEP default	
	EF	Exposure Frequency	days/yr	155	Assumes that in addition to the ground being frozen 100 days per year (the basis for the PADEP default of 180 days) that there are 51 days per year with rain events =/> 0.25" rain . [51 days/365 days = 14% is the proportion of significant rain events; 0.14 * 180 = 25 days with significant rain events; 180 – 25	
	ED	Exposure Duration	yr	25	PADEP non-residential default	
	BW	Body Weight	kg	80	PADEP default adult body weight	
	AT_c	Averaging Time for Carcinogens	days	25,550	USEPA 1989	
	AT_{nc}	Averaging Time for Noncarcinogens	days	9125	USEPA 1989	

VALUES USED FOR DAILY INTAKE CALCULATIONS
East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil (Surface)
Exposure Medium:	Soil
Exposure Point:	Air
Receptor Population:	Commercial Worker
Receptor Age:	Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Chemical Concentration in Particulate Air	mg/m^3	Chemical-Specific	See Risk Calculation Sheets	Exposure Concentration (EC) (mg/m^3) = (CA x ET x EF x ED)/AT
	ET	Exposure Time - Outdoor	hr/day	8	PADEP non-residential default	
	EF	Exposure Frequency - Outdoor	days/yr	155	Assumes that in addition to the ground being frozen 100 days per year (the basis for the PADEP default of 180 days) that there are 51 days per year with rain events =/> 0.25" rain . [51 days/365 days = 14% is the proportion of significant rain events; 0.14 * 180 = 25 days with significant rain events; 180 – 25	
	ED	Exposure Duration	yr	25	PADEP non-residential default	
	AT_c	Averaging Time for Carcinogens	hours	613,200	USEPA 2009	
	AT_{nc}	Averaging Time for Noncarcinogens	hours	219,000	USEPA 2009	

CALCULATION OF NON-CANCER HAZARDS AND CANCER RISKS -- INGESTION

East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil (Surface)
Exposure Medium:	Soil
Exposure Point:	Soil (0-2')
Receptor Population:	Commercial Worker
Receptor Age:	Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Hazard Quotient	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aroclor-1260	8.99E+00	mg/kg	8.99E+00	mg/kg	M	2.4E-06	mg/kg-day	N/A	mg/kg-day	- -	8.5E-07	mg/kg-day	2.00E+00	kg-day/mg	1.7E-06
	Antimony	8.69E+01	mg/kg	8.69E+01	mg/kg	M	2.3E-05	mg/kg-day	4.0E-04	mg/kg-day	5.8E-02	8.2E-06	mg/kg-day	N/A	kg-day/mg	- -
	Arsenic	1.77E+01	mg/kg	1.77E+01	mg/kg	M	4.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02	1.7E-06	mg/kg-day	1.50E+00	kg-day/mg	2.5E-06
	benzo(a)anthracene	4.45E+00	mg/kg	4.45E+00	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	- -	4.2E-07	mg/kg-day	7.00E-01	kg-day/mg	3.0E-07
	benzo(a)pyrene	3.73E+00	mg/kg	3.73E+00	mg/kg	M	9.9E-07	mg/kg-day	3.0E-04	mg/kg-day	3.3E-03	3.5E-07	mg/kg-day	1.00E+00	kg-day/mg	3.5E-07
	benzo(b)fluoranthene	4.72E+00	mg/kg	4.72E+00	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	- -	4.5E-07	mg/kg-day	1.20E+00	kg-day/mg	5.4E-07
	benzo(k)fluoranthene	2.16E+00	mg/kg	2.16E+00	mg/kg	M	5.7E-07	mg/kg-day	N/A	mg/kg-day	- -	2.0E-07	mg/kg-day	1.20E+00	kg-day/mg	2.5E-07
	Mercury	4.54E+00	mg/kg	4.54E+00	mg/kg	M	1.2E-06	mg/kg-day	1.6E-04	mg/kg-day	7.5E-03	4.3E-07	mg/kg-day	N/A	kg-day/mg	- -
	Vanadium	2.39E+02	mg/kg	2.39E+02	mg/kg	M	6.3E-05	mg/kg-day	7.0E-05	mg/kg-day	9.1E-01	2.3E-05	mg/kg-day	N/A	kg-day/mg	- -
											9.9E-01					**5.7E-06**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

CALCULATION OF NON-CANCER HAZARDS AND CANCER RISKS -- INHALATION

East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil (Surface)
Exposure Medium:	Soil
Exposure Point:	Air
Receptor Population:	Commercial Worker
Receptor Age:	Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value (2)	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient	Intake (Cancer)	Intake (Cancer) Units	IUR	IUR units	Cancer Risk
Inhalation	Aroclor-1260	8.99E+00	mg/kg	8.99E-10	mg/m^3	R	1.3E-10	mg/m3	N/A	mg/m3	- -	4.5E-11	mg/m3	1.00E-04	m3/ug	4.5E-12
	Antimony	8.69E+01	mg/kg	8.69E-09	mg/m^3	R	1.2E-09	mg/m3	N/A	mg/m3	- -	4.4E-10	mg/m3	N/A	m3/ug	- -
	Arsenic	1.77E+01	mg/kg	1.77E-09	mg/m^3	R	2.5E-10	mg/m3	1.50E-05	mg/m3	1.7E-05	9.0E-11	mg/m3	4.30E-03	m3/ug	3.8E-10
	benzo(a)anthracene	4.45E+00	mg/kg	4.45E-10	mg/m^3	R	6.3E-11	mg/m3	N/A	mg/m3	- -	2.3E-11	mg/m3	1.10E-04	m3/ug	2.5E-12
	benzo(a)pyrene	3.73E+00	mg/kg	3.73E-10	mg/m^3	R	5.3E-11	mg/m3	2.00E-06	mg/m3	2.6E-05	1.9E-11	mg/m3	6.00E-04	m3/ug	1.1E-11
	benzo(b)fluoranthene	4.72E+00	mg/kg	4.72E-10	mg/m^3	R	6.7E-11	mg/m3	N/A	mg/m3	- -	2.4E-11	mg/m3	1.10E-04	m3/ug	2.6E-12
	benzo(k)fluoranthene	2.16E+00	mg/kg	2.16E-10	mg/m^3	R	3.1E-11	mg/m3	N/A	mg/m3	- -	1.1E-11	mg/m3	1.10E-04	m3/ug	1.2E-12
	Mercury	4.54E+00	mg/kg	4.54E-10	mg/m^3	R	6.4E-11	mg/m3	3.00E-04	mg/m3	2.1E-07	2.3E-11	mg/m3	N/A	m3/ug	- -
	Vanadium	2.39E+02	mg/kg	2.39E-08	mg/m^3	R	3.4E-09	mg/m3	1.00E-04	mg/m3	3.4E-05	1.2E-09	mg/m3	NA	m3/ug	- -
											7.7E-05					**4.1E-10**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Sum of EPCs for particulate and volatile emissions.

SUMMARY OF NON-CANCER HAZARDS AND CANCER RISKS

East 10th Street Site, Marcus Hook, Pennsylvania

Scenario Timeframe:	Current/Future
Receptor Population:	Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Non-Carcinogenic Hazard Quotient				Chemical	Carcinogenic Risk		
				Primary Target Organ System(s)	Ingestion	Inhalation	Exposure Routes Total		Ingestion	Inhalation	Exposure Routes Total
Soil	Soil	Soil (0-2')	Aroclor-1260	- -	- -	- -	- -	Aroclor 1260	1.7E-06	4.5E-12	1.7E-06
			Antimony	Blood (Circulatory)	5.8E-02	- -	5.8E-02	Antimony	- -	- -	- -
			Arsenic	Skin	1.6E-02	1.7E-05	1.6E-02	Arsenic	2.5E-06	3.8E-10	2.5E-06
			benzo(a)anthracene	- -	- -	- -	- -	benzo(a)anthracene	3.0E-07	2.5E-12	3.0E-07
			benzo(a)pyrene	Developmental	3.3E-03	2.6E-05	3.3E-03	benzo(a)pyrene	3.5E-07	1.1E-11	3.5E-07
			benzo(b)fluoranthene	- -	- -	- -	- -	benzo(b)fluoranthene	5.4E-07	2.6E-12	5.4E-07
			benzo(k)fluoranthene	- -	- -	- -	- -	benzo(k)fluoranthene	2.5E-07	1.2E-12	2.5E-07
			Mercury	CNS; Kidney; Developmenta	7.5E-03	2.1E-07	7.5E-03	Mercury	- -	- -	- -
			Vanadium	Kidney	9.1E-01	3.4E-05	9.1E-01	Vanadium	- -	- -	- -
			(Total)		9.9E-01	7.7E-05	**9.9E-01**	(Total)	5.7E-06	4.1E-10	**5.7E-06**

APPENDIX B REMEDIATION DRAWINGS

SOIL REMEDIATION PROJECT

MARCUS HOOK, PENNSYLVANIA

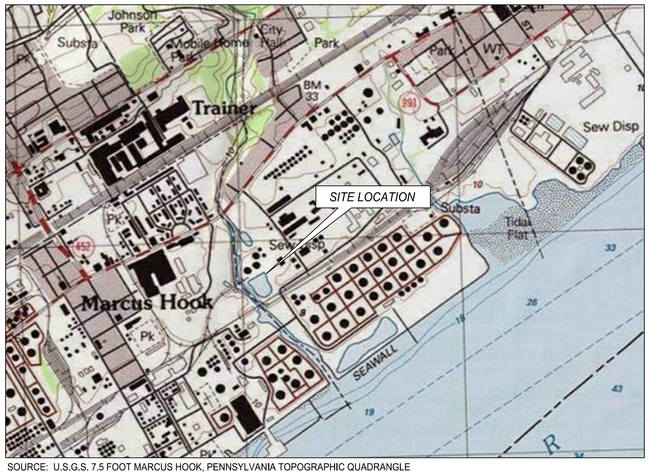
SITE VICINITY MAP

SOURCE: BING

0 200 400

SCALE (IN FEET)

SITE LOCATION MAP



SOURCE: U.S.G.S. 7.5 FOOT MARCUS HOOK, PENNSYLVANIA TOPOGRAPHIC QUADRANGLE

0 1,000 2,000

SCALE (IN FEET)

REVISION 0

OCTOBER 2021

PREPARED FOR
FMC CORPORATION

DRAWING INDEX

PREPARED BY

ERM

Environmental Resources Management

Philadelphia, Pennsylvania Office
75 Valley Stream Parkway | Suite 200
Malvern, PA| 19355 484-913-0300

EXISTING CONCRETE PAD MAY BE USED FOR EQUIPMENT LAYDOWN

LIMITS OF DISTURBANCE 17,411 SF

ROCK CONSTRUCTION ENTRANCE 1

02

SURFACE SOIL (0-2 FT BGS) EXCAVATION AREA 1 3,880 SF (SEE NOTE 4,5)

DISTURBED AREAS OUTSIDE DGA PLACEMENT SHALL BE STABILIZED ACCORDING TO THE PA CODE CHAPTER 102 E&S REQUIREMENTS

DISTURBED AREAS OUTSIDE DGA PLACEMENT SHALL BE STABILIZED ACCORDING TO THE PA CODE CHAPTER 102 E&S REQUIREMENTS

04

PROPOSED ACCESS ROAD

SURFACE SOIL (0-2 FT BGS) EXCAVATION AREA 2 309 SF (SEE NOTE 4,5)

LIMITS OF DISTURBANCE 6,286 SF

02

ROCK CONSTRUCTION ENTRANCE 2

PENN AVENUE

LOT 15

LOT 17

MW-5

MW-6

MW-7

SB01 SB02 SB03 SB04 SB07 SB08 SB09 SB10 SB11B SB12B SB13B SB14B SB16B SB17 SB11 SB12 SB13

346 DRAIN

348 349 STORM MH

354 STORM MH

269 INLETF

265 INLETF

SEWER MH

LEGEND

- PROPERTY LINE
- FENCE
- PAD
- ROAD
- SEWER LINE
- DRIVE
- FOUNDATION OF FORMER BUILDING
- EXISTING ACCESS ROAD
- TUNNEL LOCATION
- MW-12 MONITORING WELL
- DRAIN 346 STORM DRAIN
- INLETF 269 STORM INLET
- SEWER MH 283 SEWER MANHOLE
- 26.0 1-FT ELEVATION CONTOUR
- SB12 SB08 SB02 SOIL SAMPLE EXCEEDED ACT 2 SOIL MEDIUM SPECIFIC CONCENTRATION
- SB11B SB07 SB13 SB03 SOIL SAMPLE DID NOT EXCEED ACT 2 SOIL MEDIUM SPECIFIC CONCENTRATION
- LOCATION TARGETED FOR EXCAVATION
- ROCK CONSTRUCTION ENTRANCE
- SURFACE SOIL (0-2 FT BGS) EXCAVATION AREA
- FS FILTER SOCK (SEE DETAIL 01)
- LOD LIMITS OF DISTURBANCE

NOTES:

1. THE COMPLETE SOIL SAMPLE IDENTIFICATION IS: ERM - LOT NUMBER(L#) - SOIL ID AS SHOWN IN THE DRAWING. EXAMPLE: DRAWING SOIL ID SB13, COMPLETE SOIL ID IS ERM-L15-SB13.
2. THE TOTAL LIMITS OF DISTURBANCE FOR BOTH AREAS IS 23,697 SF.
3. INLET PROTECTION LOCATIONS ARE NOT SPECIFIED IN PLAN VIEW. FILTER BAG INLET PROTECTION SHALL BE INSTALLED IN ALL STORMWATER INLETS WITHIN EITHER LIMITS OF DISTURBANCE.
4. EXCAVATION AREAS SHALL BE BACKFILLED AS PER THE SPECIFICATIONS.
5. BACKFILL EXCAVATION WITH DGA/2A TO EXISTING GRADE AND TO PROVIDE POSITIVE DRAINAGE.

0 20 40

SCALE (IN FEET)

Know what's below. Call before you dig.

Rev.	Date	Description	By	Chk

DRAWN BY KB | CADD Review MP | CHECKED BY JH

Environmental Resources Management, Inc.

ERM

SOIL REMEDIATION PROJECT
FMC CORPORATION
EAST 10TH STREET SITE
MARCUS HOOK, PA

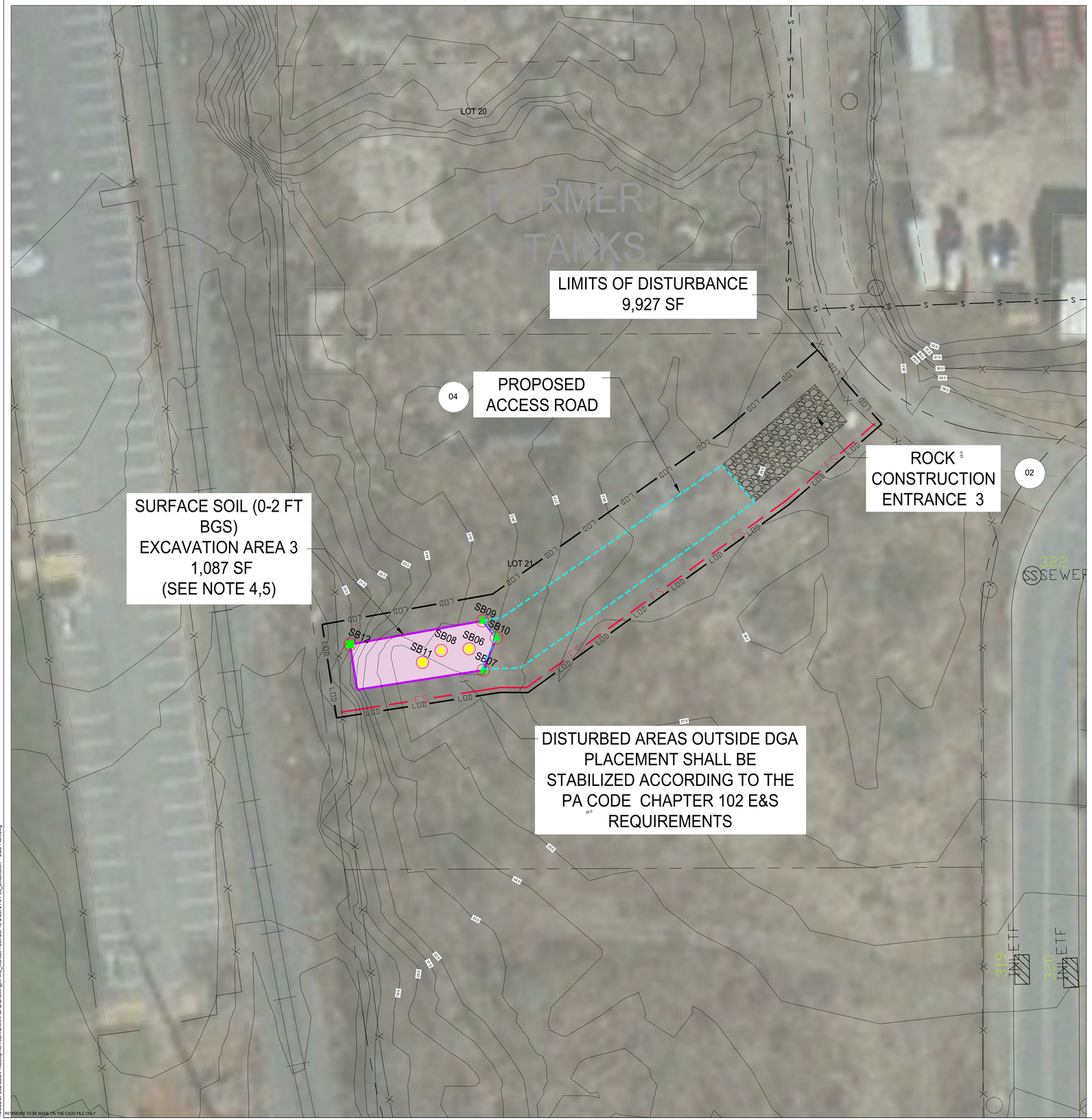
LOT 17 EXCAVATION, BACKFILL, AND SEDIMENT CONTROL PLAN

SCALE	PROJECT NUMBER	DRAWING	REV.
AS SHOWN	0615639	01	0

DATE DRAWN OCTOBER 2021

I:\SBD\CF502\data\Philadelphia\Team\DMW\CADD\Drawings\FMC_Marcus Hook\Lot 15 & Lot 21\01-02_Excavation + E&S Plan.dwg

REVISIONS TO BE MADE ON THE CADD FILE ONLY



LEGEND

- PROPERTY LINE
- FENCE
- PAD
- ROAD
- SEWER LINE
- DRIVE
- PROPOSED ACCESS ROAD
- RAILROAD
- MW-12 — MONITORING WELL
- DRAIN 346 — STORM DRAIN
- INLETF 269 — STORM INLET
- SEWER MH 283 — SEWER MANHOLE
- 26.0 — 1-FT ELEVATION CONTOUR
- SB12 SB08 SB02 — SOIL SAMPLE EXCEEDED ACT 2 SOIL MEDIUM SPECIFIC CONCENTRATION
- SB11B SB07 SB13 SB03 — SOIL SAMPLE DID NOT EXCEED ACT 2 SOIL MEDIUM SPECIFIC CONCENTRATION
- LOCATION TARGETED FOR EXCAVATION
- ROCK CONSTRUCTION ENTRANCE
- SURFACE SOIL EXCAVATION AREA
- FS — FILTER SOCK (SEE DETAIL 01)
- LOD — LIMITS OF DISTURBANCE

NOTES:

1. THE COMPLETE SOIL SAMPLE IDENTIFICATION IS: ERM - LOT NUMBER(L#) - SOIL ID AS SHOWN IN THE DRAWING. EXAMPLE: DRAWING SOIL ID SB12, COMPLETE SOIL ID IS ERM-L21-SB12.
2. THE TOTAL LIMITS OF DISTURBANCE FOR BOTH AREAS IS 9,927 SF.
3. INLET PROTECTION LOCATIONS ARE NOT SPECIFIED IN PLAN VIEW. FILTER BAG INLET PROTECTION SHALL BE INSTALLED IN ALL STORMWATER INLETS WITHIN EITHER LIMITS OF DISTURBANCE.
4. EXCAVATION AREAS SHALL BE BACKFILLED AS PER THE SPECIFICATIONS.
5. BACKFILL EXCAVATION WITH DGA/2A TO EXISTING GRADE AND TO PROVIDE POSITIVE DRAINAGE.

0 20 40
SCALE (IN FEET)

Know what's below. Call before you dig.

Rev.	Date	Description	By	Chk

DRAWN BY KB | CADD Review MP | CHECKED BY JH

Environmental Resources Management, Inc.

SOIL REMEDIATION PROJECT
FMC CORPORATION
EAST 10TH STREET SITE
MARCUS HOOK, PA

LOT 21 EXCAVATION, BACKFILL, AND SEDIMENT CONTROL PLAN

SCALE	PROJECT NUMBER	DRAWING	REV.
AS SHOWN	0615639	02	0

DATE DRAWN OCTOBER 2021

\\USBOCFS02\data\Philadelphia\Team\DMMW\CAD\Drawings\FMC_Marcus Hook\Lot 15 & Lot 21\01-02_Excavation + E&S Plan.dwg

REVISIONS TO BE MADE ON THE CADD FILE ONLY

DELAWARE COUNTY CONSERVATION DISTRICT STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES HAVE BEEN AMENDED TO BE PROJECT SPECIFIC.

CONTRACTOR SHALL BE "OPERATOR".

DELAWARE COUNTY CONSERVATION DISTRICT STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES

1. VEHICLES AND EQUIPMENT MAY NEITHER ENTER DIRECTLY TO NOR EXIT DIRECTLY FROM LOT 017 ONTO EAST 10TH STREET OR PENN AVENUE. VEHICLES AND EQUIPMENT MAY NEITHER ENTER DIRECTLY TO NOR EXIT DIRECTLY FROM LOT 021 ONTO PENN AVENUE. VEHICLES AND EQUIPMENT MUST ENTER AND EXIT THROUGH THE ROCK CONSTRUCTION ENTRANCES AS SHOWN ON SHEETS 01 AND 02.
2. STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.
3. THE CONTRACTOR SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY AND COMPLETELY IMPLEMENTED.
4. UNTIL THE SITE ACHIEVES FINAL STABILIZATION, THE OPERATOR SHALL ASSURE THAT THE BEST MANAGEMENT PRACTICES ARE IMPLEMENTED, OPERATED, AND MAINTAINED PROPERLY AND COMPLETELY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL BEST MANAGEMENT PRACTICE FACILITIES. THE OPERATOR SHALL MAINTAIN AND MAKE AVAILABLE TO LOCAL CONSERVATION DISTRICT COMPLETE, WRITTEN INSPECTION LOGS OF ALL THOSE INSPECTIONS. ALL MAINTENANCE WORK, INCLUDING CLEANING, REPAIR, REPLACEMENT, REGRADING, AND RESTABILIZATION SHALL BE PERFORMED IMMEDIATELY.
5. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO ELIMINATE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION.
6. BEFORE INITIATING ANY REVISIONS TO THE APPROVED EROSION AND SEDIMENT CONTROL PLAN OR REVISIONS TO OTHER PLANS WHICH MAY AFFECT THE EFFECTIVENESS OF THE APPROVED E&S CONTROL PLAN, THE OPERATOR MUST RECEIVE APPROVAL OF THE REVISIONS FROM THE LOCAL CONSERVATION DISTRICT.
7. THE OPERATOR SHALL ASSURE THAT THE EROSION AND SEDIMENT CONTROL PLAN IS BEING IMPLEMENTED AND MAINTAINED FOR ALL SOIL AND/OR ROCK SPOIL AND BORROW AREAS, REGARDLESS OF THEIR LOCATIONS.
8. ALL PUMPING OF SEDIMENT LADEN WATER SHALL BE THROUGH A SEDIMENT CONTROL BMP, SUCH AS A PUMPED WATER FILTER BAG DISCHARGING OVER NON-DISTURBED AREAS.
9. THE OPERATOR IS ADVISED TO BECOME THOROUGHLY FAMILIAR WITH THE PROVISIONS OF THE APPENDIX 64, EROSION CONTROL RULES AND REGULATIONS, TITLE 25, PART 1, DEPARTMENT OF ENVIRONMENTAL PROTECTION, SUBPART C, PROTECTION OF NATURAL RESOURCES, ARTICLE III, WATER RESOURCES, CHAPTER 102, EROSION CONTROL.
10. A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES.
11. EROSION AND SEDIMENT BMP'S MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS WITHIN THE TRIBUTARY AREAS OF THOSE BMP'S.
12. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMP CONTROLS MUST BE REMOVED. AREAS DISTURBED DURING REMOVAL OF THE BMP'S MUST BE STABILIZED IMMEDIATELY.
13. AT LEAST 3 DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES SHALL NOTIFY THE PENNSYLVANIA ONE CALL SYSTEM INCORPORATED AT 1-800-242-1776 FOR BURIED UTILITIES LOCATIONS.
14. CLEARING SHALL BE LIMITED ONLY WITHIN THE LIMIT OF DISTURBANCE. GRUBBING SHALL ONLY BE NEEDED WITHIN THE EXCAVATION AREAS SHOULD VEGETATIVE MATERIAL BE UNSUITABLE FOR OFF-SITE DISPOSAL.
15. THE IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE, THE OPERATOR SHALL STABILIZE ANY AREAS DISTURBED BY THE ACTIVITIES. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE SPECIFIED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE PERMANENT VEGETATIVE STABILIZATION SPECIFICATIONS.
16. A SEEDED AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.

OTHER BMPS

17. SEDIMENT MUST BE REMOVED FROM STORM WATER INLET PROTECTION AFTER EACH RUNOFF EVENT.

TEMPORARY STABILIZATION & PERMANENT STABILIZATION

18. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMP'S MUST BE MAINTAINED PROPERLY. MAINTENANCE MUST INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT CONTROL BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGARDING, RESEEDING, REMULCHING, AND RENETTING, MUST BE PERFORMED IMMEDIATELY, IF EROSION AND SEDIMENT CONTROL BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.
19. SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.
20. THE OPERATOR SHALL REMOVE FROM THE SITE, RECYCLE, OR DISPOSE OF ALL BUILDING MATERIALS AND WASTE IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET DEQ., AND 287.1 ET SEQ. THE CONTRACTOR SHALL NOT ILLEGALLY BURY, DUMP, OR DISCHARGE ANY BUILDING MATERIAL OR WASTES AT THE SITE.

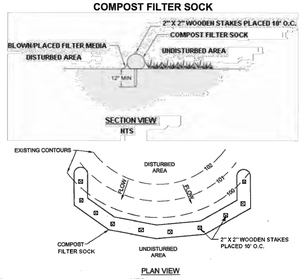
DECONTAMINATION

21. EQUIPMENT AND VEHICLE DECONTAMINATION SHALL BE PERFORMED AS DISCUSSED IN SECTION 1560 USING A DEDICATED DECONTAMINATION PAD, BUILT TO CAPTURE AND CONTAINERIZE ALL WASH WATER. SEPARATE DECONTAMINATION AREAS WILL BE NECESSARY ON LOT 17 AND LOT 21.
22. DECONTAMINATION SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF 40 CFR §761.79 (DECONTAMINATION STANDARDS AND PROCEDURES), WHICH WILL PERTAIN TO EQUIPMENT USED TO HANDLE THE CONTAMINATED SOIL.

OTHER ITEMS

23. THE E&S PERMIT BOUNDARY IS EQUAL TO THE LIMITS OF DISTURBANCE FOR THE SITE.
24. THE PROJECT'S RECEIVING WATERCOURSE IS THE MARCUS HOOK CREEK THEN ULTIMATELY THE DELAWARE RIVER, AND THE CHAPTER 93 CLASSIFICATIONS ARE WARM WATER FISHES (WWF), MIGRATORY FISHES (MF) AND WWF (MAINTENANCE ONLY); MF (PASSAGE ONLY) RESPECTIVELY.

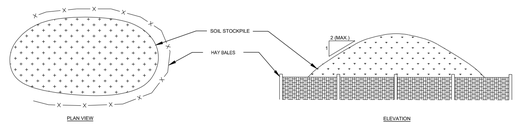
STANDARD CONSTRUCTION DETAIL #4-1
COMPOST FILTER SOCK



01 / 01,02 COMPOST FILTER SOCK DETAIL N.T.S.

NOTES:

1. SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 AND COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE MARCH 2012 PADEP EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL.
2. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIODEGRADABLE FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES AND SOCK SHALL BE REMOVED.
8. FILTER SOCK AROUND TRENCH DRAINS AND ON THE FORMER BUILDING CONCRETE SLAB WILL BE ANCHORED BY CONCRETE BLOCKS OR SIMILAR.
9. FILTER SOCKS LOCATED ON CONCRETE SURFACES WILL NOT BE STAKED.

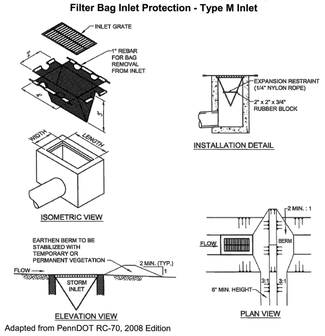


03 SOIL STOCKPILE AREA DETAIL
RESERVED N.T.S.

NOTES:

1. PLASTIC SHEETING (9-MIL MIN.) SHALL BE USED TO TEMPORARILY COVER STOCKPILED MATERIALS, AS NEEDED, TO REDUCE EXPOSURE TO SUBSTANTIAL PRECIPITATION EVENTS. COVER TO BE REMOVED AFTER PRECIPITATION EVENTS.
2. HAY BALE TO BE PLACED AROUND THE PERIMETER OF THE STOCKPILE. IMMEDIATELY APPLY TEMPORARY SEEDING TO STOCKPILES WHICH WILL BE IN PLACE FOR 20 DAYS OR MORE.
3. CONTAMINATED SOIL STOCKPILE SHOULD BE CONFINED TO THE UNEXCAVATED PORTION OF THE EXCAVATION AREA.

STANDARD CONSTRUCTION DETAIL # 4-16
Filter Bag Inlet Protection - Type M Inlet



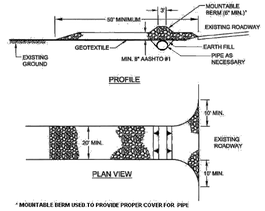
Adapted from PennDOT RC-70, 2008 Edition

05 TYPE C FILTER BAG INLET PROTECTION DETAIL
RESERVED N.T.S.

NOTES:

1. MAXIMUM DRAINAGE AREA =½ ACRE.
2. AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS., A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.
3. INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.
4. DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

STANDARD CONSTRUCTION DETAIL # 3-1
Rock Construction Entrance



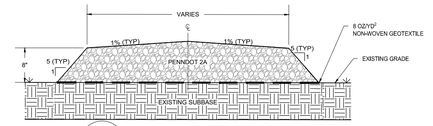
* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

Modified from Maryland DOE

02 / 01,02 ROCK CONSTRUCTION ENTRANCE DETAIL N.T.S.

NOTES:

1. THE ROCK CONSTRUCTION ENTRANCE SHALL ALLOW ENTRANCE AND EXIT FOR VEHICLES AND EQUIPMENT.
2. THE CONTRACTOR SHALL SIZE THE ROCK CONSTRUCTION ENTRANCE TO HANDLE THE LARGEST PIECE OF CONTRACTOR'S EQUIPMENT.
3. REMOVE SOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.
4. RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.
5. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

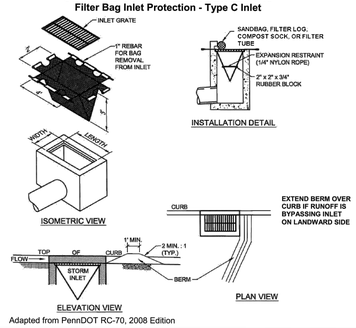


04 / 01,02 ACCESS ROAD DETAIL N.T.S.

NOTES:

1. ACCESS ROAD SHALL NOT EXCEED 8%.
2. PITCH OF THE ROAD FROM THE CENTERLINE SHALL BE 1% (TYP).
3. IF AREAS OF SOFT SOIL THAT ARE UNABLE TO SUPPORT THE ROAD ARE ENCOUNTERED DURING CONSTRUCTION, THE SOFT SOIL SHALL BE EXCAVATED AND REMOVED AND BACKFILLED.
4. CONSTRUCTION OF THE PROPOSED ACCESS ROAD ON LOT 21 WILL NECESSITATE REMOVAL AND REPLACEMENT OF A 20-30 FOOT SECTION OF THE SITE SECURITY FENCING.

STANDARD CONSTRUCTION DETAIL # 4-15
Filter Bag Inlet Protection - Type C Inlet



Adapted from PennDOT RC-70, 2008 Edition

06 / RESERVED TYPE M FILTER BAG INLET PROTECTION DETAIL N.T.S.

NOTES:

1. MAXIMUM DRAINAGE AREA = ½ ACRE.
2. AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS, A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.
3. INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE OF ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.
4. DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

LEGEND
DETAIL DESIGNATION 01
DRAWING NUMBERS WHERE DETAIL IS IDENTIFIED 01,02

Know what's below. Call before you dig.

Rev.	Date	Description	By	Chk

DRAWN BY KB | CADD Review MP | CHECKED BY JH

ERM

Environmental Resources Management, Inc.

SOIL REMEDIATION PROJECT
FMC CORPORATION
EAST 10TH STREET SITE
MARCUS HOOK, PA

SEDIMENT CONTROL PLAN NOTES AND DETAILS

SCALE	PROJECT NUMBER	DRAWING	REV.
AS SHOWN	0615639	02	0

DATE DRAWN OCTOBER 2021

I:\USBDCFS02\data\Philadelphia\Team\DMW\CAD\Drawings\FMC_Marcus Hook\Lot 15 & Lot 21\01-02_Excavation + E&S Plan.dwg

REVISIONS TO BE MADE ON THE CADD FILE ONLY

APPENDIX C DOCUMENTATION OF THIRD PARTY COOPERATION/AGREEMENT

SITE ACCESS AGREEMENT

This Agreement ("Agreement") is made this 21st day of May 2021 between FMC Corporation ("FMC"), a Delaware corporation, with offices at 2929 Walnut Street, Philadelphia, Pennsylvania 19104, and by Keystone Community Alliance, LLC with a mailing address of P.O. Box 2048, West Chester, PA 19380-9998 ("OWNER").

WHEREAS, FMC desires access to the parcels of real property owned by OWNER located at East 10th Street, Marcus Hook, PA 19061, which parcels are designated in the Delaware County Board of Assessment as Assessor's Map Reference Numbers 24-05-688:001, 24-05-688:002, 24-05-688:003, 24-05-688:006, 24-05-688:007, 24-05-688:008, 24-05-688:009, 24-05-688:010, 24-05-688:011, 24-05-688:012, 24-05-688:013, 24-05-688:014, 24-05-688:015, 24-05-688:016, 24-05-688:017, 24-05-688:018, 24-05-688:019, 24-05-688:020 and 24-05-688:021 as identified on the attached Figure 1 (and as identified as Lot numbers 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21 on Figure 1), and consisting of 29.62 total acres (the "Property"), for purposes of performing environmental investigation and remediation activities in coordination with the Pennsylvania Department of Environmental Protection (PADEP); and

WHEREAS, OWNER holds title to the Property and agrees to provide access to FMC and its authorized representatives pursuant to the terms and conditions set forth in this Agreement.

NOW THEREFORE, the parties hereto agree as follows:

1. Scope of Work. OWNER shall permit FMC and its agents, employees, representatives, consultants, contractors and subcontractors (collectively, "FMC's Representatives") to enter the Property at reasonable times to perform those planned activities (the "Activities") specified in Exhibit A, attached hereto and incorporated herein by reference. If FMC desires to undertake any activity at the Property in addition to those described in Exhibit A, FMC will obtain prior written approval of OWNER for such additional activity.

2. Repairs, Restoration of Property. FMC shall investigate the presence of underground utilities and/or other underground structures on the Property and contact all appropriate utility companies to locate underground utilities in order to avoid damaging them when conducting the Activities. OWNER agrees to supply FMC with any information OWNER or OWNER'S agents may have concerning underground utilities or underground structures. The supply of such information by OWNER will not result in any liability or cost to the OWNER, and OWNER does not warrant or otherwise represent that the information supplied is accurate. In the event that any actively utilized underground utilities, structures, fencing, improvements, or other items of OWNER or its employees, contractors, or agents on the Property are damaged as a result of the Activities, FMC shall repair them to a condition reasonably approximating the condition existing prior to conducting the Activities or shall replace them, as appropriate, unless otherwise waived or as agreed to by OWNER.

3. Compliance; Safety and Security. FMC shall adhere to and comply with all applicable government statutes, ordinances, orders, directives, rules and regulations when

conducting the Activities. FMC shall also adhere to and comply with all applicable Owner site safety and security requirements that have been provided in writing to FMC when conducting the Activities. FMC and FMC's Representatives shall conduct the Activities in a safe manner.

4. Insurance. Prior to commencing the Activities, FMC shall require its consultants, contractors, or subcontractors to provide a Certificate(s) of Insurance to OWNER evidencing the existence of Comprehensive General Liability for personal injury and broad form property damage insurance coverage for the Activities in an amount not less than Two Million Dollars ($2,000,000), Automobile Comprehensive Liability in an amount not less than One Million Dollars ($1,000,000) and Worker's Compensation at Statutory Limits. Upon the request of OWNER, the Certificate(s) of Insurance shall name OWNER or its employees, contractors, or agents as an additional insured(s).

5. Sharing of Data. FMC shall provide OWNER with copies of analyses of the soil and ground water samples collected at the Property during the Activities, as such data become available to FMC.

6. Indemnification; Defense.

6.1 FMC's Indemnification/Defense Obligations. FMC agrees to indemnify, defend and hold OWNER and its successors and assigns (collectively, "Indemnitees") harmless from and against any liabilities, judgments, orders, claims, damages, losses, or costs arising as a result of the entry onto the Property by FMC or FMC's Representatives to perform the Activities, including, without limitation, any personal injury or property damage claims arising from the acts or omissions of FMC's Representatives in connection with the Activities, except to the extent such liabilities, judgments, orders, claims, damages, losses or costs arise out of the negligence, gross negligence or willful misconduct of OWNER, or its successor(s) and assign(s). For purposes of establishing a baseline regarding the existence of Owner's potential negligence or gross negligence, FMC acknowledges that, prior to the execution of this Agreement, FMC has entered into and upon the Property on several occasions and has taken actual notice of the existence of certain hazards to include, but not be limited to, trip hazards, electrical issues, deteriorating floor surfaces, walls and stairways, etc.

6.2 Survival of Indemnification/Defense Obligations; Providing Information. The indemnification and defense terms herein shall survive any termination, cancellation or expiration of this Agreement. The providing of information, comments, data, work proposals, or reports in good faith by FMC's Representatives regarding the environmental conditions relating to the Property shall not be a basis for indemnification and defense obligations under the terms of this Agreement.

7. Commencement of Activities. FMC may commence the Activities upon the full execution of this Agreement and upon giving reasonable advance notice to OWNER. FMC will also provide OWNER with a schedule for any subsequent activities and will notify OWNER by telephone or e-mail in advance of each such event. FMC's Representatives shall use reasonable efforts to avoid unreasonable interference with the use of the Property by OWNER, and its visitors.

8. Termination; Renewal. This Agreement will expire when FMC advises OWNER, or its successor or assign, that FMC no longer needs access to the Property for the purposes of the Activities.

9. Notice. Any notice or submittal required herein shall be provided to the following persons, as appropriate:

For OWNER:

Mr. Senya D. Isayeff
Member
Keystone Community Alliance – Marcus Hook, LP
Keystone Community Alliance, LLC
P.O. Box 2048
West Chester, PA 19380-9998
Phone No.: (610) 842-4241
e-mail: senya@km414.com

For FMC:

Ms. Christina Moretti
Remediation Project Manager
FMC Corporation
2929 Walnut Street
Philadelphia, PA 19103
Phone: (215) 299-6252

e-mail: christina.moretti@fmc.com

10. Governing Law. This Agreement shall in all respects be interpreted, enforced and governed by and under the laws of the Commonwealth of Pennsylvania applicable to instruments, transactions and persons which have legal origin, contacts and relationships solely within the Commonwealth of Pennsylvania.

11. Integrated Agreement: Assignment. This Agreement constitutes the entire agreement between the parties with respect to the specific subject matter hereof and supersedes all prior negotiations and agreements regarding that subject matter, whether written or oral. This Agreement may not be altered or amended except by an instrument in writing executed by all the parties hereto. This Agreement will not be effective as to successors or other assigns of either party without the prior written consent to assignment by the other party, and any such assignment without such prior written consent shall be void and of no effect with respect to the other party.

12. No Admissions. Nothing contained in this Agreement shall constitute or be construed as an admission by a party hereto regarding any release of hazardous or other substances onto, beneath or from the Property. The parties to the Agreement reserve all claims, rights and defenses concerning this subject.

13. Successors and/or Assigns. This Agreement is binding upon the successor(s) and assign(s), if assignment occurs consistent with Paragraph 11, above.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first appearing.

FMC Corporation

By: Douglas Groux

Douglas Groux
Director, EHS
Remediation and Governance

OWNER

By:

Mr. Senya D. Isayeff
Member

Exhibit A

1. Access to the Property to complete soil remediation activities, consisting of removing soil to depths of approximately two feet, including at two distinct excavation areas previously identified to be impacted with polychlorinated biphenyls (PCBs) as shown on Figure 2.

2. Access to the Property to support the planned soil remediation activities, including: surveying, placement of erosion and sedimentation, storm water and other controls; vehicular, equipment and personnel access; staging of equipment, supplies and materials associated with the remediation; collection of post-excavation soil samples; and backfilling and seeding, as needed, the excavation areas.

3. Access to the Property to locate and mark sewers, manholes and other subsurface structures for utility clearance purposes.

4. FMC will obtain the necessary permits or other authorizations required by government authorities for completing the soil excavation and associated activities as described in items #1 and #2 above, respectively.

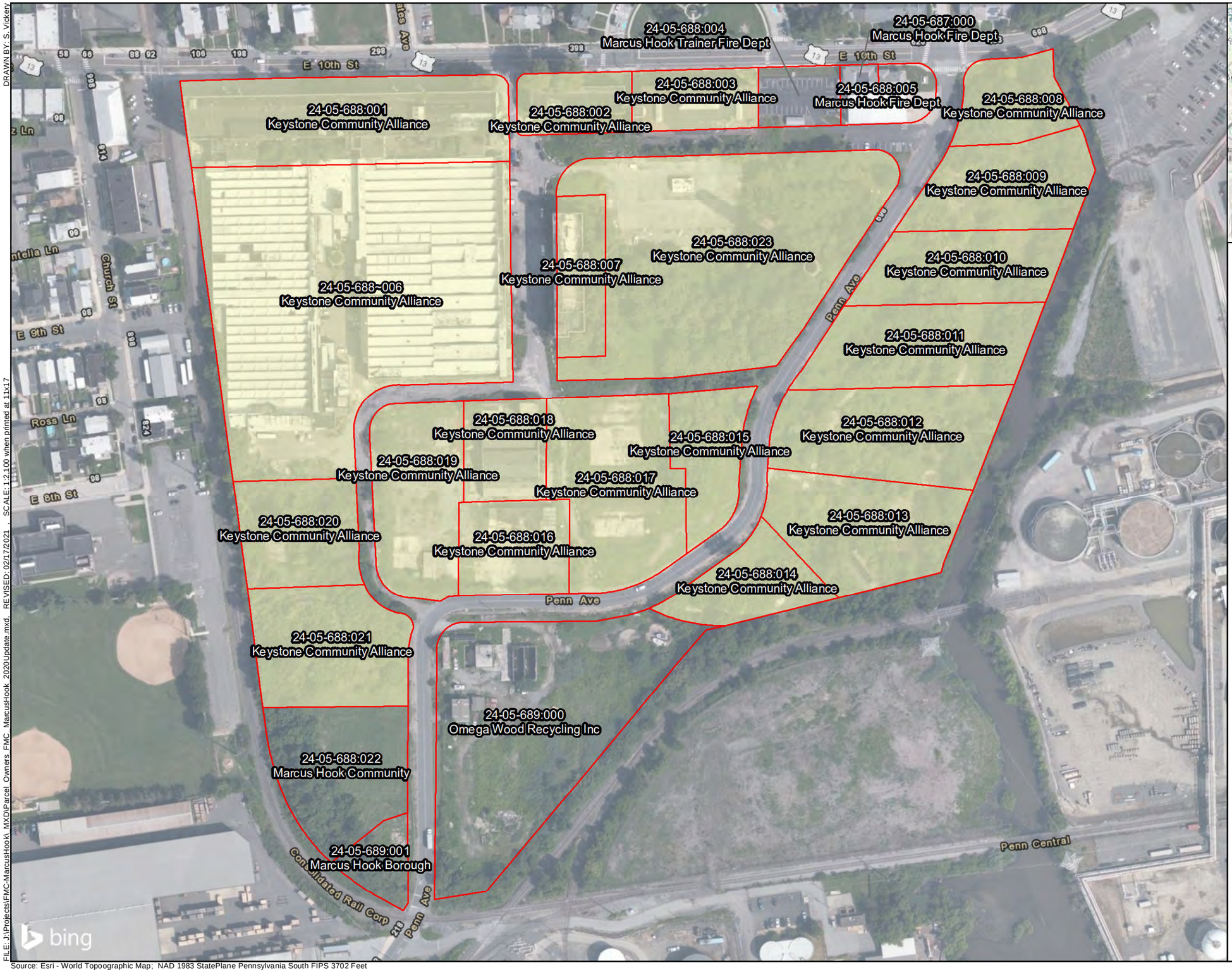
5. The actual number, size and/or location of excavation areas may be changed based upon field conditions and observations and/or further review of project plans by PADEP. Any material changes will be communicated to OWNER in advance, and are subject to agreement by OWNER.

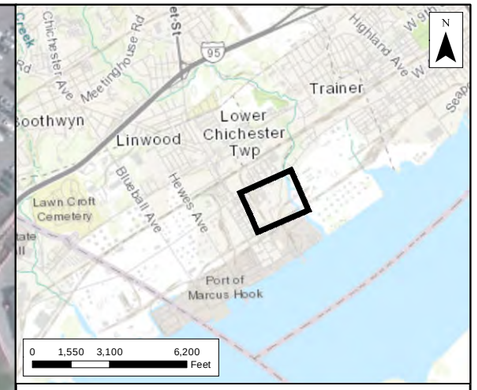
6. Clear vegetation and debris and establish temporary access ways to facilitate access to the excavation areas. Cleared vegetation and debris will be left on the Property in a manner that will not unreasonably interfere with the use of the Property by OWNER and its visitors.

7. Continued access to the Property on up to a quarterly basis [or more frequently, if directed by the PADEP] to measure water level elevations and collect water samples from the permanent ground water monitoring wells.

8. Continued access to the Property as needed for the purpose of collecting ground water samples from permanent monitoring wells for laboratory analysis.

9. Analyze water samples for some or all of the following constituents:
    - Volatile Organics – SW-846 8260
    - Butyl Alcohol – SW-846 8260
    - Butyl Acetate – SW-846 8260
    - Ethyl Alcohol – SW-846 8260
    - Ethyl Acetate – SW-846 8260
    - Tetrahydrofuran – SW-846 8260
    - Ethylene Glycol – SW-846 8015
    - Semivolatiles – SW-846 8270
    - PCBs – SW-846-8082
    - Mercury – SW-846 7470
    - Cyanide – SW-846 9012
    - All other Total Analyte List (TAL) metals – SW-846 6010
10. Upon completed use of the permanent ground water monitoring wells, FMC will close or remove the monitoring points in accordance with all applicable regulations and other requirements of government authorities. Following the closure of the monitoring points, these areas of the property will be restored to pre-activity conditions.





Legend

- Keystone Community Alliance Owned Lots
- Tax Parcel Boundary

Notes:
1. Delaware County GIS, 2021

0 175 350
Feet

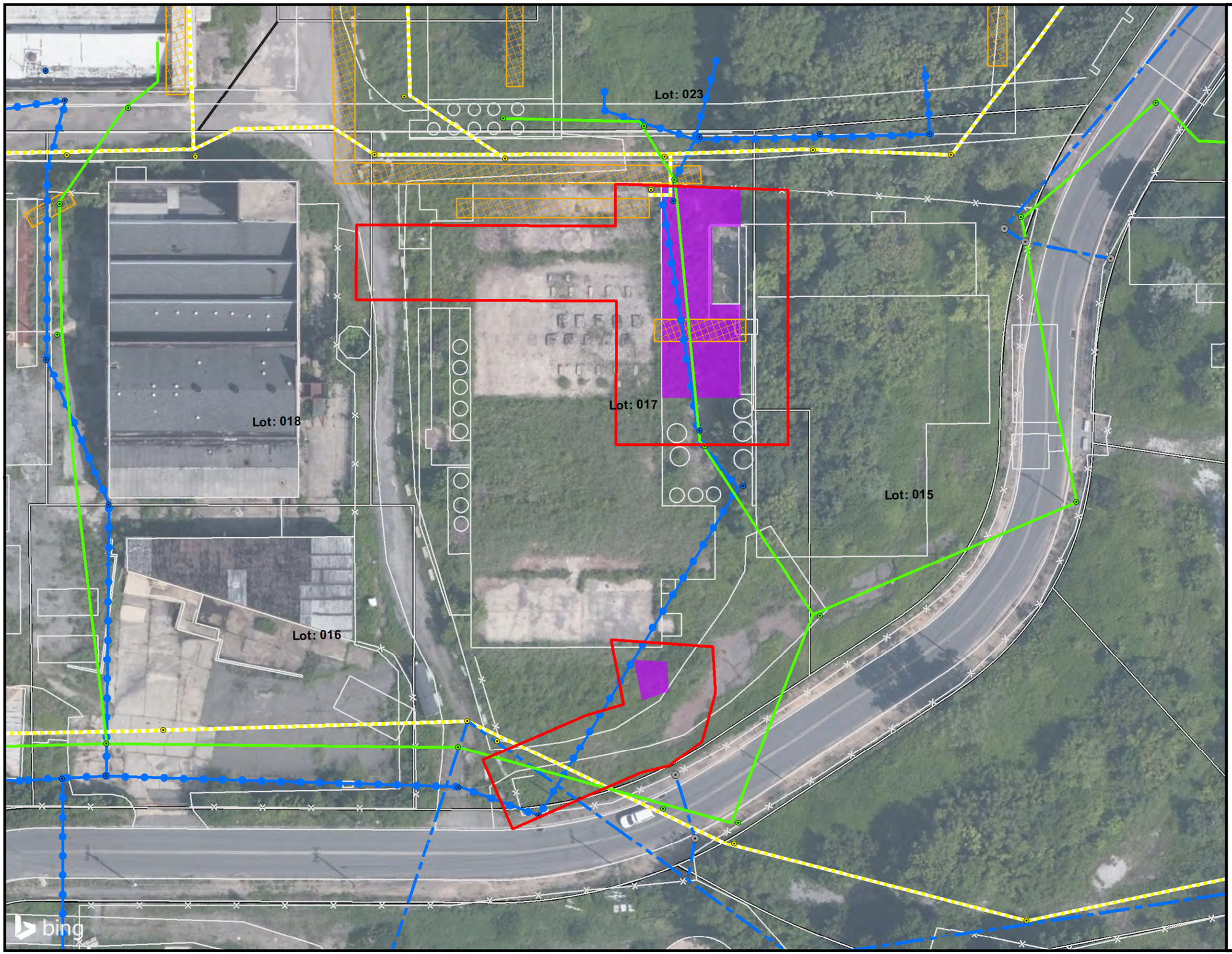
Figure 1
Tax Parcel Boundary Map
Tax Parcel Boundaries
FMC-Marcus Hook
Delaware County, Pennsylvania

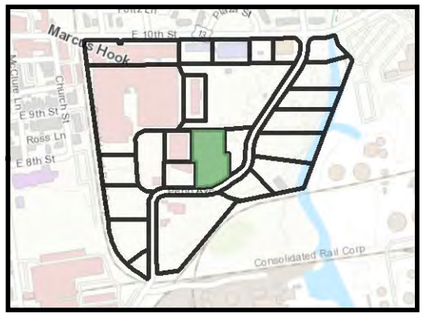
Environmental Resources Management
www.erm.com

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

FILE: J:\Projects\FMC-MarcusHook\ MXD\Parcel Owners FMC MarcusHook 2020Update.mxd, REVISED: 02/17/2021 , SCALE: 1:2,100 when printed at 11x17

DRAWN BY: S. Vickery





Legend

- Limit of Disturbance (LOD)
- Historical Manufacturing Building Footprint
- Approximate Surface Soil (0-2 ft bgs) Excavation Area
- Parcel Boundary

Utilities:

- Borough Storm Sewer Manhole
- Storm Sewer Manhole
- Mill Sewer Manhole
- Sanitary Sewer Manhole
- Sanitary Sewer Network
- Borough Storm Sewer Line
- Storm Sewer Network
- Mill Sewer Network
- Sanitary Sewer Network
- Tunnel Locations

0 25 50 100
Feet

1 inch = 50 feet

FIGURE 2
LOT 17-Surface Soil
Excavation Areas
East 10th Street Site
Marcus Hook, Pennsylvania

ERM

3/22/2021

J:\Projects\PMC-MarcusHook\MXD\Lot Exceedence Figures\FINAL_FEB2018\REVISED_20180723\FIGURE2-Lot17-SurfaceSoilExcavationAreas_20210322.mxd - steven.vickery

APPENDIX D DRAFT INSTITUTIONAL CONTROL LANGUAGE

APPENDIX D – Proposed Deed Restriction Language

As part of the remediation of the East 10th Street Site in Marcus Hook, Pennsylvania, institutional controls in the form of deed notices and restrictions will be necessary to ensure that the remedy will remain protective of human health and the environment. These institutional controls will include:

1. Deed controls for each Parcel (a.k.a., Lot) at the Site restricting the land use to non-residential uses, as defined in PA Land Recycling and Environmental Remediation Standards Act (Act 2);
2. Deed controls for portions of Lots 4, 8, 9, 10, 11, 12, 13, 17, 19, 20, 21, 22, and 24 requiring, in the event of planned future building installation, reassessment of potential vapor intrusion risk using actual building dimensions or further sampling data, and/or installation of engineering controls to mitigate potential future vapor intrusion risk;
3. Deed controls for each Lot at the Site preventing the installation of on-site groundwater production wells and restricting human use or consumption of groundwater; and
4. Deed controls, along with a Post-Remediation Care Plan, for Lot 19 to restrict the disturbance of the former carbon disulfide storage moat and the associated concrete cover, and to require the inspection and maintenance of the concrete cover.

The deed control language will be recorded with or made a part of the deeds for the Site parcels (a.k.a., Lots) under the provisions of the Uniform Environmental Covenants Act (UECA). At present, the anticipated language for the deed controls relating to the items above include the following:

<u>Non-Residential Use</u>

"The property shall not be used or occupied for residential purposes, and additionally no part of the property shall be used for the purpose of operating a child care, school or recreational area. If applicable State environmental regulations define residential use, any use that is deemed to be a residential use by such laws and regulations will also be a residential use as the terms are used herein. Notwithstanding the foregoing, the Property shall be used only for the purposes included in the meaning of the term "non-residential property" as such term is defined in Act 2."

<u>Vapor Intrusion Assessment</u>

"Owner of the property is hereby notified that if a building is to be constructed over the identified areas containing concentrations of certain volatile substances in soil potentially above acceptable risk levels, then Owner shall reassess the potential vapor intrusion risk through vapor intrusion modelling acceptable to PADEP using the actual planned building dimensions and/or additional near source soil gas data to determine if the expected carcinogenic and/or non-carcinogenic risk levels are within the acceptable risk range as defined by PADEP. If the reassessment indicates the expected carcinogenic and/or non-carcinogenic risk levels are not within the acceptable risk range as defined by PADEP, or if Owner does not perform the reassessment, the Owner shall either install engineering controls such as a vapor barrier and/or sub-grade ventilation system as part of such a building, or remediate soils containing volatile substances above 1/10th the generic soil to groundwater MSC."

<u>On-Site Groundwater Use</u>

"No water supply wells of any kind (including, without limitation, water wells used for drinking, bathing or other human consumption purposes, used for industrial use, or used for livestock, farming, or irrigation) shall be installed or used on the Property."

Lot 19 Carbon Disulfide Storage Moat

“The structure and integrity of the entombed former carbon disulfide storage moat must be maintained in compliance with Post-Remediation Care Plan. This includes inspecting and maintaining the concrete cover, such as repairing cracks or other damage that could affect the integrity of the structure.”