PARSONS

Remedial Action Work Plan

Peters Cartridge Facility
Warren County, Ohio

Prepared for:

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ACRONYMS

Acronym	Definition / Description
AHA	Activity hazard analysis
AOC	Area of Concern
AoC	Area of Contamination
BERA	Baseline Environmental Risk Assessment
bgs	Below ground surface
CCR	Construction Completion Report
CFR	*Code of Federal Regulations*
CQ	Construction quality
CQA	Construction quality assurance
CQAP	Construction Quality Assurance Plan
CQC	Construction quality control
DuPont	E. I. du Pont de Nemours and Company
FS	Feasibility study
FPA	Former Process Area
HASP	Health and Safety Plan
HDPE	High-density polyethylene (HDPE
HHBLRA	Human Health Baseline Risk Assessment
HTP	Hamilton Township Property
IC	Institutional control
ICIAP	Institutional Control Implementation and Assurance Plan
kg	Kilogram
KMOP	Kings Mill Ordnance Plant
LA	Lowland Area
mg	Milligram
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
OMP	Operation and Maintenance Plan
PSA	Project safety analysis
PSVP	Performance Standard Verification Plan
QA	Quality assurance
QC	Quality control
RA	Remedial Action
RAWP	Remedial Action Work Plan
RD	Remedial Design
RI	Remedial investigation
ROD	Record of Decision
Site	Former Peters Cartridge Facility
SLERA	Screening Level Ecological Risk Assessment
SMP	Soil Management Plan
SOW	Statement of Work
SSHO	Site Safety and Health Officer
TCLP	Toxicity Characteristic Leaching Procedure
UAO	Unilateral Administrative Order
USEPA	U. S. Environmental Protection Agency

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1.0 INTRODUCTION

Parsons prepared this Remedial Action Work Plan (RAWP) on behalf of E. I. du Pont de Nemours and Company (DuPont) for the former Peters Cartridge Facility (Site) in Warren County, Ohio. The RAWP was completed in accordance with the requirements of a Unilateral Administrative Order (UAO) issued to DuPont by the U.S. Environmental Protection Agency (USEPA) with the Statement of Work (SOW) and Record of Decision (ROD) attached to the UAO. The RAWP is provided as described in the approved Remedial Design Work Plan (Parsons 2012a).

The RAWP provides an overview of the selected remedial action (RA), schedule, organization structure, and methodsused to implement the remedy for the Site. It also defines the process for construction of the remedy, documents the responsibilities of all organizations, and lists key personnel involved with remedy implementation.

1.1 Purpose, Scope, and Organization of the Remedial Action Work Plan

1.1.1 Purpose and Scope

The SOW details the required content of the RAWP. This RAWP follows the requirements in the SOW to provide detailed descriptions of the remediation and construction activities. The RAWP also describes the construction contractor selection method, outlines the construction quality assurance (CQA) process, and lists the plans that will be provided to address long-term monitoring of the Site.

1.1.2 Report Organization

The RAWP is divided into the sections summarized below.

- Section 1 – Introduction: This section includes the purpose and scope of the RAWP; provides background information on the Site including history, surrounding land use, and prior investigations and studies; and describes the key components of the selected remedy.
- Section 2 – Project Organization: This section identifies the project team members and their responsibilities. A contact list for key project personnel is included in **Appendix A**.
- Section 3 – Construction Summary and Schedule: This section provides details of the activities to be conducted to implement the RA.
- Section 4 – Construction Contractor Selection Method: This section discusses the methods DuPont will use in selection of an RA contractor.
- Section 5 – Construction Quality Assurance: This section briefly describes the quality control (QC) and quality assurance (QA) requirements that are detailed in the Construction Quality Assurance Plan (CQAP) and the specifications. The CQAP is included as **Appendix B**.
- Section 6 – Site Monitoring Plans: This section discusses the site monitoring plans that are associated with the RA. The Performance Standards Verification Plan (PSVP) is included in **Appendix C** and contains an updated Field Sampling Plan and a Health and Safety Plan (HASP) for RA activities. The other site monitoring plans are provided as appendices to the Operation and Maintenance

Plan (OMP) (a separate document) and include an Institutional Control Implementation and Assurance Plan (ICIAP) and a Soil Management Plan (SMP).

- Section 7 – References: This section contains reference documents used in preparation of this RAWP.

1.2 Site Background

The former Peters Cartridge Facility is located along the southern bank of the Little Miami River, in Warren County, Ohio. A site location map is included as **Figure 1.1**. The Site occupies approximately 71 acres west of Grandin Road and approximately 1 acre east of Grandin Road. A map showing the RA excavation areas and proposed onsite consolidation cell is included as **Figure 1.2**.

The Site operated as an ammunition manufacturing facility from 1887 to 1944, primarily producing paper shot shell ammunition and, occasionally (between 1934 and 1944), metal cartridge ammunition, primarily to support World War I and World War II military efforts. While the Peters Cartridge Facility underwent a number of facility renovations and new construction, there were no major changes in the type of manufacturing or the location of production areas at the Site. Site buildings and facility structures shown in the figures included with this RAWP are identified using numbers and descriptions referenced in historical documents. Information on the historical use of buildings and facilities are provided in the Remedial Investigation (RI) Report (Geosyntec 2009a).

Since 1944, the former Peters Cartridge Facility has been divided into multiple land parcels that have been owned and occupied by various entities. Business occupants or tenants have included warehousing for large printing equipment; an acetylene tank reconditioning business; an instrument maker and a painter in the west end of Building R-3; and an artist’s studio (e.g., painting, sculpting) on the first and second floors, respectively, of Building R-9 (Geosyntec 2009b). The Kings Mills Technical Center property manager’s office is in Building R-2. A metals scrapping/salvage company operates in a portion of Building R-1 and the outdoor area adjacent to the western end of the building.

For the purposes of the RI and feasibility study (FS), the Site was separated into three distinct exposure areas: the Lowland Area (LA), the Former Process Area (FPA), and the Hamilton Township Property (HTP).

The LA portion of the Site lies within the Little Miami River floodplain. The LA is clearly differentiated from the remainder of the Site by steel fencing, thick vegetation, and steep topography along the southern border of the Little Miami River Scenic Trail. This trail was a historical railroad right-of-way redeveloped as a bike and walking path. North of the trail, the LA includes some historical manufacturing areas that are characterized by the presence of ash-like fill, concrete foundations, masonry structures, and concrete culverts (culvert outfalls) that drain surface water from the upgradient portions of the Site. In addition, the LA includes a narrow strip of the Little Miami River shoreline characterized by local bedrock outcrops and a shale and limestone bottom substrate. Future land use in the LA is expected to remain recreational/open space.

The FPA is a 15-acre parcel of developed land containing six buildings. The FPA encompasses the production portion of the Site where most manufacturing associated with the Peters Cartridge process took place. Discontinuous areas of ash-like fill are present around the existing buildings. Most of the FPA is relatively flat and covered by concrete/asphalt paving, buildings, and small landscaped grass areas. Portions of the FPA are currently used by commercial or industrial businesses; future land use is expected to remain commercial/industrial. Two large culverts go under the buildings on the eastern side of the Site.

The HTP, formerly called the Lewis Property, consists of a 56-acre parcel of unimproved wooded land on the southern and southwestern boundaries of the FPA. The HTP was used primarily to store finished product from the Site. The HTP consists of steeply sloping bedrock ridges and rolling topography with dense vegetation. The HTP contains bunkers, concrete supports, foundations, conveyance structures, and other facilities historically used by the Peters Cartridge Company. The salvage area at the northwestern portion of the HTP is unpaved and surrounded by steel fencing and mature woody and herbaceous vegetation. This area features buildings original to the former salvage yard, in which discontinuous areas of ash-like fill remain. The HTP is currently vacant, and future land use is expected to be recreational.

In 1992, the Ohio Environmental Protection Agency (Ohio EPA) listed the Site as a discovery site. It conducted a preliminary assessment of the Site in 1993 and subsequently brought the Site to the attention of the USEPA. Several site screening investigations and evaluations were performed between 1994 and 1999. Under an Administrative Order on Consent, effective July 7, 2004, an RI, including human health and ecological risk assessments, was completed that formed the basis for identifying remediation needs and approaches for the Site that were evaluated in a FS. The USEPA issued a ROD on 28 September 2009 and executed a UAO for the Remedial Design (RD) and RA with an effective date of April 30, 2012. The Site was listed on the National Priorities List (commonly called Superfund list), on September 18, 2012.

1.3 Surrounding Land Use

The Site is bordered to the north by the Little Miami River (designated as a State and National Scenic River), to the west by a U.S. Army Reserve Center, to the south by the Warren County Water District water treatment plant, and to the east by a natural area owned by the Ohio Department of Natural Resources (ODNR). Residential and agricultural properties are located to the southeast.

Past manufacturing and industry in the immediate vicinity of the Site included the following:

- Gunpowder was manufactured from 1878 to 1958 by the Kings Mills Powder Company along the north bank of the Little Miami River across from the Site.
- Munitions were manufactured at the government-owned Kings Mill Ordnance Plant (KMOP), adjacent to the southern end of the Site.
- Metals fabrication and painting operations were conducted by Diversified Products, Inc., at the former KMOP.

Current industrial facilities near the Site include the following:

- The Warren County water treatment facility is adjacent to the southeast end of the Site.
- The Lebanon regional wastewater treatment plant is located along the south side of Mason-Morrow-Millgrove Road, approximately 2 miles upstream (northeast) of the Site. The wastewater plant discharges treated water directly into the Little

Miami River under a National Pollutant Discharge Elimination System permit issued by the Ohio EPA.

- The former KMOP adjacent to the southern end of the Site is now occupied by the U.S. Army Reserve Center.

1.4 Former Site Investigations and Studies

Environmental investigations have been conducted at the Site since 1987. These investigations had varying data quality objectives and work scopes and were primarily focused in the main manufacturing portion of the Site.

- The RI conducted beginning in 2005 addressed all three areas of the Site.
- Analytical results collected during the RI were used to prepare a Human Health Baseline Risk Assessment (HHBLRA), a Screening Level Ecological Risk Assessment (SLERA), and a Baseline Environmental Risk Assessment (BERA).
- The FS was conducted following completion of the RI. The FS used the data presented in the RI, BERA, and HHBLRA to determine the RA objectives and evaluate remedial alternatives (Geosyntec 2009a).
- In 2008, an Interim Remedial Measures Study was conducted for Area of Concern (AOC) 9. An Interim Remedial Measure Work Plan was prepared in 2008 to summarize the investigation work and delineate the proposed scope of work for the Interim Remedial Measure (Geosyntec 2008).

1.5 Selected Remedial Action

The selected remedy specified in the ROD will serve as the final RA for the Site. As detailed in the ROD, the major components of the selected remedy are:

- Excavate surface soil in the FPA to a depth of at least 2 feet below ground surface (bgs) in areas that exceed the USEPA commercial standard for lead of 800 milligrams per kilogram (mg/kg). Excavate surface soil in the LA and in the HTP to a depth of at least 2 feet bgs in areas that exceed the USEPA residential standard for lead of 400 mg/kg. Excavate to a depth of 4 feet bgs in four isolated areas (3 in FPA, 1 in LA) with failing Toxicity Characteristic Leaching Procedure (TCLP) results. The actual areas to be excavated and depths will be determined and evaluated during the RD. The excavated areas will be backfilled with clean fill material to the existing grade.
- Clean out and remove debris and erosional material at drainage culvert and outfall areas. Excavate three identified shoreline sediment areas to a depth of approximately 6 inches and backfill the shoreline sediment areas with clean fill material.
- Consolidate impacted soil, sediment, and erosional material in an onsite consolidation cell. The cell will be constructed with an impermeable composite liner and cap system developed to be consistent with state regulations. A flexible membrane liner with a geotextile cushion will be installed as the main component of the cell liner system.
- Cap the cell with a composite system consisting, from top to bottom, of a 6-inch-thick vegetative support layer, a 2-foot-thick layer of compacted low-permeability clay, a geocomposite drainage layer, a flexible geomembrane liner, and a low-

permeability clay layer. The final cap design will be developed to be compliant with state regulations during the RD phase of the project. During the RD phase, it will be determined whether an access restriction will be required based on future use of the area.

- Monitor groundwater in accordance with the long-term monitoring plan to ensure that there is no migration of contaminants from the cell.
- Implement institutional controls (ICs) in the form of deed restrictions to accomplish the following: restrict land use to nonresidential purposes, limit future Site activities to prevent intrusive activities that could compromise the cell, and restrict onsite groundwater use to prevent ingestion exposures by a future resident with groundwater used as a domestic water supply.

Additional remedy elements are spelled out in the ROD, will be included in the RD, and are discussed further in later sections of this report.

The determination that some of the soils impacted by lead are characteristically lead hazardous has resulted in a proposal to have the USEPA classify this site as an Area of Contamination (AoC[1]). Soil will then be handled in accordance with the Area of Contamination Policy. The characteristic hazardous soil would be excavated within the AoC, treated, rendered non-hazardous, and disposed in the onsite consolidation cell.

The implementation of the above noted RA components will conform to the design specifications presented in the RD Report. The detailed implementation and verification procedures are presented in Section 3.0 of this RAWP.

[1] The term AOC is used for previous work at this Site to mean Area of Concern. To avoid confusion, the term Area of Contamination, also frequently referred to as AOC, is herein referred to as AoC.

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2.0 PROJECT ORGANIZATION

2.1 Major Project Team Members

A preliminary project organization showing lines of communications among major project team members is presented in **Figure 2.1**. Project team members are defined below. Names of personnel and companies will be placed on the organization chart after all project team members are selected. Relevant contact information is provided in **Appendix A.**

Regulatory Agencies

The regulatory agencies for the RA are the USEPA and Ohio EPA.

Local Authorities

Local authorities include the police, fire, and emergency response personnel and public officials for Hamilton Township and Warren County.

Property Owners

The owners of the property where the RA work will be performed include the following:

- Kings Mills Commerce Park, Cincinnati OH
- Hamilton Township Board of Trustees, Warren County OH
- Ohio Division of Parks and Recreation, Ohio State Parks, ODNR, Columbus OH
- Warren County Engineer, Lebanon OH
- Little Miami Inc., Milford OH
- TEJ Holdings, Inc., Cincinnati OH.

DuPont Project Coordinator

DuPont has designated Sathya Yalvigi, the DuPont Project Director for the Site, as the Project Coordinator.

Engineer / Construction Manager

The Engineer is responsible for certifying, by professional stamp and signature, that the RA was constructed in conformance with approved design documents. The Construction Manager is responsible for monitoring the construction and overseeing the inspection of the quality testing. These roles will be filled by a single person, and the Engineer/Construction Manager selected by DuPont is Keith Rankin (Parsons).

DuPont Site Representative / QA Inspector

The DuPont Site Representative / QA Inspector selected by DuPont is Clinton Betchan (Parsons).

Construction Contractor

DuPont will select the Construction Contractor through a competitive bidding process. This selection will be communicated before the start of the RA activities for the Site.

Construction Quality Personnel

Construction quality (CQ) personnel qualified to conduct and document construction quality control (CQC) activities will be independent of the Construction Contractor. This includes testing and surveying if/as required (in compliance with the USEPA- and Ohio EPA-approved CQAP for construction). The CQ personnel will be retained by the Construction Contractor but will report results directly to the Construction Manager, DuPont Site Representative, or other Parsons personnel serving as QA inspectors.

2.2 Project Responsibilities

Responsibilities of each project team member are described below.

Regulatory Agencies

It is the responsibility of the USEPA in consultation with the Ohio EPA to review and provide approvals of the deliverables for compliance with the UAO.

DuPont Project Coordinator

DuPont is responsible for implementing the terms of the UAO, including the implementation of the RA. The Project Coordinator provides day-to-day oversight on behalf of DuPont and is the primary contact among the project participants.

Engineer / Construction Manager

The Engineer / Construction Manager will review the CQ documentation, as built drawings, survey data, field and laboratory test results, and field logs, and will visit the Site to the extent necessary to certify construction of the RA was completed in accordance with the USEPA-approved final design and construction documents. The Engineer who certifies the RA construction completion will be a registered professional engineer in Ohio. The responsibilities and duties of the Engineer are more fully defined in the CQAP.

The Engineer / Construction Manager will act on behalf of DuPont regarding project-related decisions and disputes. He will work with the DuPont Site Representative to provide the required management of the RA activities.

DuPont Site Representative / QA Inspector

The DuPont Site Representative will represent DuPont at the site, manage onsite activities, and act as a liaison with and between the Engineer / Construction Manager, DuPont, and the Construction Contractor. The DuPont Site Representative will serve as the QA Inspector, supervising and directing the day-to-day CQ activities on the project and routinely interacting with the Engineer / Construction Manager.

Construction Contractor

The Construction Contractor for the RA will be responsible for meeting all of the requirements of the contract documents for implementing the RA, including the USEPA-approved final design , plans, and contract terms and conditions. The Construction Contractor will comply with all applicable federal, state, and local regulations.

Construction Quality Personnel

The CQ personnel will be independent of the Construction Contractor. Organizations performing QC required by the Contractor will conduct testing and surveying, if/as required, for the construction of the RA at the Peters Cartridge Facility. Specific responsibilities of the CQ personnel are described in the CQAP.

2.3 Coordination with Stakeholders

Local Authorities

Contact and coordination with the local emergency response agencies will be required at the start of Site remedial activities (beginning with mobilization). Permits are not required for work performed on the Site; however, adherence to the regulatory requirements of the permits is required. Permits will be obtained for hauling materials over public roads.

Property Owners

The Property Owners will be kept advised of any project activities on their property or that might affect their access or business operations.

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3.0 CONSTRUCTION SUMMARY AND SCHEDULE

3.1 Preliminary Remedial Action Schedule

A preliminary RA schedule is presented in **Figure 3.1**. It will be replaced by a revised, final RA construction schedule that will be developed by the Construction Contractor and provided at the pre-construction meeting before start of construction.

3.2 Construction Summary and Sequencing

The following sections detail the activities associated with implementing the RA components. The sequencing of construction work is listed here in the general order that the work will be accomplished, but the actual sequence of work activities will be determined by the Contractor once the contract is signed and the Contractor's schedule is received.

3.2.1 Pre-Construction Activities

Upon finalization of the design documents, including the design drawings and construction specifications, DuPont will issue bid packages to prospective bidders for the RA. At the end of the bidding process, DuPont will review the bids, interview potential contractors, obtain clarification of issues with the bid, and then select a contractor to receive the RA construction award.

The contractors will be required to provide the following submittals with the bid:

- List all proposed suppliers and subcontractors used in the preparation of the bid.
- Identify the Contractor's key personnel proposed to perform the work on the Site and provide their resumes and work experience. The list shall contain at a minimum the Contractor's project manager, site superintendent, site foreman, and site health and safety officer.
- Include a preliminary Contractor's progress schedule for performance of the work .
- Submit a preliminary material handling plan.
- Provide a preliminary amendment to the HASP.

Upon contract award, the Contractor will prepare and submit the following documents:

- Project schedule in accordance with Section 01510 – Progress Schedules. Progress schedules shall be included with each payment application and shall delineate work done and work scheduled.
- The material handling plan, which also includes the method statements as presented in Section 01510 - Progress Schedules. It shall include a surface water diversion plan as presented in Section 01080 - Environmental Controls.
- Results of all high lead soils treatability testing performed. This will be used to establish the treatability mix design for approval prior to performing the work.
- A schedule of values and schedule for progress payments for the entire project.
- In accordance with Section 01080 – Environmental Controls, the Contractor shall submit prior to the start of work a surface water diversion plan and an air emissions control plan aspart of a the spill and emission control plan.

- In accordance with Section 01070 – Health and Safety Requirements, the Contractor shall submit a HASP amendment. This document shall be complete with Contractor-specific requirements and activity hazard analyses (AHAs) for all tasks to be performed as part of the RA.

The Contractor shall secure all road use permits prior to mobilization.

DuPont will hold a pre-project safety analysis (pre-PSA) site risk assessment call as well as a PSA call / meeting prior to the start of field activities for each major work element. The purpose and attendees of this meeting are described in the HASP.

A pre-construction conference will be held after contract award and prior to mobilization. A preliminary agenda for the pre-construction conference is listed in Section 01520 – Project Meetings. Local emergency response agencies will be invited to attend this meeting.

To save time and accelerate the start of RA work, DuPont proposes to use a separate contract to perform most of the tree clearing associated with the major excavation areas, consolidation cell, and staging areas. The tree clearing will start about a month before the mobilization of the RA Contractor. The balance of the clearing will be performed by the RA Contractor.

Details of the tree clearing are included in Section 02100 – Clearing. This activity will generally proceed as follows.

- Trees will be cleared from the excavation areas, consolidation cell area, onsite borrow area, staging area, and access roads.
- Main tree trunks are to be recycled offsite.
- The tree tops and brush not suitable for recycling are to be chipped and left onsite for reuse as mulch.
- All stumps will be removed with the associated root ball. The stumps and associated root balls will be ground up and stockpiled onsite along with the soil removed from the root ball.
- Ground stump material from contaminated soil areas will be stockpiled separately from ground stump material from clean areas of the site and will be sampled and characterized to determine final disposal. However, it is not expected that any materials resulting from tree clearing work will be disposed in the onsite consolidation cell.

Details such as the proposed staging areas, procedures, methods, equipment, sequence, and schedule to be used for the clearing work are to be included in the material handling plan.

The clearing contractor and/or the RA Contractor, in cooperation with the DuPont Site Representative, shall flag trees (other than ash or beech) that are 12 inches in diameter or greater, are near the outside edges of the excavation areas, and will experience less than 25% root disturbance. These trees will be flagged to remain and be protected during the remediation. At these sites, there will be special handling of the soil area to be excavated and backfilled.

The clearing of trees shall be coordinated with the installation of the sediment and erosion control measures. The silt fence to be installed at the bottom of the slopes shall be installed before, during, or immediately after clearing of an area. Details of the sediment and erosion control features are provided on Drawings 3, 4, 5, and 6 and in Section 01080 – Environmental Controls.

Prior to mobilization, the RA contractor is to take pre-construction photographs and video to document the condition of the work areas, facilities, and roads. These will include but not be limited to Grandin Road and Striker Road sections used to haul materials from the lower excavation areas to the consolidation cell.

Contractor mobilization to the site shall include setting up support trailers for the DuPont Site Representative and for Contractor personnel. The Contractor shall provide other support facilities as detailed in Section 01100 – Temporary Construction Facilities.

3.2.2 Excavation of Soil and Sediments

Prior to the start of excavation of soils and sediments, the Engineer will conduct pre-excavation non-hazardous soils sampling and testing for TCLP lead, arsenic, and mercury to confirm areas designated as non-hazardous do not require treatment for high concentrations of these substances. The location of these samples are shown in the Field Sampling Plan Figures 2.1 NE and 2.1 NW.

The excavation of soils and sediments are separated into the categories shown in Table 1. Color and hatching on the drawings are provided as guides on how the materials are classified and their excavation depths.

TABLE 1
MATERIAL CLASSIFICATION CATEGORIES

Drawing	Material Classification	Designation on Drawing	Excavation Depth
7, 8, 9, 10	Non-hazardous soil	Yellow Areas	2 feet
7, 8, 9	High lead soil (to be treated to non-hazardous)	Yellow with red hatch lines	2 feet
7, 8	High lead soil (to be treated to non-hazardous)	Yellow with red and blue cross hatch lines	4 feet
7, 8	Non hazardous sediment	Blue	6 inches
9	Trash (high lead / non-hazardous)	Yellow with red hatch lines / yellow	Depth of trash, minimum of 2 feet
7, 8, 9, 10	Ravine soils (non-hazardous)	Yellow	2 feet or bedrock if shallower

The independent surveyor shall perform pre-construction surveys to record existing topography and establish survey controls. The surveyor will stake out the excavation areas delineating both the non-hazardous and the high lead areas. The pre-construction surveys include a survey of the AOC 7 and 9 ravines that are to be excavated. This survey is necessary to establish existing grades within these ravine bottoms and prepare, in consultation with the Engineer, the plan for restoring the ravine bottoms to existing grade and installing the rock channel protection lining.

The Contractor must decontaminate all equipment and trucks prior to leaving work areas and or prior to leaving the Site to prevent tracking of contaminated materials between the work areas of the site or offsite. As an alternate approach, the Contractor can prevent contamination of equipment such as trucks.

The Contractor shall perform high lead soil treatment testing and bench scale studies as necessary to establish the mix design to be used to treat high lead soils to a non-hazardous classification.

The treatment of the high lead soils will require special handling, including preparing the treatment area; treating; staging; sampling; testing for TCLP lead, arsenic, and mercury; loading; handling;, hauling; and placing and compacting/testing of the soils in the onsite consolidation cell. The treated soil shall not be hauled to the consolidation cell area until the analytical results on the TCLP testing have confirmed the soil is not TCLP hazardous for lead, arsenic, or mercury. Each designated high lead soil area will receive at least one test, even if its volume is less than 750 cubic yards. High lead soil areas greater than 750 cubic yards will have one soil test for every 750 cubic yards or part thereof (that is, an area of 800 cubic yards would have two tests on the treated soil.)

The Contractor will excavate the non-hazardous soils and industrial debris. This activity will include handling, hauling, staging if necessary, placing, compacting and compaction testing of the soils in the onsite consolidation cell.

The soil excavation shall be conducted from the higher elevation areas to the lower elevation areas to prevent erosion of potentially impacted soils from areas to be excavated into areas that have been excavated and backfilled. The Contractor's material handling plan will define how the various areas will be excavated.

The Contractor shall clean all open AOC 7, 8 and 9 channels, excavate 6 inches of sediments from shoreline sediment areas and outfall channels, solidify and/or dry the material, and place the removed material in the consolidation cell.

The material in the AOC 9 trash area will be excavated and loaded onto trucks for offsite disposal by DuPont. The AOC 9 trash consists of both hazardous and nonhazardous trash potentially containing small amount of regulated asbestos containing material. Transport and offsite disposal will be arranged and paid for directly by DuPont. The Contractor is responsible for coordinating the trucks supplied by DuPont, loading the trucks, and decontaminating the trucks before they leave the site.

The soils to be transported to the consolidation cell for disposal shall be transported using Grandin Road, temporary haul roads across the Site, or other means of transport across the site proposed by the Contractor. The Contractor shall provide all proposed means and haul routes in the material handling plan.

Verification that the RD objectives are achieved will be accomplished by performing surveys of the excavation areas at least three times, including:

- Before the excavation
- After the material has been excavated to confirm the required depth of material has been removed to the required limits
- After backfill to confirm the required cover soil has been installed

These surveys will be performed by an independent surveyor registered in Ohio.

3.2.3 Excavation Area Restoration

In parallel with the excavation of soils, the contractor will backfill the excavation areas with clean soils from onsite and offsite borrow sources. Areas requiring special handling include the following:

- Slopes steeper than 2.5H:1V will be restored with gabion slope systems.
- The excavated areas of the AOC 7 and AOC 9 ravines, channel A, and the AOC 8 channel areas scheduled for rock channel protection will be backfilled with rock channel protection and/or fill soil to restore the ravine bottoms to original grade and to stabilize the ravine channel.
- The excavated parts of the shoreline sediment areas will be backfilled with AASHTO No. 2 stone.
- The drainage channels between the outfalls and the shoreline sediment areas where excavated will be backfilled as shown on the drawings.

The top 6 inches of fill in all areas to be seeded will be topsoil.

All areas that were paved will be restored as pavement, including all pavements, drives, and sidewalk areas in accordance with the requirements of the contract documents. Proposed pavement detail is shown on the drawings. The existing stone parking area on the east side of Grandin Road that requires excavation will be replaced as a stone parking area.

3.2.4 Consolidation Cell Construction and Closure

The Contractor will construct barrier soil test pads as detailed in Section 02280 – Recompacted Clay Barrier Liner Layer for approval of the clay barrier soil to be used for the cell bottom liner system. Test pads will be constructed using either the clay soils excavated from the cell and/or any offsite clay that may be proposed for this barrier soil layer.

The Contractor will excavate the 4.2 acre, onsite consolidation cell and prepare it for receipt of soils. The excavated soils will be used for construction of the consolidation cell cap or as backfill in the excavation areas.

The Contractor will prepare the consolidation cell subgrade, install the ravine drains prior to backfill of the ravines, construct the 18-inch clay soil barrier layer, and install the consolidation cell bottom liner system. This system includes the reinforced geosynthetic clay liner, 60 mil textured high-density polyethylene (HDPE) liner, and geocomposite leachate drainage layer with leachate collection trench/sump.

To protect the integrity of the consolidation cell liner system, the first 12-inch lift of contaminated soil placed in the cell above the liner system will be screened prior to placement, in conformance with the specification. This screening will remove material that could puncture or weaken the liner. Screened soil will be placed on the first lift both on the cell bottom and on the 3H:1V side slopes. This first lift must be placed with low ground pressure equipment.

The Contractor will then fill and compact excavated potentially contaminated materials, including soils, sediments, and depositional material, in the consolidation cell in 10-inch (maximum) compacted lifts.

Concrete, block, brick, and boulders greater than 12 inches in any dimension will not be placed in the consolidation cell. These will be separated out, any attached soil will be broom-cleaned, and the material will be stockpiled as directed by the DuPont Site Representative.

Shredded disposable decontamination equipment and personnel protection equipment will be placed within the consolidation cell. The contractor will process and incorporate the materials into the fill within the consolidation cell. This will be an ongoing work process as the consolidation cell is constructed.

The contractor is responsible for handling and disposal of decontamination water used as dust control water or water used as moisture adjustment during compaction of materials placed in the consolidation cell.

After completion of all excavation and placement of contaminated soils in the onsite consolidation cell, the contractor will perform final grading of the cell as required to install the permanent cap and construct the multilayer cap over the consolidation cell.

The consolidation cell cap system to be installed includes a 6 inch soil subbase, reinforced geosynthetic clay liner, 40 mil HDPE liner, geocomposite infiltration drainage layer with perimeter drains to surface water outlets. Above the drainage layer is a 24 inch protective cover layer consisting of an asphalt cover, a soil cover, or a stone road depending on the area of the cap.

The soils used to construct the cell will require a variety of CQ tests performed at the source, during placement, and in place. These tests are detailed in the specifications and CQAP. The flexible membrane liners, geosynthetic clay liners, and geocomposites used in the construction of the cell are required to provide material certification from the manufacturer with test results showing compliance with the specifications. The flexible membrane liner seams are to be tested after installation as detailed in the specifications and CQAP.

3.2.5 Culvert Cleaning

The contractor will clean all depositional material within the AOC 7, AOC 8, and AOC 9 culverts; solidify and/or dry the material; and place removed material in the consolidation cell. This work must be performed without worker entry into the culverts, which are deteriorated. Contractors may use existing culvert access points or create additional culvert access points as required to perform the work. If additional access points are created, the Contractor must include all costs for restoring the integrity of the culvert after completion of the culvert cleaning work. Details of the approach, all methods, and equipment must be provided for evaluation in the Contractor’s material handling plan included with the bid(see Section 3.2.1). The culverts vary in size and materials of construction.

In the process of removing the depositional material, the Contractor may need to remove materials such as boulders, concrete chunks or slabs, large pieces of metal and plastic debris, and tree trunks. These will be handled as follows:

- Boulders removed from the culverts shall be broom-cleaned of soil and placed in a storage area designated by the DuPont Site Representative.
- Pieces of concrete removed from the culverts shall be broom-cleaned of soil and then crushed and used as rock channel protection in the drainage channels.

- Tree trunks and limbs removed from the culverts shall be broom-cleaned of soil and then chipped. Chipped vegetative material will be stored with the other chipped material on the Site.
- Large metal, plastic, and rubber debris removed from the culverts will be disposed of offsite with the AOC 9 trash materials.

After cleaning the culverts, the contractor shall again inspect them with a recording video camera to allow comparison to the original videos and show that the depositional material has been removed.

3.2.6 Surface Water Controls

Permanent surface water control structures will be installed in accordance with the contract documents, including the AOC 9 outfall structure, AOC 8 outfall splash pad, permanent catch basins, manholes, associated piping, and headwalls. All existing manholes and catch basins that are not at grade will be adjusted to grade and, if needed, the casting will be replaced.

3.2.7 Erosion Control Methods

Temporary Erosion Control: The Contractor shall install, maintain, and if needed, relocate and or repair all soil erosion and sediment control equipment and features detailed in the specifications and on the drawings. These features include silt fence below the excavation areas on the slopes, silt checks in the AOC 7 and AOC 9 ravines to be excavated, bale barriers or silt fence box barriers around drainage inlets, and silt curtains in the Little Miami River at the outfalls. The contractor shall maintain these control measures throughout the site restoration to prevent soil erosion; prevent damage to ground cover, shrubs, or trees; and prevent release of contaminants or wastes. Control measures shall be maintained until the vegetation is established as at least a 70% cover.

Permanent Erosion Control: A turf reinforcement mat shall be used for maximum protection in drainage swale areas where noted and on slopes from 4H:1V to 3H:1V. A permanent erosion control blanket shall be used on steep slopes greater than 3H:1V. Sediment logs shall be placed on all slopes 2.5H:1V to be seeded. Slopes greater than 2.5H:1V shall have gabion slope protection installed in lieu of backfilling with soil. The Contractor can propose an alternative to the gabion protection system in its bid.

3.2.8 Dust Control

The Contractor shall prepare an air emissions control plan as part of a spill and emission control plan. The air emissions control plan will target dust control and control of emission of dust with lead levels that may exceed action levels.

Dust control may include water sprinkling, certain chemical treatments (calcium chloride), or similar methods. Dust control shall be repeated at intervals that will ensure that ground conditions in work areas, areas under active grading, and haul roads do not result in the release of visible dust clouds from the site. The Contractor cannot allow dust or soil emissions to occur from trucks used to transport contaminated materials or soils. The Contractor shall cover the soil in the truck beds to prevent any emissions. Dust control activities shall be increased if the DuPont Site Representative indicates the need for such action.

3.2.9 Air Monitoring

The Engineer will perform air monitoring at the Site perimeter and real-time air monitoring for dust upgradient and downgradient of the work areas. The purposes of the Engineer's real-time monitoring will be to

- Detect risks to offsite personnel and receptors
- Determine if an upgrade (or downgrade) of personnel protective equipment is required while performing onsite work
- Implement engineering controls, protocols, or emergency procedures if the Contractor-established action levels are encountered.

The Contractor's air emissions control plan shall include, at a minimum, any additional air monitoring for dust to be performed by the Contractor and procedures for the collection of samples from workers within the work area for lead analysis.

Prior to mobilization, the Engineer will perform baseline air monitoring. This air monitoring will be performed for 5 days with air monitors mounted along the bike path and near the proposed consolidation cell along the property line with the Warren County Water Treatment Plant.

3.2.10 Health and Safety Protocols

The Contractor shall adhere to the project HASP and the Contractor-supplied addendum, which will includes Contractor AHAs and any other Contractor-specific requirements. The Contractor shall plan and perform the project work to protect all site personnel, including its workers, its subcontractor's workers, DuPont personnel, the Engineer, all site visitors, and the community. Compliance shall be strictly adhered to and enforced by the Contractor.

All supervisory and safety personnel employed on the site must participate in a health and safety training program that complies with criteria set forth by the Occupational Safety and Health Administration in accordance with 29 *Code of Federal Regulations* (CFR) 1910.120(e). Contractors who are not performing intrusive activities are not required to have 29 CFR 1910.120(e) training but must be working under the oversight of someone who does. All personnel involved in field activities must participate in a medical monitoring program as required by 29 CFR 1910.120(f). Substance abuse testing and background checks is required for all employees working on the Site.

The Contractor shall designate an individual to be the Site Safety and Health Officer (SSHO). Where appropriate for each work crew, the Contractor shall designate one person as a health and safety support person. These individuals shall perform activities at their location consistent with the HASP such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They shall have appropriate training equivalent to the SSHO in the specific areas for which they have responsibility. They shall report to and be under the supervision of the SSHO.

A pre-PSA hazard identification call will be held and a Project Safety Analysis (PSA) will be prepared and a PSA call/meeting held for each major work element. These calls/meetings will include the representatives from the Company, the DuPont Site Representative, the Engineer, the Contractor, and any subcontractors involved in the work element.

The Contractor shall participate in any unexpected occurrenceinvestigations for the project in accordance with DuPont policy.

3.2.11 Construction Quality Program

The CQAP describes QC and QA procedures for the RA construction activities for the Site. This plan summarizes the CQC requirements detailed in the specifications and includes the CQA program to ensure the work is performed in accordance with the approved design documents.

3.2.12 Post Construction Submittals

Upon completion of construction, the Contractor is required to submit final record topographical drawings documenting final topography of the consolidation cell area, excavation areas, AOC 9 trash area, all other disturbed areas, and the restored onsite borrow areas. The drawings should include all new drainage structures and all existing structures visible on the surface of the ground or noted on the contract drawings.

The Contractor shall submit the results of all testing performed as part of the work and shall provide material certifications and warranties if not already submitted.

3.2.13 Project Close-Out

The Contractor shall comply with the general conditions of the contract and provide all required submittals before requesting the Engineer's inspection of the work, or a designated portion of the work, for certification of substantial completion. The Contractor shall perform final cleaning and remove temporary facilities and tools before final close-out.

Once the Contractor and DuPont agree that the construction is complete, DuPont will notify the USEPA and Ohio EPA to arrange for a prefinal Inspection. The USEPA and Ohio EPA will perform a walk-through inspection and will advise DuPont, who will then advise the Contractor of any outstanding construction items discovered during the walk-through. Once the Contractor has completed the outstanding work, a final inspection walk-through will be performed.

3.2.14 Post Construction Monitoring / Operation and Maintenance

Once vegetation is established, the Contractor shall remove temporary erosion controls.

The Contractor will be required to periodically inspect vegetation until vegetation is fully established. This condition is defined as at least 70% grass cover.

Seedlings will be planted by others after the vegetation (grass cover) has become established. The monitoring of the trees, vegetation, and groundwater and the operation and maintenance of the landfill cap will be addressed in the OMP.

3.3 Schedule for Other Plan Submittals

Table 2 provides a preliminary schedule for submittal of other significant deliverables or completion of other activities associated with RA construction.

TABLE 2
SCHEDULE FOR OTHER DELIVERABLES AND ACTIVITIES

Deliverable / Activity	Schedule
Pre-construction inspection meeting	Prior to Contractor mobilization
Final OMP	Prior to prefinal inspection
Notice of completion of construction	Within one week of Contractor demobilization
Pre-final inspection report	15 days after prefinal inspection
Final inspection	15 days after completion of work identified in prefinal inspection
Construction completion report (CCR)	30 days after final inspection
Completion of RA report	30 days after the successful precertification inspection pursuant to the UAO

4.0 CONSTRUCTION CONTRACTOR SELECTION METHOD

DuPont will select the RA Construction Contractor through a competitive bidding process. Bid documents will be assembled by the Supervising Contractor on behalf of DuPont and issued to a minimum of five pre-qualified bidders. Bid proposals from responding bidders will be evaluated and a construction contractors will be selected.

Potential construction contractors have already gone through a phased process in which they were provided information based on the 30% design and known changes. Companies were requested to provide information regarding their qualifications with their description on how they would perform the work.

The main criteria for contractor selection are listed below, with no implied order of preference:

- Availability to meet schedule
- Contract terms
- Contractor equipment, construction methods and QC procedures
- Contractor overall qualifications
- Health and safety culture and record
- Insurance and bonding
- Price
- Understanding of the work

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5.0 CONSTRUCTION QUALITY ASSURANCE

5.1 Overview of Construction Quality Assurance Requirements

This section summarizes the CQA requirements for the project, which are described in greater detail in the CQAP.

The Engineer / Construction Manager will be responsible for certifying construction of the RA in accordance with approved plans, specifications, and other contract documents. The Engineer / Construction Manager will be Keith Rankin, P.E., of Parsons.

5.2 Construction Quality Assurance Plan Implementation Method

DuPont has retained a company that is qualified to perform CQA for the RA at the Peters Cartridge Site. Parsons will be the CQA firm for this project and will oversee the RA construction. The CQA contractor will provide the necessary qualified personnel, equipment, and support services to conduct oversight of Construction Contractor QC activities. CQA will include, if/as required, testing of independently collected or duplicate media samples provided by the Construction Contractor, oversight of the Contractor CQC as required by the contract, and oversight of any required independent surveying.

CQA personnel will directly interface with the Construction Manager and Construction Contractor during construction. CQA personnel will review all submittals, QA field inspections, QA sampling and testing procedures, and Construction Contractor QC test data to verify adherence to the CQAPand contract documents.

CQA requirements for RA construction are described in greater detail in the CQAP. The QC activities to be performed by the Construction Contractor will be defined in its CQC Plan.

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6.0 SITE MONITORING PLANS

6.1 Performance Standards Verification Plan

Specific monitoring plan requirements for the total remedy will be included in the PSVP. The purpose of the PSVP is to provide a mechanism to ensure that both short-term and long-term performance standards for the RA are met. The Draft PSVP is included with the 95% Design Report. Once approved, the PSVP will be implemented on the approved schedule. The PSVP includes the following supporting plans:

- HASP
- Field Sampling Plan

The Quality Assurance Project Plan (Parsons 2012) remains applicable to the remedial action work and an updated Quality Assurance Project Plan was not prepared.

6.2 Operations and Maintenance Plan

The final OMP for the full remedy implemented at the Site is required to be submitted no later than the time of the pre-final inspection of the RA construction. However, to meet the requirements of the SOW, a draft OMP is being submitted with the draft Final (95%) Design Report.

The OMP will be implemented after completion of the final inspection and submittal of the CCR.

6.3 Institutional Control Implementation and Assurance Plan

The ICIAP will discuss the requirements for the implementation and maintenance of ICs to maintain limitations on land and groundwater activity and use over areas that do not support unlimited use/unrestricted exposure as set forth in the ROD. The final ICIAP will be submitted to USEPA prior to the pre-final construction inspection.

6.4 Soil Management Plan

The SMP will identify the process for ensuring that future land use at the Site, including utility installation and repair and foundation installation, is protective of human health and the environment. The SMP will be provided as part of the ICIAP.

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7.0 REFERENCES

Geosyntec, 2009a. Remedial Investigation Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. February 25.

Geosyntec, 2009b. Feasibility Study Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. June 23.

Parsons. 2012a. Remedial Design Work Plan, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons. 2012b. Quality Assurance Project Plan Pre-Design Investigation, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons, 2013. Preliminary Design Report, Peters Cartridge Facility, Warren County, Ohio. May.

Parsons, 2014. Treatability Study Report For Lead Immobilization, Peters Cartridge Facility, Warren County, Ohio. January.

USEPA, 2009. Record of Decision – Peters Cartridge Facility, Hamilton Township, Warren County, Ohio. September.

USEPA, 2012a. Administrative Order for the Remedial Design and Remedial Action at Peters Cartridge Facility Site, Kings Mills, Warren County, Ohio. March.

USEPA, 2012b. Statement of Work for the Remedial Design and Remedial Action at Peters Cartridge Facility Site, Kings Mills, Warren County, Ohio. March.

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ACRONYMS

Acronym	Definition / Description
AHA	Activity hazard analysis
AOC	Area of Concern
AoC	Area of Contamination
BERA	Baseline Environmental Risk Assessment
bgs	Below ground surface
CCR	Construction Completion Report
CFR	*Code of Federal Regulations*
CQ	Construction quality
CQA	Construction quality assurance
CQAP	Construction Quality Assurance Plan
CQC	Construction quality control
DuPont	E. I. du Pont de Nemours and Company
FS	Feasibility study
FPA	Former Process Area
HASP	Health and Safety Plan
HDPE	High-density polyethylene (HDPE
HHBLRA	Human Health Baseline Risk Assessment
HTP	Hamilton Township Property
IC	Institutional control
ICIAP	Institutional Control Implementation and Assurance Plan
kg	Kilogram
KMOP	Kings Mill Ordnance Plant
LA	Lowland Area
mg	Milligram
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
OMP	Operation and Maintenance Plan
PSA	Project safety analysis
PSVP	Performance Standard Verification Plan
QA	Quality assurance
QC	Quality control
RA	Remedial Action
RAWP	Remedial Action Work Plan
RD	Remedial Design
RI	Remedial investigation
ROD	Record of Decision
Site	Former Peters Cartridge Facility
SLERA	Screening Level Ecological Risk Assessment
SMP	Soil Management Plan
SOW	Statement of Work
SSHO	Site Safety and Health Officer
TCLP	Toxicity Characteristic Leaching Procedure
UAO	Unilateral Administrative Order
USEPA	U. S. Environmental Protection Agency

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1.0 INTRODUCTION

Parsons prepared this Remedial Action Work Plan (RAWP) on behalf of E. I. du Pont de Nemours and Company (DuPont) for the former Peters Cartridge Facility (Site) in Warren County, Ohio. The RAWP was completed in accordance with the requirements of a Unilateral Administrative Order (UAO) issued to DuPont by the U.S. Environmental Protection Agency (USEPA) with the Statement of Work (SOW) and Record of Decision (ROD) attached to the UAO. The RAWP is provided as described in the approved Remedial Design Work Plan (Parsons 2012a).

The RAWP provides an overview of the selected remedial action (RA), schedule, organization structure, and methodsused to implement the remedy for the Site. It also defines the process for construction of the remedy, documents the responsibilities of all organizations, and lists key personnel involved with remedy implementation.

1.1 Purpose, Scope, and Organization of the Remedial Action Work Plan

1.1.1 Purpose and Scope

The SOW details the required content of the RAWP. This RAWP follows the requirements in the SOW to provide detailed descriptions of the remediation and construction activities. The RAWP also describes the construction contractor selection method, outlines the construction quality assurance (CQA) process, and lists the plans that will be provided to address long-term monitoring of the Site.

1.1.2 Report Organization

The RAWP is divided into the sections summarized below.

- Section 1 – Introduction: This section includes the purpose and scope of the RAWP; provides background information on the Site including history, surrounding land use, and prior investigations and studies; and describes the key components of the selected remedy.
- Section 2 – Project Organization: This section identifies the project team members and their responsibilities. A contact list for key project personnel is included in **Appendix A**.
- Section 3 – Construction Summary and Schedule: This section provides details of the activities to be conducted to implement the RA.
- Section 4 – Construction Contractor Selection Method: This section discusses the methods DuPont will use in selection of an RA contractor.
- Section 5 – Construction Quality Assurance: This section briefly describes the quality control (QC) and quality assurance (QA) requirements that are detailed in the Construction Quality Assurance Plan (CQAP) and the specifications. The CQAP is included as **Appendix B**.
- Section 6 – Site Monitoring Plans: This section discusses the site monitoring plans that are associated with the RA. The Performance Standards Verification Plan (PSVP) is included in **Appendix C** and contains an updated Field Sampling Plan and a Health and Safety Plan (HASP) for RA activities. The other site monitoring plans are provided as appendices to the Operation and Maintenance

Plan (OMP) (a separate document) and include an Institutional Control Implementation and Assurance Plan (ICIAP) and a Soil Management Plan (SMP).

- Section 7 – References: This section contains reference documents used in preparation of this RAWP.

1.2 Site Background

The former Peters Cartridge Facility is located along the southern bank of the Little Miami River, in Warren County, Ohio. A site location map is included as **Figure 1.1**. The Site occupies approximately 71 acres west of Grandin Road and approximately 1 acre east of Grandin Road. A map showing the RA excavation areas and proposed onsite consolidation cell is included as **Figure 1.2**.

The Site operated as an ammunition manufacturing facility from 1887 to 1944, primarily producing paper shot shell ammunition and, occasionally (between 1934 and 1944), metal cartridge ammunition, primarily to support World War I and World War II military efforts. While the Peters Cartridge Facility underwent a number of facility renovations and new construction, there were no major changes in the type of manufacturing or the location of production areas at the Site. Site buildings and facility structures shown in the figures included with this RAWP are identified using numbers and descriptions referenced in historical documents. Information on the historical use of buildings and facilities are provided in the Remedial Investigation (RI) Report (Geosyntec 2009a).

Since 1944, the former Peters Cartridge Facility has been divided into multiple land parcels that have been owned and occupied by various entities. Business occupants or tenants have included warehousing for large printing equipment; an acetylene tank reconditioning business; an instrument maker and a painter in the west end of Building R-3; and an artist’s studio (e.g., painting, sculpting) on the first and second floors, respectively, of Building R-9 (Geosyntec 2009b). The Kings Mills Technical Center property manager’s office is in Building R-2. A metals scrapping/salvage company operates in a portion of Building R-1 and the outdoor area adjacent to the western end of the building.

For the purposes of the RI and feasibility study (FS), the Site was separated into three distinct exposure areas: the Lowland Area (LA), the Former Process Area (FPA), and the Hamilton Township Property (HTP).

The LA portion of the Site lies within the Little Miami River floodplain. The LA is clearly differentiated from the remainder of the Site by steel fencing, thick vegetation, and steep topography along the southern border of the Little Miami River Scenic Trail. This trail was a historical railroad right-of-way redeveloped as a bike and walking path. North of the trail, the LA includes some historical manufacturing areas that are characterized by the presence of ash-like fill, concrete foundations, masonry structures, and concrete culverts (culvert outfalls) that drain surface water from the upgradient portions of the Site. In addition, the LA includes a narrow strip of the Little Miami River shoreline characterized by local bedrock outcrops and a shale and limestone bottom substrate. Future land use in the LA is expected to remain recreational/open space.

The FPA is a 15-acre parcel of developed land containing six buildings. The FPA encompasses the production portion of the Site where most manufacturing associated with the Peters Cartridge process took place. Discontinuous areas of ash-like fill are present around the existing buildings. Most of the FPA is relatively flat and covered by concrete/asphalt paving, buildings, and small landscaped grass areas. Portions of the FPA are currently used by commercial or industrial businesses; future land use is expected to remain commercial/industrial. Two large culverts go under the buildings on the eastern side of the Site.

The HTP, formerly called the Lewis Property, consists of a 56-acre parcel of unimproved wooded land on the southern and southwestern boundaries of the FPA. The HTP was used primarily to store finished product from the Site. The HTP consists of steeply sloping bedrock ridges and rolling topography with dense vegetation. The HTP contains bunkers, concrete supports, foundations, conveyance structures, and other facilities historically used by the Peters Cartridge Company. The salvage area at the northwestern portion of the HTP is unpaved and surrounded by steel fencing and mature woody and herbaceous vegetation. This area features buildings original to the former salvage yard, in which discontinuous areas of ash-like fill remain. The HTP is currently vacant, and future land use is expected to be recreational.

In 1992, the Ohio Environmental Protection Agency (Ohio EPA) listed the Site as a discovery site. It conducted a preliminary assessment of the Site in 1993 and subsequently brought the Site to the attention of the USEPA. Several site screening investigations and evaluations were performed between 1994 and 1999. Under an Administrative Order on Consent, effective July 7, 2004, an RI, including human health and ecological risk assessments, was completed that formed the basis for identifying remediation needs and approaches for the Site that were evaluated in a FS. The USEPA issued a ROD on 28 September 2009 and executed a UAO for the Remedial Design (RD) and RA with an effective date of April 30, 2012. The Site was listed on the National Priorities List (commonly called Superfund list), on September 18, 2012.

1.3 Surrounding Land Use

The Site is bordered to the north by the Little Miami River (designated as a State and National Scenic River), to the west by a U.S. Army Reserve Center, to the south by the Warren County Water District water treatment plant, and to the east by a natural area owned by the Ohio Department of Natural Resources (ODNR). Residential and agricultural properties are located to the southeast.

Past manufacturing and industry in the immediate vicinity of the Site included the following:

- Gunpowder was manufactured from 1878 to 1958 by the Kings Mills Powder Company along the north bank of the Little Miami River across from the Site.
- Munitions were manufactured at the government-owned Kings Mill Ordnance Plant (KMOP), adjacent to the southern end of the Site.
- Metals fabrication and painting operations were conducted by Diversified Products, Inc., at the former KMOP.

Current industrial facilities near the Site include the following:

- The Warren County water treatment facility is adjacent to the southeast end of the Site.
- The Lebanon regional wastewater treatment plant is located along the south side of Mason-Morrow-Millgrove Road, approximately 2 miles upstream (northeast) of the Site. The wastewater plant discharges treated water directly into the Little

Miami River under a National Pollutant Discharge Elimination System permit issued by the Ohio EPA.

- The former KMOP adjacent to the southern end of the Site is now occupied by the U.S. Army Reserve Center.

1.4 Former Site Investigations and Studies

Environmental investigations have been conducted at the Site since 1987. These investigations had varying data quality objectives and work scopes and were primarily focused in the main manufacturing portion of the Site.

- The RI conducted beginning in 2005 addressed all three areas of the Site.
- Analytical results collected during the RI were used to prepare a Human Health Baseline Risk Assessment (HHBLRA), a Screening Level Ecological Risk Assessment (SLERA), and a Baseline Environmental Risk Assessment (BERA).
- The FS was conducted following completion of the RI. The FS used the data presented in the RI, BERA, and HHBLRA to determine the RA objectives and evaluate remedial alternatives (Geosyntec 2009a).
- In 2008, an Interim Remedial Measures Study was conducted for Area of Concern (AOC) 9. An Interim Remedial Measure Work Plan was prepared in 2008 to summarize the investigation work and delineate the proposed scope of work for the Interim Remedial Measure (Geosyntec 2008).

1.5 Selected Remedial Action

The selected remedy specified in the ROD will serve as the final RA for the Site. As detailed in the ROD, the major components of the selected remedy are:

- Excavate surface soil in the FPA to a depth of at least 2 feet below ground surface (bgs) in areas that exceed the USEPA commercial standard for lead of 800 milligrams per kilogram (mg/kg). Excavate surface soil in the LA and in the HTP to a depth of at least 2 feet bgs in areas that exceed the USEPA residential standard for lead of 400 mg/kg. The actual areas to be excavated and depths will be determined and evaluated during the RD. The excavated areas will be backfilled with clean fill material to the existing grade.
- Clean out and remove debris and erosional material at drainage culvert and outfall areas. Excavate three identified shoreline sediment areas to a depth of approximately 6 inches and backfill the shoreline sediment areas with clean fill material.
- Consolidate impacted soil, sediment, and erosional material in an onsite consolidation cell. The cell will be constructed with an impermeable composite liner and cap system developed to be consistent with state regulations. A flexible membrane liner with a geotextile cushion will be installed as the main component of the cell liner system.
- Cap the cell with a composite system consisting, from top to bottom, of a 6-inch-thick vegetative support layer, a 2-foot-thick layer of compacted low-permeability clay, a geocomposite drainage layer, a flexible geomembrane liner, and a low-permeability clay layer. The final cap design will be developed to be compliant with state regulations during the RD phase of the project. During the RD phase,

it will be determined whether an access restriction will be required based on future use of the area.

- Monitor groundwater in accordance with the long-term monitoring plan to ensure that there is no migration of contaminants from the cell.
- Implement institutional controls (ICs) in the form of deed restrictions to accomplish the following: restrict land use to nonresidential purposes, limit future Site activities to prevent intrusive activities that could compromise the cell, and restrict onsite groundwater use to prevent ingestion exposures by a future resident with groundwater used as a domestic water supply.

Additional remedy elements are spelled out in the ROD, will be included in the RD, and are discussed further in later sections of this report.

The determination that some of the soils impacted by lead are characteristically lead hazardous has resulted in a proposal to have the USEPA classify this site as an Area of Contamination (AoC[1]). Soil will then be handled in accordance with the Area of Contamination Policy. The characteristic hazardous soil would be excavated within the AoC, treated, rendered non-hazardous, and disposed in the onsite consolidation cell.

The implementation of the above noted RA components will conform to the design specifications presented in the RD Report. The detailed implementation and verification procedures are presented in Section 3.0 of this RAWP.

[1] The term AOC is used for previous work at this Site to mean Area of Concern. To avoid confusion, the term Area of Contamination, also frequently referred to as AOC, is herein referred to as AoC.

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2.0 PROJECT ORGANIZATION

2.1 Major Project Team Members

A preliminary project organization showing lines of communications among major project team members is presented in **Figure 2.1**. Project team members are defined below. Names of personnel and companies will be placed on the organization chart after all project team members are selected. Relevant contact information is provided in **Appendix A.**

Regulatory Agencies

The regulatory agencies for the RA are the USEPA and Ohio EPA.

Local Authorities

Local authorities include the police, fire, and emergency response personnel and public officials for Hamilton Township and Warren County.

Property Owners

The owners of the property where the RA work will be performed include the following:

- Kings Mills Commerce Park, Cincinnati OH
- Hamilton Township Board of Trustees, Warren County OH
- Ohio Division of Parks and Recreation, Ohio State Parks, ODNR, Columbus OH
- Warren County Engineer, Lebanon OH
- Little Miami Inc., Milford OH
- TEJ Holdings, Inc., Cincinnati OH.

DuPont Project Coordinator

DuPont has designated Sathya Yalvigi, the DuPont Project Director for the Site, as the Project Coordinator.

Engineer / Construction Manager

The Engineer is responsible for certifying, by professional stamp and signature, that the RA was constructed in conformance with approved design documents. The Construction Manager is responsible for monitoring the construction and overseeing the inspection of the quality testing. These roles will be filled by a single person, and the Engineer/Construction Manager selected by DuPont is Keith Rankin (Parsons).

DuPont Site Representative / QA Inspector

The DuPont Site Representative / QA Inspector selected by DuPont is Clinton Betchan (Parsons).

Construction Contractor

DuPont will select the Construction Contractor through a competitive bidding process. This selection will be communicated before the start of the RA activities for the Site.

Construction Quality Personnel

Construction quality (CQ) personnel qualified to conduct and document construction quality control (CQC) activities will be independent of the Construction Contractor. This includes testing and surveying if/as required (in compliance with the USEPA- and Ohio EPA-approved CQAP for construction). The CQ personnel will be retained by the Construction Contractor but will report results directly to the Construction Manager, DuPont Site Representative, or other Parsons personnel serving as QA inspectors.

2.2 Project Responsibilities

Responsibilities of each project team member are described below.

Regulatory Agencies

It is the responsibility of the USEPA in consultation with the Ohio EPA to review and provide approvals of the deliverables for compliance with the UAO.

DuPont Project Coordinator

DuPont is responsible for implementing the terms of the UAO, including the implementation of the RA. The Project Coordinator provides day-to-day oversight on behalf of DuPont and is the primary contact among the project participants.

Engineer / Construction Manager

The Engineer / Construction Manager will review the CQ documentation, as built drawings, survey data, field and laboratory test results, and field logs, and will visit the Site to the extent necessary to certify construction of the RA was completed in accordance with the USEPA-approved final design and construction documents. The Engineer who certifies the RA construction completion will be a registered professional engineer in Ohio. The responsibilities and duties of the Engineer are more fully defined in the CQAP.

The Engineer / Construction Manager will act on behalf of DuPont regarding project-related decisions and disputes. He will work with the DuPont Site Representative to provide the required management of the RA activities.

DuPont Site Representative / QA Inspector

The DuPont Site Representative will represent DuPont at the site, manage onsite activities, and act as a liaison with and between the Engineer / Construction Manager, DuPont, and the Construction Contractor. The DuPont Site Representative will serve as the QA Inspector, supervising and directing the day-to-day CQ activities on the project and routinely interacting with the Engineer / Construction Manager.

Construction Contractor

The Construction Contractor for the RA will be responsible for meeting all of the requirements of the contract documents for implementing the RA, including the USEPA-approved final design , plans, and contract terms and conditions. The Construction Contractor will comply with all applicable federal, state, and local regulations.

Construction Quality Personnel

The CQ personnel will be independent of the Construction Contractor. Organizations performing QC required by the Contractor will conduct testing and surveying, if/as required, for the construction of the RA at the Peters Cartridge Facility. Specific responsibilities of the CQ personnel are described in the CQAP.

2.3 Coordination with Stakeholders

Local Authorities

Contact and coordination with the local emergency response agencies will be required at the start of Site remedial activities (beginning with mobilization). Permits are not required for work performed on the Site; however, adherence to the regulatory requirements of the permits is required. Permits will be obtained for hauling materials over public roads.

Property Owners

The Property Owners will be kept advised of any project activities on their property or that might affect their access or business operations.

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3.0 CONSTRUCTION SUMMARY AND SCHEDULE

3.1 Preliminary Remedial Action Schedule

A preliminary RA schedule is presented in **Figure 3.1**. It will be replaced by a revised, final RA construction schedule that will be developed by the Construction Contractor and provided at the pre-construction meeting before start of construction.

3.2 Construction Summary and Sequencing

The following sections detail the activities associated with implementing the RA components. The sequencing of construction work is listed here in the general order that the work will be accomplished, but the actual sequence of work activities will be determined by the Contractor once the contract is signed and the Contractor's schedule is received.

3.2.1 Pre-Construction Activities

Upon finalization of the design documents, including the design drawings and construction specifications, DuPont will issue bid packages to prospective bidders for the RA. At the end of the bidding process, DuPont will review the bids, interview potential contractors, obtain clarification of issues with the bid, and then select a contractor to receive the RA construction award.

The contractors will be required to provide the following submittals with the bid:

- List all proposed suppliers and subcontractors used in the preparation of the bid.
- Identify the Contractor's key personnel proposed to perform the work on the Site and provide their resumes and work experience. The list shall contain at a minimum the Contractor's project manager, site superintendent, site foreman, and site health and safety officer.
- Include a preliminary Contractor's progress schedule for performance of the work .
- Submit a preliminary material handling plan.
- Provide a preliminary amendment to the HASP.

Upon contract award, the Contractor will prepare and submit the following documents:

- Project schedule in accordance with Section 01510 – Progress Schedules. Progress schedules shall be included with each payment application and shall delineate work done and work scheduled.
- The material handling plan, which also includes the method statements as presented in Section 01510 - Progress Schedules. It shall include a surface water diversion plan as presented in Section 01080 - Environmental Controls.
- Results of all high lead soils treatability testing performed. This will be used to establish the treatability mix design for approval prior to performing the work.
- A schedule of values and schedule for progress payments for the entire project.
- In accordance with Section 01080 – Environmental Controls, the Contractor shall submit prior to the start of work a surface water diversion plan and an air emissions control plan aspart of a the spill and emission control plan.

- In accordance with Section 01070 – Health and Safety Requirements, the Contractor shall submit a HASP amendment. This document shall be complete with Contractor-specific requirements and activity hazard analyses (AHAs) for all tasks to be performed as part of the RA.

The Contractor shall secure all road use permits prior to mobilization.

DuPont will hold a pre-project safety analysis (pre-PSA) site risk assessment call as well as a PSA call / meeting prior to the start of field activities for each major work element. The purpose and attendees of this meeting are described in the HASP.

A pre-construction conference will be held after contract award and prior to mobilization. A preliminary agenda for the pre-construction conference is listed in Section 01520 – Project Meetings. Local emergency response agencies will be invited to attend this meeting.

To save time and accelerate the start of RA work, DuPont proposes to use a separate contract to perform most of the tree clearing associated with the major excavation areas, consolidation cell, and staging areas. The tree clearing will start about a month before the mobilization of the RA Contractor. The balance of the clearing will be performed by the RA Contractor.

Details of the tree clearing are included in Section 02100 – Clearing. This activity will generally proceed as follows.

- Trees will be cleared from the excavation areas, consolidation cell area, onsite borrow area, staging area, and access roads.
- Main tree trunks are to be recycled offsite.
- The tree tops and brush not suitable for recycling are to be chipped and left onsite for reuse as mulch.
- All stumps will be removed with the associated root ball. The stumps and associated root balls will be ground up and stockpiled onsite along with the soil removed from the root ball.
- Ground stump material from contaminated soil areas will be stockpiled separately from ground stump material from clean areas of the site and will be sampled and characterized to determine final disposal. However, it is not expected that any materials resulting from tree clearing work will be disposed in the onsite consolidation cell.

Details such as the proposed staging areas, procedures, methods, equipment, sequence, and schedule to be used for the clearing work are to be included in the material handling plan.

The clearing contractor and/or the RA Contractor, in cooperation with the DuPont Site Representative, shall flag trees (other than ash or beech) that are 12 inches in diameter or greater, are near the outside edges of the excavation areas, and will experience less than 25% root disturbance. These trees will be flagged to remain and be protected during the remediation. At these sites, there will be special handling of the soil area to be excavated and backfilled.

The clearing of trees shall be coordinated with the installation of the sediment and erosion control measures. The silt fence to be installed at the bottom of the slopes shall be installed before, during, or immediately after clearing of an area. Details of the sediment and erosion control features are provided on Drawings 3, 4, 5, and 6 and in Section 01080 – Environmental Controls.

Prior to mobilization, the RA contractor is to take pre-construction photographs and video to document the condition of the work areas, facilities, and roads. These will include but not be limited to Grandin Road and Striker Road sections used to haul materials from the lower excavation areas to the consolidation cell.

Contractor mobilization to the site shall include setting up support trailers for the DuPont Site Representative and for Contractor personnel. The Contractor shall provide other support facilities as detailed in Section 01100 – Temporary Construction Facilities.

3.2.2 Excavation of Soil and Sediments

Prior to the start of excavation of soils and sediments, the Engineer will conduct pre-excavation non-hazardous soils sampling and testing for Toxicity Characteristic Leaching Procedure (TCLP) lead, arsenic, and mercury to confirm areas designated as non-hazardous do not require treatment for high concentrations of these substances. The location of these samples are shown in the Field Sampling Plan Figures 2.1 NE and 2.1 NW.

The excavation of soils and sediments are separated into the categories shown in Table 1. Color and hatching on the drawings are provided as guides on how the materials are classified and their excavation depths.

TABLE 1
MATERIAL CLASSIFICATION CATEGORIES

Drawing	Material Classification	Designation on Drawing	Excavation Depth
7, 8, 9, 10	Non-hazardous soil	Yellow Areas	2 feet
7, 8, 9	High lead soil (to be treated to non-hazardous)	Yellow with red cross hatch	2 feet
7, 8	Non hazardous sediment	Blue	6 inches
9	Trash (high lead / non-hazardous)	Yellow with red cross hatch / yellow	Depth of trash, minimum of 2 feet
7, 8, 9, 10	Ravine soils (non-hazardous)	Yellow	2 feet or bedrock if shallower

The independent surveyor shall perform pre-construction surveys to record existing topography and establish survey controls. The surveyor will stake out the excavation areas delineating both the non-hazardous and the high lead areas. The pre-construction surveys include a survey of the AOC 7 and 9 ravines that are to be excavated. This survey is necessary to establish existing grades within these ravine bottoms and prepare, in consultation with the Engineer, the plan for restoring the ravine bottoms to existing grade and installing the rock channel protection lining.

The Contractor must decontaminate all equipment and trucks prior to leaving work areas and or prior to leaving the Site to prevent tracking of contaminated materials between the work areas of the site or offsite. As an alternate approach, the Contractor can prevent contamination of equipment such as trucks.

The Contractor shall perform high lead soil treatment testing and bench scale studies as necessary to establish the mix design to be used to treat high lead soils to a non-hazardous classification.

The treatment of the high lead soils will require special handling, including preparing the treatment area; treating; staging; sampling; testing for TCLP lead, arsenic, and mercury; loading; handling;, hauling; and placing and compacting/testing of the soils in the onsite consolidation cell. The treated soil shall not be hauled to the consolidation cell area until the analytical results on the TCLP testing have confirmed the soil is not TCLP hazardous for lead, arsenic, or mercury. Each designated high lead soil area will receive at least one test, even if its volume is less than 750 cubic yards. High lead soil areas greater than 750 cubic yards will have one soil test for every 750 cubic yards or part thereof (that is, an area of 800 cubic yards would have two tests on the treated soil.)

The Contractor will excavate the non-hazardous soils and industrial debris. This activity will include handling, hauling, staging if necessary, placing, compacting and compaction testing of the soils in the onsite consolidation cell.

The soil excavation shall be conducted from the higher elevation areas to the lower elevation areas to prevent erosion of potentially impacted soils from areas to be excavated into areas that have been excavated and backfilled. The Contractor's material handling plan will define how the various areas will be excavated.

The Contractor shall clean all open AOC 7, 8 and 9 channels, excavate 6 inches of sediments from shoreline sediment areas and outfall channels, solidify and/or dry the material, and place the removed material in the consolidation cell.

The material in the AOC 9 trash area will be excavated and loaded onto trucks for offsite disposal by DuPont. The AOC 9 trash consists of both hazardous and nonhazardous trash potentially containing small amount of regulated asbestos containing material. Transport and offsite disposal will be arranged and paid for directly by DuPont. The Contractor is responsible for coordinating the trucks supplied by DuPont, loading the trucks, and decontaminating the trucks before they leave the site.

The soils to be transported to the consolidation cell for disposal shall be transported using Grandin Road, temporary haul roads across the Site, or other means of transport across the site proposed by the Contractor. The Contractor shall provide all proposed means and haul routes in the material handling plan.

Verification that the RD objectives are achieved will be accomplished by performing surveys of the excavation areas at least three times, including:

- Before the excavation
- After the material has been excavated to confirm the required depth of material has been removed to the required limits
- After backfill to confirm the required cover soil has been installed

These surveys will be performed by an independent surveyor registered in Ohio.

3.2.3 Excavation Area Restoration

In parallel with the excavation of soils, the contractor will backfill the excavation areas with clean soils from onsite and offsite borrow sources. Areas requiring special handling include the following:

- Slopes steeper than 2.5H:1V will be restored with gabion slope systems.

- The excavated areas of the AOC 7 and AOC 9 ravines, channel A, and the AOC 8 channel areas scheduled for rock channel protection will be backfilled with rock channel protection and/or fill soil to restore the ravine bottoms to original grade and to stabilize the ravine channel.
- The excavated parts of the shoreline sediment areas will be backfilled with AASHTO No. 2 stone.
- The drainage channels between the outfalls and the shoreline sediment areas where excavated will be backfilled as shown on the drawings.

The top 6 inches of fill in all areas to be seeded will be topsoil.

All areas that were paved will be restored as pavement, including all pavements, drives, and sidewalk areas in accordance with the requirements of the contract documents. Proposed pavement detail is shown on the drawings. The existing stone parking area on the east side of Grandin Road that requires excavation will be replaced as a stone parking area.

3.2.4 Consolidation Cell Construction and Closure

The Contractor will construct barrier soil test pads as detailed in Section 02280 – Recompacted Clay Barrier Liner Layer for approval of the clay barrier soil to be used for the cell bottom liner system. Test pads will be constructed using either the clay soils excavated from the cell and/or any offsite clay that may be proposed for this barrier soil layer.

The Contractor will excavate the 4.2 acre, onsite consolidation cell and prepare it for receipt of soils. The excavated soils will be used for construction of the consolidation cell cap or as backfill in the excavation areas.

The Contractor will prepare the consolidation cell subgrade, install the ravine drains prior to backfill of the ravines, construct the 18-inch clay soil barrier layer, and install the consolidation cell bottom liner system. This system includes the reinforced geosynthetic clay liner, 60 mil textured high-density polyethylene (HDPE) liner, and geocomposite leachate drainage layer with leachate collection trench/sump.

To protect the integrity of the consolidation cell liner system, the first 12-inch lift of contaminated soil placed in the cell above the liner system will be screened prior to placement, in conformance with the specification. This screening will remove material that could puncture or weaken the liner. Screened soil will be placed on the first lift both on the cell bottom and on the 3H:1V side slopes. This first lift must be placed with low ground pressure equipment.

The Contractor will then fill and compact excavated potentially contaminated materials, including soils, sediments, and depositional material, in the consolidation cell in 10-inch (maximum) compacted lifts.

Concrete, block, brick, and boulders greater than 12 inches in any dimension will not be placed in the consolidation cell. These will be separated out, any attached soil will be broom-cleaned, and the material will be stockpiled as directed by the DuPont Site Representative.

Shredded disposable decontamination equipment and personnel protection equipment will be placed within the consolidation cell. The contractor will process and incorporate the materials into the fill within the consolidation cell. This will be an ongoing work process as the consolidation cell is constructed.

The contractor is responsible for handling and disposal of decontamination water used as dust control water or water used as moisture adjustment during compaction of materials placed in the consolidation cell.

After completion of all excavation and placement of contaminated soils in the onsite consolidation cell, the contractor will perform final grading of the cell as required to install the permanent cap and construct the multilayer cap over the consolidation cell.

The consolidation cell cap system to be installed includes a 6 inch soil subbase, reinforced geosynthetic clay liner, 40 mil HDPE liner, geocomposite infiltration drainage layer with perimeter drains to surface water outlets. Above the drainage layer is a 24 inch protective cover layer consisting of an asphalt cover, a soil cover, or a stone road depending on the area of the cap.

The soils used to construct the cell will require a variety of CQ tests performed at the source, during placement, and in place. These tests are detailed in the specifications and CQAP. The flexible membrane liners, geosynthetic clay liners, and geocomposites used in the construction of the cell are required to provide material certification from the manufacturer with test results showing compliance with the specifications. The flexible membrane liner seams are to be tested after installation as detailed in the specifications and CQAP.

3.2.5 Culvert Cleaning

The contractor will clean all depositional material within the AOC 7, AOC 8, and AOC 9 culverts; solidify and/or dry the material; and place removed material in the consolidation cell. This work must be performed without worker entry into the culverts, which are deteriorated. Contractors may use existing culvert access points or create additional culvert access points as required to perform the work. If additional access points are created, the Contractor must include all costs for restoring the integrity of the culvert after completion of the culvert cleaning work. Details of the approach, all methods, and equipment must be provided for evaluation in the Contractor’s material handling plan included with the bid(see Section 3.2.1). The culverts vary in size and materials of construction.

In the process of removing the depositional material, the Contractor may need to remove materials such as boulders, concrete chunks or slabs, large pieces of metal and plastic debris, and tree trunks. These will be handled as follows:

- Boulders removed from the culverts shall be broom-cleaned of soil and placed in a storage area designated by the DuPont Site Representative.
- Pieces of concrete removed from the culverts shall be broom-cleaned of soil and then crushed and used as rock channel protection in the drainage channels.
- Tree trunks and limbs removed from the culverts shall be broom-cleaned of soil and then chipped. Chipped vegetative material will be stored with the other chipped material on the Site.
- Large metal, plastic, and rubber debris removed from the culverts will be disposed of offsite with the AOC 9 trash materials.

After cleaning the culverts, the contractor shall again inspect them with a recording video camera to allow comparison to the original videos and show that the depositional material has been removed.

3.2.6 Surface Water Controls

Permanent surface water control structures will be installed in accordance with the contract documents, including the AOC 9 outfall structure, AOC 8 outfall splash pad, permanent catch basins, manholes, associated piping, and headwalls. All existing manholes and catch basins that are not at grade will be adjusted to grade and, if needed, the casting will be replaced.

3.2.7 Erosion Control Methods

Temporary Erosion Control: The Contractor shall install, maintain, and if needed, relocate and or repair all soil erosion and sediment control equipment and features detailed in the specifications and on the drawings. These features include silt fence below the excavation areas on the slopes, silt checks in the AOC 7 and AOC 9 ravines to be excavated, bale barriers or silt fence box barriers around drainage inlets, and silt curtains in the Little Miami River at the outfalls. The contractor shall maintain these control measures throughout the site restoration to prevent soil erosion; prevent damage to ground cover, shrubs, or trees; and prevent release of contaminants or wastes. Control measures shall be maintained until the vegetation is established as at least a 70% cover.

Permanent Erosion Control: A turf reinforcement mat shall be used for maximum protection in drainage swale areas where noted and on slopes from 4H:1V to 3H:1V. A permanent erosion control blanket shall be used on steep slopes greater than 3H:1V. Sediment logs shall be placed on all slopes 2.5H:1V to be seeded. Slopes greater than 2.5H:1V shall have gabion slope protection installed in lieu of backfilling with soil. The Contractor can propose an alternative to the gabion protection system in its bid.

3.2.8 Dust Control

The Contractor shall prepare an air emissions control plan as part of a spill and emission control plan. The air emissions control plan will target dust control and control of emission of dust with lead levels that may exceed action levels.

Dust control may include water sprinkling, certain chemical treatments (calcium chloride), or similar methods. Dust control shall be repeated at intervals that will ensure that ground conditions in work areas, areas under active grading, and haul roads do not result in the release of visible dust clouds from the site. The Contractor cannot allow dust or soil emissions to occur from trucks used to transport contaminated materials or soils. The Contractor shall cover the soil in the truck beds to prevent any emissions. Dust control activities shall be increased if the DuPont Site Representative indicates the need for such action.

3.2.9 Air Monitoring

The Engineer will perform air monitoring at the Site perimeter and real-time air monitoring for dust upgradient and downgradient of the work areas. The purposes of the Engineer's real-time monitoring will be to

- Detect risks to offsite personnel and receptors

- Determine if an upgrade (or downgrade) of personnel protective equipment is required while performing onsite work
- Implement engineering controls, protocols, or emergency procedures if the Contractor-established action levels are encountered.

The Contractor's air emissions control plan shall include, at a minimum, any additional air monitoring for dust to be performed by the Contractor and procedures for the collection of samples from workers within the work area for lead analysis.

Prior to mobilization, the Engineer will perform baseline air monitoring. This air monitoring will be performed for 5 days with air monitors mounted along the bike path and near the proposed consolidation cell along the property line with the Warren County Water Treatment Plant.

3.2.10 Health and Safety Protocols

The Contractor shall adhere to the project HASP and the Contractor-supplied addendum, which will includes Contractor AHAs and any other Contractor-specific requirements. The Contractor shall plan and perform the project work to protect all site personnel, including its workers, its subcontractor's workers, DuPont personnel, the Engineer, all site visitors, and the community. Compliance shall be strictly adhered to and enforced by the Contractor.

All supervisory and safety personnel employed on the site must participate in a health and safety training program that complies with criteria set forth by the Occupational Safety and Health Administration in accordance with 29 *Code of Federal Regulations* (CFR) 1910.120(e). Contractors who are not performing intrusive activities are not required to have 29 CFR 1910.120(e) training but must be working under the oversight of someone who does. All personnel involved in field activities must participate in a medical monitoring program as required by 29 CFR 1910.120(f). Substance abuse testing and background checks is required for all employees working on the Site.

The Contractor shall designate an individual to be the Site Safety and Health Officer (SSHO). Where appropriate for each work crew, the Contractor shall designate one person as a health and safety support person. These individuals shall perform activities at their location consistent with the HASP such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They shall have appropriate training equivalent to the SSHO in the specific areas for which they have responsibility. They shall report to and be under the supervision of the SSHO.

A pre-PSA hazard identification call will be held and a Project Safety Analysis (PSA) will be prepared and a PSA call/meeting held for each major work element. These calls/meetings will include the representatives from the Company, the DuPont Site Representative, the Engineer, the Contractor, and any subcontractors involved in the work element.

The Contractor shall participate in any unexpected occurrenceinvestigations for the project in accordance with DuPont policy.

3.2.11 Construction Quality Program

The CQAP describes QC and QA procedures for the RA construction activities for the Site. This plan summarizes the CQC requirements detailed in the specifications and includes the CQA program to ensure the work is performed in accordance with the approved design documents.

3.2.12 Post Construction Submittals

Upon completion of construction, the Contractor is required to submit final record topographical drawings documenting final topography of the consolidation cell area, excavation areas, AOC 9 trash area, all other disturbed areas, and the restored onsite borrow areas. The drawings should include all new drainage structures and all existing structures visible on the surface of the ground or noted on the contract drawings.

The Contractor shall submit the results of all testing performed as part of the work and shall provide material certifications and warranties if not already submitted.

3.2.13 Project Close-Out

The Contractor shall comply with the general conditions of the contract and provide all required submittals before requesting the Engineer's inspection of the work, or a designated portion of the work, for certification of substantial completion. The Contractor shall perform final cleaning and remove temporary facilities and tools before final close-out.

Once the Contractor and DuPont agree that the construction is complete, DuPont will notify the USEPA and Ohio EPA to arrange for a prefinal Inspection. The USEPA and Ohio EPA will perform a walk-through inspection and will advise DuPont, who will then advise the Contractor of any outstanding construction items discovered during the walk-through. Once the Contractor has completed the outstanding work, a final inspection walk-through will be performed.

3.2.14 Post Construction Monitoring / Operation and Maintenance

Once vegetation is established, the Contractor shall remove temporary erosion controls.

The Contractor will be required to periodically inspect vegetation until vegetation is fully established. This condition is defined as at least 70% grass cover.

Seedlings will be planted by others after the vegetation (grass cover) has become established. The monitoring of the trees, vegetation, and groundwater and the operation and maintenance of the landfill cap will be addressed in the OMP.

3.3 Schedule for Other Plan Submittals

Table 2 provides a preliminary schedule for submittal of other significant deliverables or completion of other activities associated with RA construction.

TABLE 2
SCHEDULE FOR OTHER DELIVERABLES AND ACTIVITIES

Deliverable / Activity	Schedule
Pre-construction inspection meeting	Prior to Contractor mobilization
Final OMP	Prior to prefinal inspection
Notice of completion of construction	Within one week of Contractor demobilization
Pre-final inspection report	15 days after prefinal inspection
Final inspection	15 days after completion of work identified in prefinal inspection
Construction completion report (CCR)	30 days after final inspection
Completion of RA report	30 days after the successful precertification inspection pursuant to the UAO

4.0 CONSTRUCTION CONTRACTOR SELECTION METHOD

DuPont will select the RA Construction Contractor through a competitive bidding process. Bid documents will be assembled by the Supervising Contractor on behalf of DuPont and issued to a minimum of five pre-qualified bidders. Bid proposals from responding bidders will be evaluated and a construction contractors will be selected.

Potential construction contractors have already gone through a phased process in which they were provided information based on the 30% design and known changes. Companies were requested to provide information regarding their qualifications with their description on how they would perform the work.

The main criteria for contractor selection are listed below, with no implied order of preference:

- Availability to meet schedule
- Contract terms
- Contractor equipment, construction methods and QC procedures
- Contractor overall qualifications
- Health and safety culture and record
- Insurance and bonding
- Price
- Understanding of the work

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5.0 CONSTRUCTION QUALITY ASSURANCE

5.1 Overview of Construction Quality Assurance Requirements

This section summarizes the CQA requirements for the project, which are described in greater detail in the CQAP.

The Engineer / Construction Manager will be responsible for certifying construction of the RA in accordance with approved plans, specifications, and other contract documents. The Engineer / Construction Manager will be Keith Rankin, P.E., of Parsons.

5.2 Construction Quality Assurance Plan Implementation Method

DuPont has retained a company that is qualified to perform CQA for the RA at the Peters Cartridge Site. Parsons will be the CQA firm for this project and will oversee the RA construction. The CQA contractor will provide the necessary qualified personnel, equipment, and support services to conduct oversight of Construction Contractor QC activities. CQA will include, if/as required, testing of independently collected or duplicate media samples provided by the Construction Contractor, oversight of the Contractor CQC as required by the contract, and oversight of any required independent surveying.

CQA personnel will directly interface with the Construction Manager and Construction Contractor during construction. CQA personnel will review all submittals, QA field inspections, QA sampling and testing procedures, and Construction Contractor QC test data to verify adherence to the CQAPand contract documents.

CQA requirements for RA construction are described in greater detail in the CQAP. The QC activities to be performed by the Construction Contractor will be defined in its CQC Plan.

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6.0 SITE MONITORING PLANS

6.1 Performance Standards Verification Plan

Specific monitoring plan requirements for the total remedy will be included in the PSVP. The purpose of the PSVP is to provide a mechanism to ensure that both short-term and long-term performance standards for the RA are met. The Draft PSVP is included with the 95% Design Report. Once approved, the PSVP will be implemented on the approved schedule. The PSVP includes the following supporting plans:

- HASP
- Field Sampling Plan

The Quality Assurance Project Plan (Parsons 2012) remains applicable to the remedial action work and an updated Quality Assurance Project Plan was not prepared.

6.2 Operations and Maintenance Plan

The final OMP for the full remedy implemented at the Site is required to be submitted no later than the time of the pre-final inspection of the RA construction. However, to meet the requirements of the SOW, a draft OMP is being submitted with the draft Final (95%) Design Report.

The OMP will be implemented after completion of the final inspection and submittal of the CCR.

6.3 Institutional Control Implementation and Assurance Plan

The ICIAP will discuss the requirements for the implementation and maintenance of ICs to maintain limitations on land and groundwater activity and use over areas that do not support unlimited use/unrestricted exposure as set forth in the ROD. The final ICIAP will be submitted to USEPA prior to the pre-final construction inspection.

6.4 Soil Management Plan

The SMP will identify the process for ensuring that future land use at the Site, including utility installation and repair and foundation installation, is protective of human health and the environment. The SMP will be provided as part of the ICIAP.

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7.0 REFERENCES

Geosyntec, 2009a. Remedial Investigation Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. February 25.

Geosyntec, 2009b. Feasibility Study Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. June 23.

Parsons. 2012a. Remedial Design Work Plan, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons. 2012b. Quality Assurance Project Plan Pre-Design Investigation, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons, 2013. Preliminary Design Report, Peters Cartridge Facility, Warren County, Ohio. May.

Parsons, 2014. Treatability Study Report For Lead Immobilization, Peters Cartridge Facility, Warren County, Ohio. January.

USEPA, 2009. Record of Decision – Peters Cartridge Facility, Hamilton Township, Warren County, Ohio. September.

USEPA, 2012a. Administrative Order for the Remedial Design and Remedial Action at Peters Cartridge Facility Site, Kings Mills, Warren County, Ohio. March.

USEPA, 2012b. Statement of Work for the Remedial Design and Remedial Action at Peters Cartridge Facility Site, Kings Mills, Warren County, Ohio. March.

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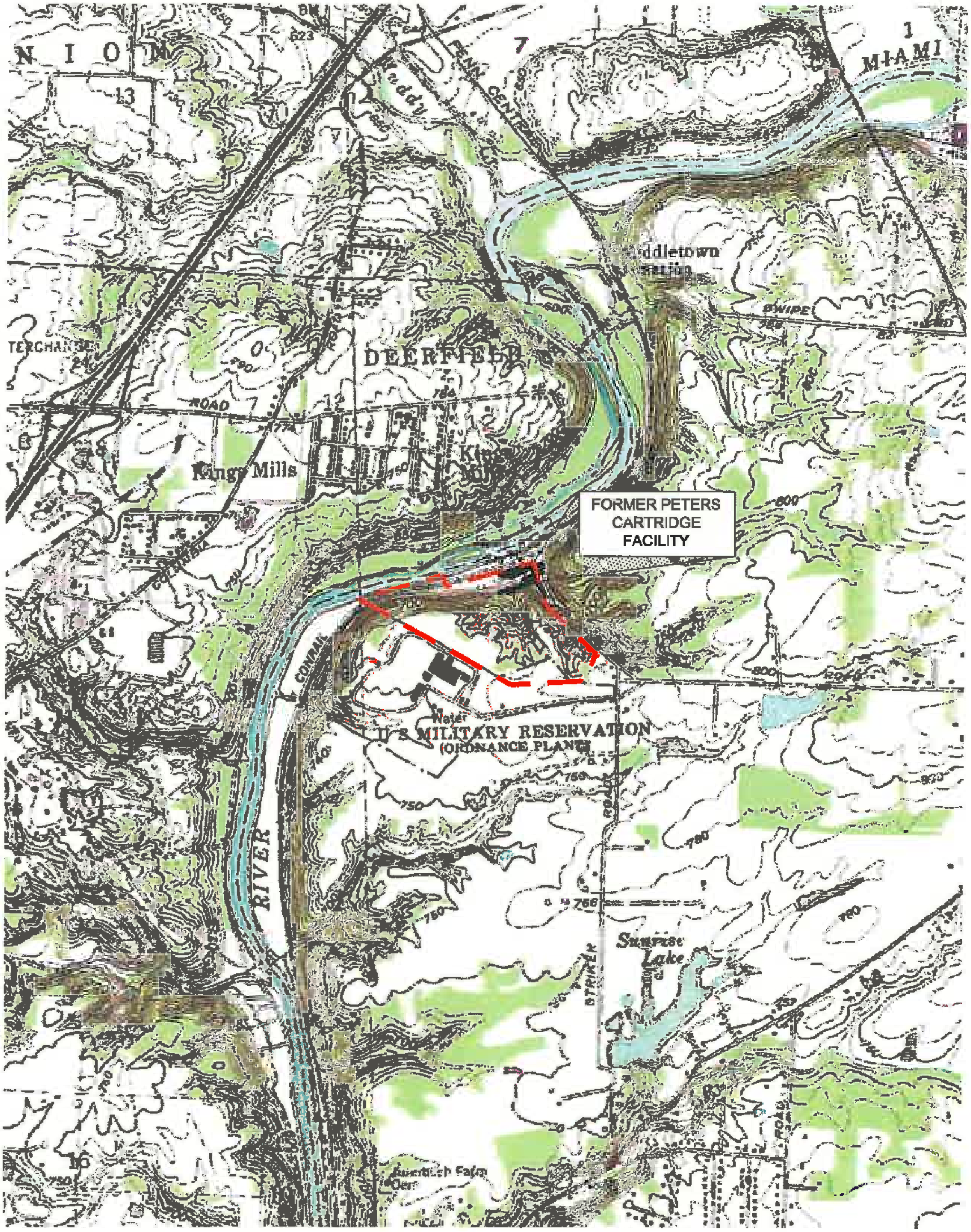
FIGURES



Latitude: N 39° 20' 55.5"
Longitude: W 84° 14' 32.8"

0 1/2 1 MILE

0 1000 2000 4000 6000 FEET

USGS 7.5-Minute Topographic Map; South Lebanon, OH Quadrangle 2000; Scale: 1:24,000

Job No.	446128
Designed	EJM
Drawn	SBM
Checked	KER
Reviewed	
Approved	
Reg. No.	
Date	2/7/14

Issue Certification

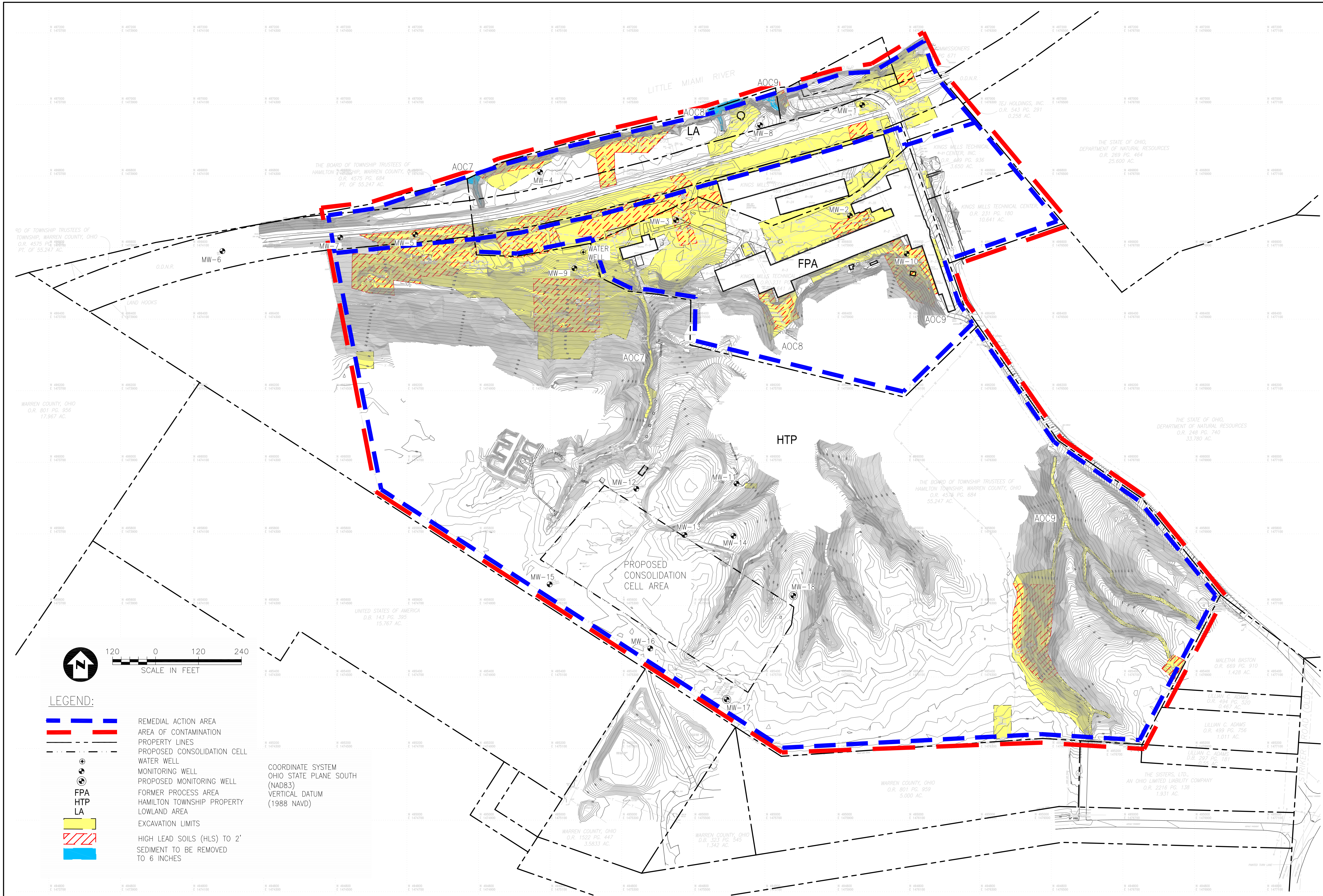
NOT FOR BIDDING OR CONSTRUCTION

PARSONS
26301 CURTISS WRIGHT PKWY.
CLEVELAND, OHIO 44143
PHONE: 513-552-7044

FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LOCATION MAP

FIGURE NO.	REV.
1.1	—



Rev.	Date	Description	By
B	2/21/14	PRE FINAL DESIGN REPORT TO USEPA	EJM
A	2/2/14	PRE FINAL DESIGN REPORT TO DUPONT	EJM

Dupont\Peters Cartridge\(Fig1.2)(Site Layout).dwg

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed SMA
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

PARSONS
2443 CROWNE POINT DRIVE,
SHARONVILLE, OHIO 45241
PHONE: 513-326-3040

DUPONT

DuPONT CORPORATE REMEDIATION GROUP 974 CENTER ROAD
CRP 715/218
WILMINGTON, DE 19805

PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LAYOUT

FIGURE NO. 1.2
REV. B

FIGURE 2.1
PROJECT ORGANIZATION CHART

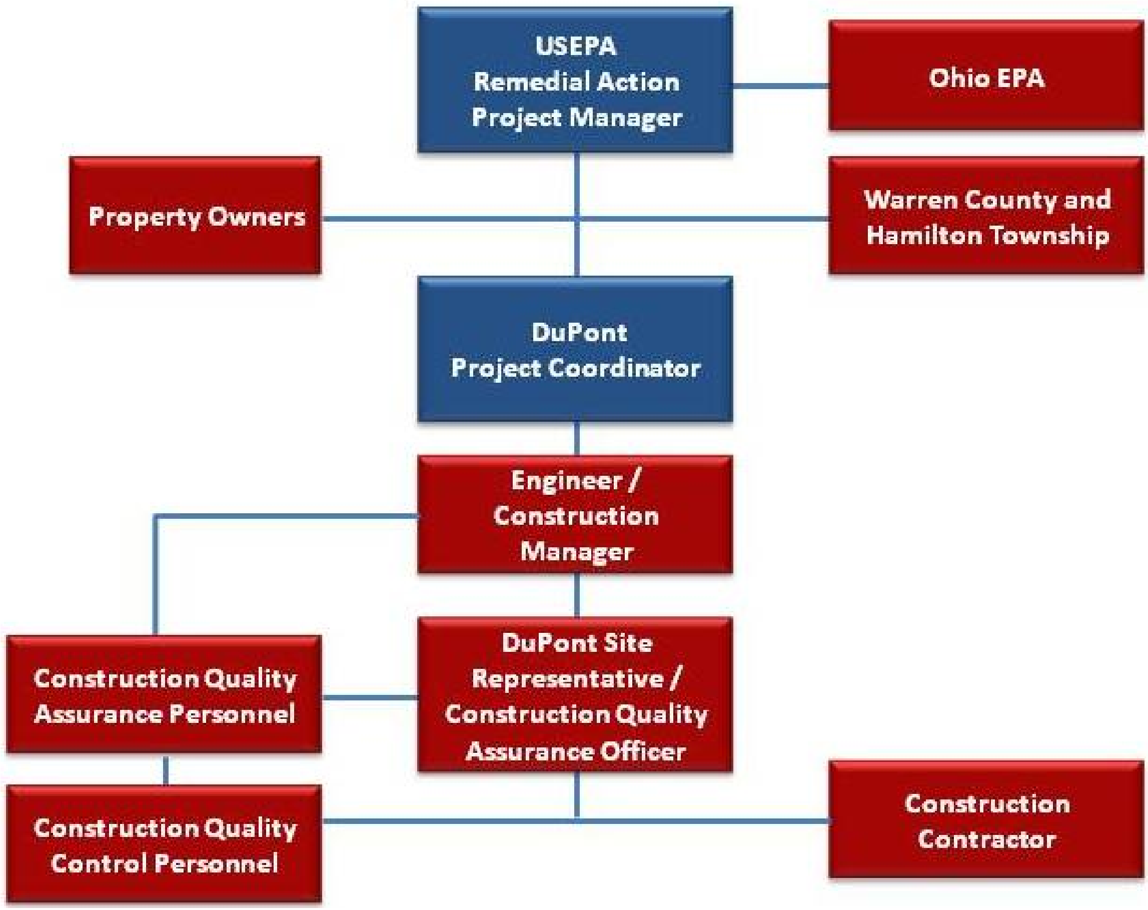
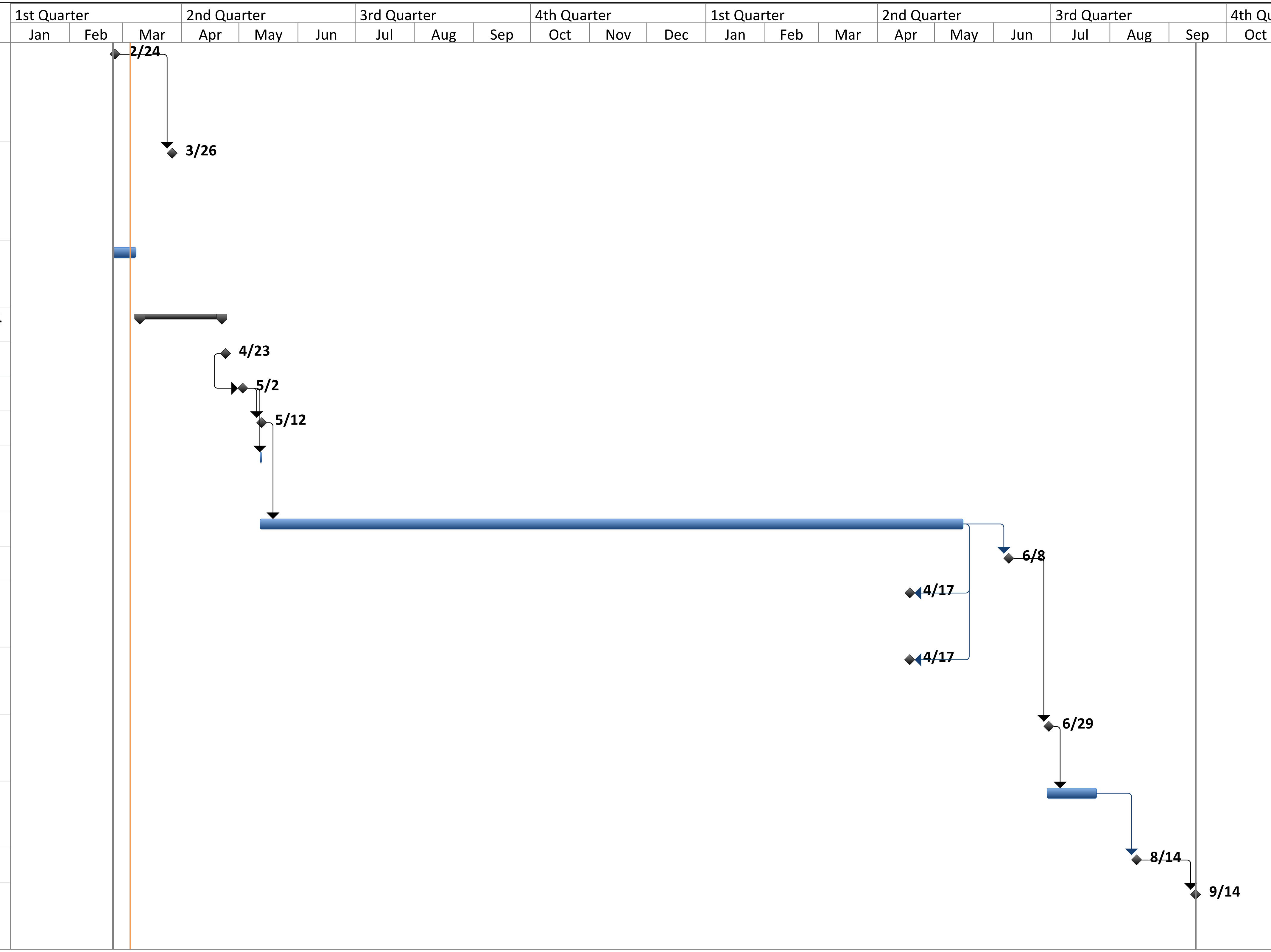


Figure 3.1
Preliminary Remedial Action Schedule
Peters Cartridge Facility
Warren County, Hamilton Township, Ohio

ID	Task Name	Duration	Start	Finish
1	EPA receives Pre-Final/Final Design Submittal	1 day	Mon 2/24/14	Mon 2/24/14
2	EPA approval of Pre-Final/Final Desiggn Submittal	1 day	Wed 3/26/14	Wed 3/26/14
3	Bid Document Preparation	10 days	Mon 2/24/14	Fri 3/7/14
4	**Bidding Process**	**31 days**	**Mon 3/10/14**	**Mon 4/21/14**
12	Notice of Award	1 day	Wed 4/23/14	Wed 4/23/14
13	Contract Signed	1 day	Fri 5/2/14	Fri 5/2/14
14	Mobilization	1 day	Mon 5/12/14	Mon 5/12/14
15	Pre-Construction Inspection and Meeting	1 day	Mon 5/12/14	Mon 5/12/14
16	RA Construction	265 days	Mon 5/12/14	Fri 5/15/15
17	Pre-Final Inspection	1 day	Mon 6/8/15	Mon 6/8/15
18	Final O&M Plan Submitted	1 day	Fri 4/17/15	Fri 4/17/15
19	Final ICIAP and SMP Submitted	1 day	Fri 4/17/15	Fri 4/17/15
20	Prefinal Inspection Report	1 day	Mon 6/29/15	Mon 6/29/15
21	Punchlist Work by Contractor	20 days	Mon 6/29/15	Fri 7/24/15
22	Final Inspection	1 day	Fri 8/14/15	Fri 8/14/15
23	Construction Completion Report	1 day	Mon 9/14/15	Mon 9/14/15



Project: RA_Schedule.mpp
Date: Wed 3/5/14

Task	Milestone	Project Summary	Manual Summary Rollup	Progress
Split	Summary	Manual Task	Manual Summary	

APPENDIX A
CONTACT LIST FOR
KEY PROJECT TEAM MEMBERS
PETERS CARTRIDGE FACILITY REMEDIAL ACTION

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U.S. EPA Ms. Demaree Collier Remedial Project Manager U.S. Environmental Protection Agency, Region 5 77 West Jackson Boulevard (SR-6J) Chicago, Illinois 60604-3511 (312) 886-0214 Collier.demaree@epa.gov		**Ohio EPA** Ms. Tammy McPeek Site Coordinator Ohio Environmental Protection Agency Southwest District Office Division of Environmental Response and Revitalization 401 East Fifth Street Dayton, Ohio 45402-2911 (937) 285-6441 Tamara.McPeek@epa.state.oh.us
AECOM (U.S. EPA Contractor) Mr. Paul Dombrowski AECOM 701 Edgewater Drive Wakefield, MA 01880 Paulm.dombrowski@aecom.com (781)246-5200		
DuPont Mr. Sathya Yalvigi Project Director Peters Cartridge Facility Project Coordinator E.I.du Pont de Nemours and Company DuPont Corporate Remediation Group 974 Centre Road CRP 715/218 Wilmington, DE 19805 (302) 999-2764 Sathya.V.Yalvigi@USA.dupont.com		**DuPont ADQM** Ms. Sharon Nordstrom Project Chemist URS Iron Hill Corporate Center 4051 Ogletown Road, Suite 300 Newark, DE 19713 (302)781-5936 sharon.nordstrom@urs.com

DuPont Mr. Tyson Campbell Senior Project Manager E.I.du Pont de Nemours and Company DuPont Corporate Remediation Group 6324 Fairview Road Charlotte, NC 28210 (704)362-6640 (302)379-6988 cell Tyson.E.Campbell@usa.dupont.com		
Parsons Mr. Keith Rankin Project Manager / Construction Manager Parsons 26301 Curtiss Wright Parkway, Suite 100 Richmond Heights, Ohio 44143 (216) 486-9005 (216) 912-2894 (direct) (216) 214-2502 (mobile) keith.rankin@Parsons.com		**Parsons** Mr. Clinton Betchan DuPont Site Representative (405)496-8648 (mobile) Clinton.betchan@parsons.com
Parsons Mr. Eric Mysona Project Geologist Parsons 2443 Crowne Point Drive Sharonville, Ohio 45241 (513)552-7009 eric.mysona@parsons.com		**Parsons** Mr. Scott Anderson Technical Director Parsons 100 High Street Boston, MA 02110 (617)449-1406 scott.anderson@parsons.com

Additional contacts for Contractor to be added once a contractor is selected and information is obtained.

APPENDIX B
CONSTRUCTION QUALITY ASSURANCE PLAN

Construction Quality Assurance Plan

Peters Cartridge Facility
Warren County, Ohio

Prepared for:

E. I. du Pont de Nemours and Company
Corporate Remediation Group
Chestnut Run Plaza
974 Centre Road
Wilmington, Delaware 19805

Prepared by:

PARSONS
26301 Curtiss Wright Parkway, Suite 100
Cleveland, Ohio 44243

February 2014

DuPont PN 507787
Parsons PN 446128

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FIGURES

TABLES

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ACRONYMS

Acronym	Definition / Description
AOC	Area of Concern
bgs	Below ground surface
CCR	Construction Completion Report
Company	E. I. du Pont de Nemours and Company
CQAP	Construction Quality Assurance Plan
CY	Cubic yard
DuPont	E. I. du Pont de Nemours and Company
FML	Flexible membrane liner
FPA	Former Process Area
GCL	Geosynthetic clay liner
HTP	Hamilton Township Property
kg	Kilogram
LA	Lowland Area
mg	Milligram
Ohio EPA	Ohio Environmental Protection Agency
QA	Quality assurance
QC	Quality control
RA	Remedial Action
RD	Remedial Design
ROD	Record of Decision
Site	Former Peters Cartridge Facility
SOW	Statement of Work
TCLP	Toxicity Characteristic Leaching Procedure
UAO	Unilateral Administrative Order
USEPA	U. S. Environmental Protection Agency

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1.0 INTRODUCTION

Parsons prepared this Construction Quality Assurance Plan (CQAP) on behalf of E. I. du Pont de Nemours and Company (DuPont, the Company) for the former Peters Cartridge Facility (Site) in Warren County, Ohio. This CQAP was completed in accordance with the requirements of a Unilateral Administrative Order (UAO) issued to DuPont by U. S. Environmental Protection Agency (USEPA) and with the Statement of Work (SOW) and Record of Decision (ROD) attached to the UAO.

This CQAP describes quality control (QC) and quality assurance (QA) procedures for the remedial action (RA) construction activities for the Site. This CQAP stresses careful inspection and documentation during the entire construction phase of the project, from the selection of materials through the implementation of the remedial measures. The purpose of this CQAP is to provide the procedures to be used to ensure that the project is conducted in accordance with plans and specifications prepared by Parsons and approved by DuPont. All parties involved in this construction project will receive a copy of this CQAP.

This CQAP governs all aspects of construction QA, including the following items:

- Delegation of responsibility and authority for all aspects of the project, including chain-of-command and duties of the construction manager and QA inspection personnel
- Project meetings, including a pre-construction meeting, progress meetings, and unscheduled meetings to address problems or work deficiencies
- QA testing protocols for materials and methods
- Soil sampling protocols, including borrow material sampling procedures, sample compositing, identification, handling procedures, and laboratory test methods
- Procedures to be followed should any QA test fail to achieve project requirements
- All project QA documentation, including daily monitoring logs, progress reports, corrective measures reports, and the final construction certification report

The Site has been divided into three areas: the Lowland Area (LA), the Former Process Area (FPA), and the Hamilton Township Property (HTP).

- The LA includes the portions of the Site along the southern bank of the Little Miami River, within the Little Miami River floodplain. Steel fencing, thick vegetation, and steep topography along the southern border of the scenic trail effectively differentiate the LA from the remainder of the Site.
- The FPA is the primary location where historic manufacturing operations were conducted. It is also referred to as an Operational Area.
- The HTP was used primarily for storage of materials and supplies and is now owned by Hamilton Township. Some process operations (e.g., mixing) may have been conducted at select HTP locations.

A general Site Location Map is provided as **Figure 1.1**. The Site Layout is depicted on **Figure 1.2**.

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2.0 SCOPE OF WORK

2.1 Objectives

The work addressed under this CQAP will facilitate proper construction of the former Peters Cartridge Facility remedy. All work will be constructed to the lines, grades, and dimensions indicated on the plans and details and in accordance with the project specifications. All work will be conducted according to the procedures and methods set forth within the project specifications.

The objectives of this CQAP are to ensure that proper construction techniques and procedures are used and to verify that the materials and methods used meet the specifications. This CQAP is a supplement to the construction documents and is intended for use by the QA personnel. Any conflicts between the construction documents and the CQAP will be brought to the immediate attention of DuPont. Additionally, the QA/QC program will attempt to identify and anticipate problems that may occur during construction and their corrective measures. After completion of the construction activities, a construction report will be prepared that documents the RA was constructed in conformance with the design and construction specifications and plans.

2.2 Project Elements

This CQAP addresses the QA and QC programs for RA construction. In general, this project consists of the following activities:

- Non-hazardous soil excavation areas will be sampled in place at a frequency of one sample for every 750 cubic yards (CY) of soil. Samples will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) lead, arsenic, and mercury to confirm non-hazardous characterization of the soils prior to soil excavation. Sampling and confirmation is to be performed by the Engineer. Based on the 2-foot depth of the excavation, this equates to one sample for every 100- by 100-foot grid.
- The surface soil in the FPA will be excavated to a depth of 2 feet below ground surface (bgs) in areas that exceed the USEPA commercial standard for lead of 800 milligrams per kilogram (mg/kg). Surface soil in the LA and in the HTP will be excavated to a depth of 2 feet bgs in areas that exceed the USEPA residential standard for lead of 400 mg/kg. The actual areas to be excavated and depths were determined and evaluated during the remedial design. The soils will be transported and placed in the onsite consolidation cell. The excavated areas will be backfilled with clean fill material to the existing grade.
- Soils in areas of the HTP, LA, and FPA containing high lead concentrations will be treated before they are moved to the consolidation cell. After treatment, they will be sampled at a frequency of one sample for every 750 CY of treated soil and tested for TCLP lead, arsenic, and mercury to confirm that the soils are classified as non-hazardous. Each designated high lead soil area will receive at least one test, even if it contains less than 750 CY. High lead soil areas greater than 750 CY will have one soil test for every 750 CY or part thereof (that is, an = area of 800 CY would have two tests on the treated soil.) When they are confirmed to be non-hazardous, the soils will be transported to the onsite consolidation cell. This sampling and analysis will be performed by the RA Contractor. The qualifications of the proposed analytical laboratory will be

submitted to the Engineer and Company for review and approval prior to the work being performed.

- Trash material will be excavated from the western slope of the AOC 9 western ravine. The trash material will be transported offsite for disposal as a hazardous or non-hazardous waste, depending on the characteristics of the material removed. In areas where the trash consists of a surface deposit, it will be excavated to the minimum depth of 2 feet. Areas where the trash deposit is thicker than 2 feet in depth will have all trash removed and an additional 6 inches of native soil removed. The trash will be disposed of offsite and the 6 inches of native soil will be transported to the onsite consolidation cell for disposal. After removal of the trash and native soil as described here, the slope will be regraded to a maximum slope of 2.5 horizontal to 1 vertical as necessary to eliminate any extreme steep slope that remains after the trash is removed to facilitate placement of the 2 feet of clean cover soil and revegetation.
- Debris and erosional material at drainage culvert and outfall areas will be cleaned out and removed. Six inches of sediments will be removed within the outfall channels and replaced with clean fill and/or erosion protection. Depositional material will be removed from the AOC 7, 8, and 9 culverts. Three shoreline sediment areas at the AOC 7, 8, and 9 outfalls will be excavated to a depth of 6 inches and then backfilled with clean fill material.
- Impacted soil, sediment, and erosional material will be consolidated in an onsite consolidation cell. Part of the cell surface will be completed as an asphalt parking area and the remainder of the cap final surface will be vegetated.
- The consolidation cell liner will be constructed with a dual barrier system consisting of recompacted soil, reinforced geosynthetic clay liner (GCL), flexible membrane liner (FML), and a leachate collection layer. The consolidation cell cap will be constructed of an engineered subbase, a GCL, an FML, a geocomposite drainage layer, and a 24-inch-thick protective cover layer.
- The disturbed soil areas will be revegetated except for areas where pavement was removed and is to be replaced, ravines and drainage channels that are to have rock channel protection, steep slopes greater than 2.5H:1V that will be protected with gabion slope systems, and stone access roads.

3.0 RESPONSIBILITIES AND AUTHORITIES

3.1 QA/QC Management Organization

3.1.1 Principal Organizations

The principal organizations involved in conducting the RA at the former Peters Cartridge Facility Superfund Site include USEPA, Ohio Environmental Protection Agency (Ohio EPA), DuPont, Parsons, and the Construction Contractor (to be determined). The RA Contractor will be responsible for the QC and certification during the RA activities while the Engineer will be responsible for the verification and QA part of this plan.

3.1.2 USEPA

It is the responsibility of the USEPA to review the CQAP for compliance with the Consent Decree and decide whether to approve or reject the CQAP based on this review. The USEPA will have the responsibility and authority to review and accept, or reject, any design revisions or requests for a variance that are submitted by DuPont. The agency also has the responsibility and authority to review and approve the Construction Completion Report (CCR) and all QA/QC documentation collected during the construction of the RA to confirm that the CQAP was followed and that the project was constructed as specified in the contract documents.

3.1.3 Ohio EPA

The Ohio EPA will be provided deliverables so they may consult with the USEPA.

3.1.4 DuPont

DuPont is the responsible party for the RA and is referred as the "Company" in the specifications. DuPont has the responsibility to implement, monitor, and control the quality of construction and related activities in conformance with the UAO issued to DuPont by the USEPA that became effective on April 30, 2012. DuPont has the authority to select professional organizations and contractors to assist them in fulfilling these responsibilities.

3.1.5 Engineer / Construction Manager

The Engineer / Construction Manager selected by DuPont for remedial design (RD) and RA activities for this Site is Parsons. The Engineer / Construction Manager will be responsible for monitoring the construction, inspection, verification, and QA in accordance with this CQAP. The Engineer will inform all parties involved with the RA construction of their responsibilities, lines of communication, lines of authority, and QA procedures.

QA personnel will be assigned specific responsibilities and tasks. The responsibilities will include the following:

- Provide overall technical QA
- Support engineering personnel in meetings, as necessary
- Provide interface with any regulatory agency representatives and the Construction Contractor in the absence of a DuPont representative

QA responsibilities include the following:

- Review design criteria, plans, and specifications for clarity and completeness so the CQAP can be implemented
- Provide engineering support in meetings, as necessary
- Provide certifications, on behalf of DuPont, that the construction was completed in general conformance with the approved design plans and specifications
- Consult with the engineering personnel on field problems and corrective measures
- Schedule and coordinate QA inspection activities performed by Engineer personnel
- Witness critical aspects of construction work, as necessary
- Report progress to DuPont
- Determine required resolution of suspected non-standard work when notified by QA inspection personnel
- Provide reports to DuPont on the inspection results including, but not limited to:
    - Review and interpretation of all data sheets and reports
    - Identification of work that they believe should be accepted, rejected, or uncovered for observation, or that may require special testing, inspection, or approval
    - Rejection of defective work and verification that corrective measures are implemented

3.1.6 DuPont Site Representative / QA Inspector

Specific QA responsibilities of the DuPont Site Representative / QA inspection personnel will include the following:

- Perform independent, continuous, onsite inspection of the work in progress to assess compliance with the facility design criteria, plans, and specifications
- Verify that the equipment used in testing meets the test requirements and that the tests are conducted according to this CQAP
- Report to the Construction Manager results of all inspections, including work that is not of acceptable quality or that fails to meet the specified design
- Inspect and verify that labels, tags, manifests, or other identifying documents of all construction materials conform to material specifications

3.1.7 Construction Contractor

The Construction Contractor selected by DuPont will be responsible for constructing the RA in strict accordance with the design plans and specifications and implementation of QC procedures. The Construction Contractor will use construction procedures and techniques that will result in the completed construction meeting the design requirements. The contractor will hire independent entities to implement the QC procedures associated with this project.

The QC team will include but not be limited to field and laboratory testing, surveying, and liner testing. The independent subcontractor will report all testing results directly to the Engineer.

3.2 Project Meetings

3.2.1 Preconstruction Meeting

A preconstruction meeting will be held prior to starting construction. Participants will include DuPont, the Construction Manager, the DuPont Site Representative, and the Construction Contractor. The agenda for this meeting will include, but not be limited to, the following QA/QC topics:

- Provide each organization with all relevant QA documents and supporting information
- Familiarize each organization with the CQAP and its role relative to the design criteria, construction and closure plans, specifications, and construction documentation
- Determine if any changes to the CQAP are needed to ensure that the onsite consolidation cell will be constructed to meet or exceed the specified designs
- Determine if any changes to the CQAP are needed to ensure that the work to be performed in the excavation areas and culverts to be cleaned will meet or exceed the specified designs
- Review the responsibilities of each organization
- Review lines of authority and communication for each organization
- Discuss the established procedures or protocol for observations and tests, including sampling strategies
- Discuss the established procedures or protocol for handling construction deficiencies, repairs, and retesting
- Review methods for documenting and reporting inspection data
- Review methods for distributing and storing documents and reports
- Review work area security and health and safety protocol
- Discuss procedures for the location and protection of construction materials and for the prevention of damage of the materials from inclement weather or other adverse events

Other issues not related to QA and QC will also be discussed.

3.2.2 Progress Meetings

Progress meetings will be held during the course of the work to:

- Discuss the project schedule and work performed to date
- Address and resolve (i.e., establish corrective actions for) any existing or anticipated construction and/or soil treatment problems
- Discuss and resolve (i.e., establish corrective actions for) any coordination or QA problems encountered to date

Participants will include DuPont or its designee, the Construction Manager, the DuPont Site Representative, and the Construction Contractor. The DuPont Site Representative will document the meeting as minutes. The appropriate federal, state, or local regulatory agencies will be informed of the meeting schedule.

Meetings will be held every two weeks. The meeting frequency will be adjusted if deemed appropriate.

3.2.3 Problem or Work Deficiency Meetings

A special meeting will be held if a major QA problem or deficiency has or is likely to occur. At a minimum, the meeting will be attended by DuPont or its designee, the Construction Contractor, the DuPont Site Representative, other QA inspection personnel as appropriate, and the Construction Manager in his role as QA/QC manager. Applicable federal, state, or local regulatory personnel will be informed of the meeting time and place. The purpose of these meetings will be to define and resolve the QA problems encountered or recurring QA deficiency in the following manner:

- Define and discuss the problem or deficiency
- Review alternative solutions
- Implement a plan to resolve the problem or deficiency

The meeting will be documented by the DuPont Site Representative as minutes.

4.0 REVIEW AND INSPECTION ACTIVITIES

4.1 Shop Drawing Review and Approval

Initial review activities by the Engineer will involve review of Construction Contractor submittals and shop drawings as identified in the specifications. The Construction Contractor will submit to the Engineer for review and approval all documents as described in the design plans and specifications. The Engineer will review the submittals and determine if they generally conform to the intent of the specified items. The purpose of having submittals reviewed by the Engineer is to assist the Construction Contractor in interpreting the contract documents.

Upon approval by the Engineer, the Construction Contractor will be allowed to proceed with construction using the approved material. Field inspections by QA personnel will involve inspection of installed items for conformance with the approved item. The Construction Contractor will not be allowed to use substitute materials unless the Construction Contractor has resubmitted a substituted item for the Engineer's review and approval.

4.2 Routine Inspection

During the performance of the construction activities, QA personnel will generally be performing independent, continuous, onsite inspection of the work in progress by the Construction Contractor to assess compliance with construction design criteria, plans, and specifications. QA personnel will routinely inspect and verify that labels, tags, manifests, or other identifying documents of all construction materials conform to approved material/specifications. QA personnel will also monitor testing of components and equipment by the Construction Contractor to ensure that the tests and results conform to applicable criteria. QA personnel will be present to witness testing and will observe constructed features before they are covered or obscured by subsequent construction activities.

All daily routine inspections, test monitoring, and independent testing performed by QA personnel will be recorded on appropriate forms.

4.3 Geotechnical Inspection

QA personnel, in conjunction with the Construction Contractor, will inspect daily all slopes within or adjacent to the work area for signs of instability or potential slope failure. All such signs will be reported to the Engineer’s geotechnical professional, who will advise of any actions to be taken. The Engineer’s geotechnical professional may direct the Construction Contractor to install survey monuments in the slope and to monitor the slope for slippage.

4.4 Quality Assurance Program

The Engineer will evaluate the project activities to ensure that construction is in accordance with the project design plans and specifications. Construction evaluation testing will consist of visual observations of the work, materials, and soils testing; testing of geosynthetic materials; and a survey of as-built conditions.

All QA testing will be conducted in accordance with the project specifications or as described here. Where there are discrepancies between the design plans and specifications and the CQAP, it will be the Construction Contractor's responsibility to bring the discrepancy to the attention of the Engineer for written clarification. The Construction Contractor will cooperate with the Engineer for sampling and testing as required with the project specifications or as described here. All applicable testing methods as previously identified will be observed. Documentation and reporting of test results will be in accordance with the requirements identified in Section 7.0.

The following definitions are presented to facilitate the QA program:

- In fill and cover, a layer is defined as a compacted stratum composed of several lifts constructed without construction joints.
- A lift is defined as a constructed segment of a layer composed of soil materials placed sequentially, each at a thickness no greater than that specified.

The following sections provide details for each of the major elements of the RA work. The QA/QC requirements are summarized in **Table 4.1**.

4.4.1 Clearing

The clearing work shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and the clearing work is conducted to the limits and in the manner specified. The Construction Contractor shall also follow the guidelines for clearing, handling, and hauling methods in the material handling plan. The QA activities associated with this work will be observational, and no sampling and analysis is required. Specific attention will be paid to see that potentially contaminated soil is removed from tree stumps and roots prior to grinding and vegetative material is not mixed with the soil to be placed in the consolidation cell.

4.4.2 Excavation

The excavation, handling, and hauling of potentially contaminated soils shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and excavations stay within the boundaries prescribed by the contract specifications and drawings. Additionally, QA personnel are to continually evaluate the excavations to confirm the extent of contamination removal meets the criteria specified. The Construction Contractor shall also follow the guidelines for excavation, handling, and hauling methods in the material handling plan.

The Engineer will perform additional sampling prior to the excavation activities to confirm the areas identified as being non-hazardous but requiring excavation are not TCLP hazardous. The Engineer will collect and analyze soil samples at a frequency of one sample from every 750 CY to be excavated (a 100-foot by 100-foot area). The sample will be collected from ground surface to a depth of 2 feet. Any asphalt or concrete will be excluded from the sample. The soil collected from 0 to 2 feet at a sample point will be mixed together, and a single soil sample will be collected from the composited material to be sent to TestAmerica Laboratories for testing of TCLP lead, arsenic, and mercury. If analytical results indicate an area should be classified as TCLP hazardous, the area where the sample was collected will be reclassified as part of the high lead area and will be treated as discussed below prior to disposal in the consolidation cell.

QC verification that the remedial design objectives are achieved will be accomplished by performing surveys of the excavation areas:

- Before the excavation
- After the material has been excavated to confirm the required depth of material has been removed to the required limits
- After backfill to confirm the required cover soil has been installed.

These surveys will be performed by an independent surveyor registered in Ohio.

4.4.3 Excavation of High Lead Soil Areas

The treatment, excavation, handling, and hauling of soils from areas identified as high lead areas shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and excavations stay within the boundaries prescribed by the contract specifications and drawings. Additionally, QA personnel are to continually evaluate the excavations to determine if the extent of contamination removal meets the criteria specified. The Construction Contractor shall follow the guidelines for excavation, handling, and hauling methods in the material handling plan.

The performance specification for this requires the Construction Contractor to test the treated soils prior to excavating and hauling them to the consolidation cell at a frequency of one sample per every 750 CY to confirm that the treated soil is not TCLP hazardous for lead, arsenic, and mercury.

4.4.4 Excavation of AOC 9 Trash

The excavation, handling, and hauling of trash and potentially contaminated soils shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and excavations stay within the boundaries prescribed by the contract specifications and drawings. Additionally, QA personnel are to continually evaluate the excavations to determine if the extent of contamination removal meets the criteria specified. The Construction Contractor shall follow the guidelines for excavation, handling, and hauling methods in the material handling plan. The AOC 9 trash (hazardous and non-hazardous) shall be loaded into vehicles for disposal offsite.

The verification that the excavation is complete in this area is based on visual verification that all trash is removed and an additional 6 inches of native soil is excavated.

4.4.5 AOC 7, AOC 8, and AOC 9 Culvert Cleanout

The excavation, handling, and hauling of potentially contaminated soils from the three culverts through the Site shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed as prescribed by the contract specifications and drawings. The Construction Contractor shall follow the guidelines for excavation, handling, and hauling methods in the material handling plan. The Construction Contractor will make a video record of the culverts after they have been cleaned of debris and depositional material. The QA activities associated with this work will be observational, and no sampling and analysis is required.

4.4.6 Shore Sediment Cleanup

The excavation, handling, and hauling of potentially contaminated sediment from the three shoreline areas and drainage channels back to the culvert outlets shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed as prescribed by the contract specifications and drawings. The Construction Contractor shall follow the guidelines for excavation, handling, and hauling methods in the material handling plan. The QA activities associated with this work will be observational, and no sampling and analysis is required.

4.4.7 Backfill and Compaction of Excavation Areas

The backfill and compaction of the excavation areas shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, and any soils from offsite that are used as backfill material meet the chemical screening and geotechnical requirements as prescribed by the contract specifications and drawings.

The Construction Contractor shall screen any offsite materials for chemical contamination and shall provide test results of geotechnical criteria as detailed in Table 4.1. The QA activities associated with the compaction work will be observational, and no sampling and analysis is required.

Material evaluations shall be performed on soil from offsite that is proposed for use to determine its acceptability as construction material and compliance with design plans and specifications. Criteria to be used for determining the acceptability of materials for use during construction are defined in the project specifications. All evaluation tests will be performed in an independent soils testing laboratory.

Tests to be performed by the Construction Contractor are detailed in Table 4.1. These tests will facilitate material evaluations during the construction.

4.4.8 Drainage Channel Erosion Protection

The installation of permanent erosion protection in the drainage channels in the AOC 7, AOC 8 (below outfall only), and AOC 9 ravines shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, and the filter fabric and rock channel protection materials meet the requirements as prescribed by the contract specifications and drawings.

4.4.9 Excavation of Soil from Consolidation Cell and Onsite Borrow Area

The excavation, handling, and hauling of clean borrow soils from the excavation to create the consolidation cell and from the onsite borrow area shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and excavations stay within the boundaries prescribed by the contract specifications and drawings. The Construction Contractor shall follow the guidelines for excavation, handling, and hauling methods in the material handling plan.

4.4.10 Backfill and Compaction of Consolidation Cell Clay Liner Subgrade

The backfill and compaction of the clay soils for the consolidation cell liner subgrade shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, soils are dried to meet the geotechnical requirements, and the subgrade soil is graded within the limits shown on the drawings and is compacted to the criteria specified. The liner subgrade shall be placed in three 6-inch (maximum) lifts to meet the required elevations. Each lift shall be compacted to achieve a predetermined percent of the standard Proctor maximum dry density as required based on the test pad constructed. All evaluation tests will be performed in an independent soils testing laboratory. Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during construction.

4.4.11 Placement of Consolidation Cell Liner GCL Secondary Barrier Layer

The installation of the GCL for the consolidation cell liner system shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, the subgrade soil is graded within the limits shown on the drawings and meets the requirements of the GCL manufacturer, and the required material testing has been performed in accordance with the contract specifications. The Construction Contractor will have interface and internal shear testing performed on the GCL material to be used.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during construction.

4.4.12 Placement of Consolidation Cell Flexible Membrane Liner

The installation of the FML for the consolidation cell liner system shall be monitored by QA personnel. QA personnel shall visually inspect the sheet rolls as they arrive on the jobsite for manufacturer's lot numbers, roll numbers, and possible damage in transit. As each sheet is unrolled, the QA personnel shall visually inspect the sheet surfaces. Sharp creases resulting from wrinkles in the material at the time of manufacture are not acceptable.

The Construction Contractor shall provide test results for samples of the FML that were analyzed for thickness, ultimate tensile strength, elongation, puncture resistance, and tear resistance. Interface shear testing shall be performed on the liner material in accordance with the specifications.

The Construction Contractor is to certify to the Engineer that the surface on which the membrane is to be installed is acceptable before commencing work. The Construction Contractor shall maintain these surfaces in an acceptable condition during installation of the membrane. During installation, the Contractor shall perform non-destructive and destructive testing as listed in Table 4.1. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.13 Placement of Consolidation Cell Liner Leachate Drainage Layer

The installation of a geocomposite for the leachate liner layer above the FML in the consolidation cell liner system shall be monitored by QA personnel. QA personnel shall visually inspect the geocomposite rolls as they arrive on the jobsite for manufacturer's lot numbers, roll numbers, and possible damage in transit. As each roll is unrolled, the QA personnel shall visually inspect the geocomposite surfaces.

The Construction Contractor shall provide test results for samples of the geocomposite that show compliance with the specifications. Interface shear testing and clogging testing shall be performed on the geocomposite material in accordance with the specifications.

The Construction Contractor is to certify to the Engineer that the FML liner is free of protrusions, rocks, dirt, or other unacceptable conditions prior to the installation of geocomposites. The Construction Contractor shall maintain these surfaces in an acceptable condition during installation of the geocomposite. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed.

Tests to be performed by the Construction Contractor are detailed in Table 4.1. These will facilitate material evaluations during the construction.

4.4.14 Backfill and Compaction of Waste Soil in Consolidation Cell

The backfill and compaction of the waste soils in the consolidation cell shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, material for the first 12 inches over the liner system is screened as specified, that all large debris is removed as specified, no vegetative material is disposed in the cell, that the fill is graded to the elevations shown on the drawings, and the fill is compacted to the criteria specified.

The Construction Contractor shall provide test results of geotechnical criteria as detailed in Table 4.1. Construction evaluation testing will consist of visual observations of the work, in-place moisture and density testing, and a survey of as-built conditions.

4.4.15 Backfill and Compaction of Consolidation Cell Cap Engineered Subbase

The backfill and compaction of the soils for the consolidation cell cap engineered subbase shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, soils are dried to meet the geotechnical requirements, and the subbase soil is graded within the limits shown on the drawings and is compacted to the criteria specified. The engineered subbase will be placed in one 6-inch-thick (maximum) lift to meet the required elevations. The lift will be compacted to achieve a predetermined percent of the standard Proctor maximum dry density as required. All evaluation tests will be performed in an independent soils testing laboratory. Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.16 Placement of Consolidation Cell Cap GCL Secondary Barrier Layer

The installation of the GCL for the consolidation cell cap system shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed, the subbase soil is graded within the limits shown on the drawingsand meets the requirements of the GCL manufacturer, and required material testing has been performed as required by the specifications.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.17 Placement of Consolidation Cell Flexible Membrane Liner

The installation of the FML for the consolidation cell cap system shall be monitored by QA personnel. QA personnel shall visually inspect the sheet rolls as they arrive on the jobsite for manufacturer's lot numbers, roll numbers, and possible damage in transit. As each sheet is unrolled, the QA personnel shall visually inspect the sheet surfaces. Sharp creases resulting from wrinkles in the material at the time of manufacture are not acceptable.

The Construction Contractor shall provide test results of samples of the FML which were analyzed for thickness, ultimate tensile strength, elongation, puncture resistance, and tear resistance.

The Construction Contractor is to certify to the Engineer that the surface on which the membrane is to be installed is acceptable before commencing work. The Construction Contractor shall maintain these surfaces in an acceptable condition during installation of the membrane. During installation, the Contractor shall perform non-destructive and destructive testing. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.18 Placement of Consolidation Cell Cap Infiltration Drainage Layer

The installation of a geocomposite for the cap infiltration drainage layer above the FML in the consolidation cell cap system shall be monitored by QA personnel. QA personnel shall visually inspect the geocomposite rolls as they arrive on the jobsite for manufacturer's lot numbers, roll numbers, and possible damage in transit. As each roll is unrolled, the QA personnel shall visually inspect the geocomposite surfaces.

The Construction Contractor shall provide test results for samples of the geocomposite that show compliance with the specifications. Clogging testing shall be performed on the geocomposite material in accordance with the specifications.

The Construction Contractor is to certify to the Engineer that the FML cap layer is free of protrusions, rocks, dirt, or other unacceptable conditions prior to the installation of geocomposites. The Construction Contractor shall maintain these surfaces in an acceptable condition during installation of the geocomposite. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.19 Placement of Protective Cover Soil

The backfill and compaction of protective cover soil shall be monitored by QA personnel. QA personnel are to ensure that environmental control measures (i.e., dust prevention and water erosion control) are followed and any offsite soils used as backfill material meet the chemical screening and geotechnical requirements as prescribed by the contract specifications and drawings.

The Construction Contractor shall screen any offsite materials for chemical contamination and shall provide test results of geotechnical criteria as detailed in Table 4.1. The QA activities associated with the compaction work will be observational, and no sampling and analysis is required.

Material evaluations shall be performed on offsite soil proposed for use to determine its acceptability as construction material and compliance with acceptability criteria in the design plans and specifications. All evaluation tests will be performed in an independent soils testing laboratory.

Tests to be performed by the Construction Contractor are detailed in Table 4.1, which will facilitate material evaluations during the construction.

4.4.20 Topsoil Layer

The topsoil layer is the uppermost component of the vegetated areas. Its function is, in conjunction with a vegetative cover, to protect the cap against erosion. Criteria to be used for determining the acceptability of materials for use during construction are defined in the project specifications. All evaluation tests will be performed in an independent soils testing laboratory.

The tests to be performed by the Construction Contractor on candidate topsoil borrow areas prior to any of the borrow soils being used or stockpiled for use are presented in Table 4.1.

Preconstruction inspection activities will include checking topsoil properties against the design specifications and ensuring that deleterious materials are not included. The underlying soil layer shall be checked to ensure that it has been constructed to meet or exceed the specified design.

Topsoil placement, preparation for seeding, and seeding will take place in an essentially continuous operation. The appropriate seed mixture, fertilizer, and additives or mulch are defined in the specifications. The application rate of seed, fertilizer, and additives or mulch will be monitored to confirm compliance with the project specifications. Table 4.1 indicates the general and monitoring responsibilities for the Construction Contractor and Engineer for the seed, fertilizer, and additives or mulch certification and application.

QA inspection personnel will confirm the application equipment is appropriate for the job and that the specifications are met for the rate of seed, fertilizer, and additives or mulch application; amount and uniformity of coverage; and water application.

4.4.21 Paving

Specific QA testing for the asphalt concrete surfaces shall consist of material and construction quality evaluations. Material evaluations shall be performed for the raw and fabricated materials to be used in the construction of the structural surfacing. The design plans and specificationsdefine the criteria to be used for determining the acceptability of the materials to be supplied and installed. The Engineer shall review and approve all of the material certifications presented by the Construction Contractor prior to their use.

Construction quality evaluations that include visual inspection and field testing shall be performed by QA personnel on the installation of all components for each asphalt concrete surface. The construction of the subbase and aggregate base courses shall be monitored for layer thickness, optimum moisture, and compaction prior to finished surface placement and proper application of a tack coat. Application of the surface course shall be monitored for appropriate mix temperature upon application, proper joint overlapping, optimum compaction, and proper drainage. The surface course shall be tested for final compaction and shall be at least 95 percent maximum laboratory density.

4.4.22 Stone Roadway and Parking Lot

Specific QA testing for the stone roadway and parking lot surfaces shall consist of material and construction quality evaluations. Material evaluations shall be performed for the materials to be used in the construction of the stone surface. The design plans and specifications define the criteria to be used for determining the acceptability of the materials to be supplied and installed. The Engineer shall review and approve all of the material certifications presented by the Construction Contractor prior to their use.

Construction quality evaluations that involve visual inspection and field testing shall be performed by QA personnel on the installation of the stone roadway and parking lot. The construction of the stone course shall be monitored for layer thickness, optimum moisture, and compaction.

4.4.23 Gabion Baskets and Gabion Mattresses

Specific QA testing for the gabion baskets and gabion mattresses shall consist of material and construction quality evaluations. Material evaluations shall be performed for the gabion and wire basket materials to be used. The design plans and specifications define the criteria to be used for determining the acceptability of the materials to be supplied and installed. The Engineer shall review and approve all of the material certifications presented by the Construction Contractor prior to their use.

The Contractor QC includes verifying the foundations are properly prepared and that the gabion baskets and gabion mattresses are installed in accordance with specification Section 02340.

4.4.24 Concrete Box Culvert Extension

The concrete box culvert extension may be installed of cast-in-place concrete or be constructed of precast concrete. The QA requirements include review of any material testing results and inspection of the subsurface foundation prior to placement of the culvert base.

The Contractor QC includes verifying the foundations are properly prepared and compacted and that the steel reinforcement and concrete meets specifications.

4.5 In-Place Density Control

Where required by individual specifications sections, earthen construction materials requiring compaction to desired densities will be tested for in-place density. These materials will be field tested in accordance with the procedures for determining the acceptable level of compaction as described by respective American Society for Testing and Materials test methods. The Contractor shall select equipment that is capable of providing the minimum densities required by respective specifications and shall submit a description of the type of the equipment proposed for use to the QA personnel for approval.

Field tests to measure the dry density and moisture content of the compacted soil materials will be performed using Troxler nuclear moisture/density gauges Model 3411-B or equivalent. The testing must be conducted by personnel who are trained and certified in the use of the Troxler equipment. These measurements will be performed with the gauge in the direct transmission mode with the depth probe typically extended 6 inches. The gauges will be standardized daily. The inspector will program the nuclear densitometer with the maximum dry density of the soil actually being placed (that is, based on material evaluation of stockpile being placed).

4.6 Horizontal and Vertical Control

Horizontal and vertical controls will be established in the work areas. The horizontal and vertical controls established will be used to develop the as-built Site drawings and to verify excavation areas, consolidation cell limits, thickness of the consolidation cell soil layers, monitoring well locations, and other Site features.

4.7 Documentation to Demonstrate Compliance

Documentation testing performed will be submitted to the Engineer for review. Documentation to demonstrate compliance will include, but not be limited to, the following report forms:

- Particle size distribution curve (where required)
- Permeability test report (where required)
- Standard Proctor, moisture-density curve (where required)
- Geosynthetics testing
- Daily inspection report - to be prepared by QA personnel
- Certification from Contractor demonstrating material tested offsite is same as material delivered to the Site

5.0 SOIL SAMPLING AND TEST STRATEGIES

5.1 General

Generally, two methods will be used to collect soil samples for analysis from the major Site activity areas. One method is to collect the samples from the borrow area. The second method involves taking representative samples of materials as they are being placed in the field. The following subsections discuss in detail the procedures to be used.

5.2 Soil Sampling Methods

Appropriate sample jars or containers as specified by the analyzing laboratory will be used to transport soil samples to the laboratory for analysis.

5.2.1 Borrow Area Sampling Method

In accordance with the technical specifications, all soil obtained from borrow areas will be tested for and comply with the gradation defined. Material and chemical property analyses will be conducted on the borrow soils at the frequency listed in Table 4.1.

The designated offsite borrow soil at the Warren County Water Treatment Plant is not required to have additional chemical testing because adequate testing was performed as part of the pre-design investigations. If the contractor chooses other offsite borrow areas, soils will require chemical property testing. The sampling procedures to collect samples for chemical and geotechnical testing as listed in Table 4.1 are described below for in-place borrow material and stockpiled borrow material.

Sampling Procedures – In-Place Material

Follow the steps in Table 1 for sampling of in-place material from borrow areas.

TABLE 1
STEPS FOR SAMPLING IN-PLACE BORROW AREA MATERIAL

Step	Procedure
1	Dig two pits within the soil borrow area for sampling purposes. Position the pits so that a soil sample can be collected that is representative of the anticipated vertical and horizontal extent of soil removal.
2	From two prepared pits within the soil borrow area, use a shovel to collect a sample at approximately mid-depth at each of five sampling locations per pit. Composite the five samples from each pit in the field to provide two representative composite samples (one per pit).
3	Transfer each sample into a separate container.
4	Attach a label to each container and record location referencing an established grid system in the borrow area.
5	Deliver the samples to the laboratory for analysis within the specified timeframe.

Sampling Procedures – Stockpiled Material

Collect approximately equal volumes of soil from the top, middle, and bottom of each stockpile from which material will be used for the project. Composite the soil from these multiple locations in the field to provide representative samples. To achieve an average of one sample for the CY sampling frequency specified in Table 4.1, collect a composite sample of at least six points for every 1,000 CY of stockpiled material. Follow the steps in Table 2 for sampling of stockpiled materials.

TABLE 2
STEPS FOR SAMPLING STOCKPILED BORROW AREA MATERIAL

Step	Procedure
1	Using a shovel, excavate into the pile to a depth of about 2 to 3 feet.
2	Collect a subsample using the shovel.
3	Repeat Steps 1 and 2 at each of the sampling points.
4	Use the shovel to mix the subsamples into one homogeneous mass and place the specified amount in an appropriate container.
5	Attach a label to the container and record necessary data in the field logbook.
6	Return the remaining contents of the composited sample to the stockpile.
7	Deliver the composited sample to the laboratory for analysis within the specified timeframe.

5.2.2 Field-Placed Soil Sampling Method

This section describes the soil sampling required for soil during the placement of the soil, which shall be performed at a rate of one sample analyzed per 5,000 CY. Collect soil subsamples of approximate equal volume from incoming truckloads of soil. Typically, this will involve collecting a subsample from every fourth truckload of soil. Composite the subsamples in the field to provide a representative composite sample for the specified frequency of soil placed.

Follow the steps in Table 3 for sampling of field-placed material.

TABLE 3
STEPS FOR SAMPLING FIELD-PLACED MATERIAL

Step	Procedure
1	Using a shovel, collect sample from every fourth truckload of soil.
2	Repeat step 1 as often as necessary to collect a sufficient volume of soil representative of the required CY sampling frequency of soil placed as specified in Table 4.1.
3	Use the shovel to mix the subsamples into one homogeneous mass and place the specified amount in an appropriate container.
4	Attach a label to the container and record necessary data in the field log book.
5	Deliver the composited sample to the laboratory for analysis within the specified timeframe.

5.3 Sample Identification and Data Collection

5.3.1 Sample Identification

All soil samples will be identified with chain-of-custody labels that will include the following information:

- Project name
- Sample number
- Names of sample collection personnel
- Date of collection
- Location of collection, such as grid address or stockpile number

5.3.2 Field Data

All information pertinent to each sampling event will be recorded. Each report will correspond to a test pit or stockpile and will contain the following information:

- Sample number
- Approximate location of test pit or sample location
- Field observation
- Weather conditions
- Date of collection
- Name of person collecting the sample

5.4 In-Place Moisture Density Tests

The frequency of moisture density testing is discussed in the contract specificationsfor various earthen materials. These test will be conducted at the specified test frequency per lift intervals indicated on Table 4.1. These intervals will be taped off and/or estimated in the field for proper spacing. The QA inspector may determine that more than the minimum required moisture-density tests per area are necessary to accurately evaluate the quality of the compacted soil lift being evaluated. Any additional tests deemed necessary will be located at the QA inspector's discretion and tied into a grid system (for an area) or linear measuring system (for a road or trench alignment).

5.5 Treatment of Laboratory Test Result Outlier

Occasionally, one laboratory test value deviates markedly from the remainder of the test values. Such a value is called an outlier. When an outlier occurs, the following procedures will be followed by laboratory personnel:

- Recalculate the test value, checking for math errors.
- Check any values used for comparison, making sure they were the correct values to be used.
- If the outlier value still exists, perform the test again on the same soil sample.
- If the outlier value still exists, discuss the value and course of action with the Engineer.

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6.0 CORRECTIVE MEASURES

When material or work is rejected because field observations or tests indicate it does not meet the design plans and specifications, corrective measures must be implemented. For questionable material or workmanship, additional testing may be necessary. The following are procedures and corrective measures to be followed for QA testing problems that are likely to occur.

6.1 Excessive Drying or Wetting of Stockpiled Soil

If soils are stockpiled at the facility prior to placement, excessive drying or wetting of the soils could become a problem. It may be appropriate to cover the piles with plastic sheets to minimize moisture loss or gain until the material is used in the construction activities. Water can also be sprayed on the stockpile to prevent drying.

6.2 In-Place Moisture Density Test Failures

6.2.1 Moisture

When the moisture content is determined to be too far below optimum, the compacted soil will be disked and moisture will be added to achieve a moisture content greater than optimum prior to recompaction.

When the moisture content is so high that the soil cannot be compacted to required density limits, the soil will be disked or scarified and left to dry in the sun and wind prior to recompaction. If this action does not result in sufficient drying, the soil will be removed and stockpiled until it dries to an acceptable moisture content.

Under either failure condition, the extent of work will include the area delineated by a circle with the center at the location of the failed test and a radius corresponding to the distance from the location of the failed test to the nearest passing test or to a closer passing test as determined by additional testing. Retesting will be performed within 10 feet of the original location of the failed test after corrective measures have been taken.

6.2.2 Density

If the compaction is less than the specified maximum dry density, or is not considered acceptable using the approved procedures, the lift of soil in the work area will be deemed unacceptable. The soil will be removed and set aside for alternate uses. The extent of the work area will include the area delineated by a square with the center at the failed test and a rectilinear dimension of 50 feet. Retesting will be performed within 10 feet of the original failed test after corrective measures have been taken.

6.3 Ponding of Water on Completed Soil Layers, Lifts, or Subgrades

If ponding of water on completed, compacted layers, lifts, or subgrades becomes a common problem, the completed surfaces which are to receive additional lifts of compacted soil will be rolled with a smooth drum roller at the end of each day. This will limit ponding as well as help to minimize drying and desiccation cracking. The affected area will be scarified prior to placement of the next lift of soil.

6.4 Dust Control

If fugitive emissions are found to exceed the set limits as stated within the Health and Safety Plan, dust control measures must be implemented. These measures include spraying the stockpiles or dry area with water or covering the dry area with plastic sheeting. Addition of water to a stockpile or dry area must be monitored to ensure that overwatering does not occur and watering does not result in any run-off from the affected area.

6.5 Cut Grade / Slope Does not Meet Drawings and Specifications

If the excavation cut surface grade does not comply with the depth of excavation as specified in the drawings, work must be conducted to make it comply. Additional material may be excavated to bring the cut surface to the required grade.

6.6 Final Grade / Slope Does not Meet Drawings and Specifications

If the finished surface does not comply with the proper elevation as specified in the drawings, work must be conducted to make it comply. Additional material may be added to areas to bring the surface up to grade or to improve the surface drainage.

6.7 AOC 7, AOC 8, and AOC 9 Culverts Damaged or All Sediment not Removed during Cleaning

If during cleaning, the culverts or associated structures are damaged, they will be repaired by the Construction Contractor. If the Construction Contractor is unable to remove all of the sediment from the culverts, alternate removal methods will be discussed with DuPont and the Engineer.

6.8 Obstruction Encountered in the Path of Proposed Piping

In the event that obstructions not shown on the drawings are encountered during the progress of the work and require alterations to the drawings, the Owner will be immediately notified. The Owner and Engineer will then review the problem and provide any necessary deviations from the specified line or grade.

6.9 Damage to In-Place Pipe

Any damage occurring to the piping after installation will be repaired. All repair work will be performed in accordance with the manufacturer's recommendations and with the same level of standards as the initial installation.

6.10 Damage to Underlying Materials

If underlying materials that are part of the cell liner or cap construction are damaged, appropriate corrective measures to the underlying materials will be performed prior to placement of the overlying layers.

7.0 DOCUMENTATION

7.1 General

The Construction Contractor will document all activities associated with the construction of the RA at the former Peters Cartridge Facility. Such documentation will include, at a minimum, daily reports of construction and treatment activities, photographs, and sketches as necessary. Field investigation reports will be filled out by the Engineer or specialty QA personnel when major QA questions arise at the Site.

7.2 Construction Monitoring

7.2.1 Daily Monitoring Reports

Standard daily reporting procedures will include preparation of a summary report with supporting data sheets and, when appropriate, problem identification and corrective measures reports. A report will be prepared and submitted to the Engineer daily by onsite personnel. These reports will provide the chronological framework for identifying and recording all other reports.

Additional information that may be included on the forms by the QA personnel includes:

- Unit processes and locations of construction underway that day
- Equipment and personnel working in the area, including subcontractors
- Descriptions of areas being monitored and documented
- Descriptions of offsite materials received, including any quality verification (vendor certification) documentation

7.2.2 Data Sheets

All field and/or laboratory tests will be recorded on data sheets. The following data sheets will be used:

- Laboratory Testing Summary Report
- Grain Size Distribution Test Report
- Proctor Test Report
- Nuclear Density and Moisture Test Data
- Geosynthetics Liner Seam Testing Report
- GCL Subgrade Inspection Reports

The completed reports will be available onsite and will be submitted to DuPont as part of the final CCR.

7.2.3 Problem Identification and Corrective Measures Report

A problem identification report and a corrective measure report will be completed whenever major field problems are encountered and corrective measures may be necessary. These reports will be attached to the associated daily reports.

DuPont will be notified by the Construction Contractor of problems requiring modifications to design plans and details prior to proceeding or completion of the construction item. Changes or additions will be noted on construction record drawings.

7.2.4 Acceptance of Completed Components

All daily reports, data sheets, problem identification, and corrective measures reports will be reviewed by the Engineer. The documentation will be evaluated and analyzed for internal consistency and for consistency with similar work. Timely review of these documents will permit errors, inconsistencies, and other problems to be detected and corrected as they occur.

The above information will be assembled and summarized as part of the final CCR. The report will indicate that the materials and construction processes comply with DuPont's and the Engineer's plans and specifications for this project.

7.3 Photographic Documentation

The QA inspection personnel will be responsible for photographing the construction progress on a frequent basis. Photographs will be taken prior to the start of construction, at key phases of the work, and after completion of the work. Photographic documentation will serve as a pictorial record of work progress, problems, and mitigation activities.

The basic file will be maintained by the DuPont Site Representative and will contain dated digital prints and/or videos with appropriate description, stored in a separate file in chronological order. These photographs will be available for review at reasonable times by the Construction Manager, Engineer, DuPont, USEPA, Ohio EPA, and other parties affiliated with the Site activities. Selected photographs will be included in the Final Report.

7.4 Final Construction Report

The Engineer will prepare a Final Construction Report for RA construction addressing each item identified above. The report will include an analysis of the Contractor's compliance with the project plans and specifications and a summary of QA sampling and testing. The report will also include:

- Scale drawings depicting a topographic survey of the Site before and after construction and/or excavation of each work area
- Record drawings
- Statements pertaining to the extent of the excavation associated with remediation, such as depths, plan dimensions, elevations, and thicknesses
- Statements pertaining to the consolidation cell construction (i.e.; liner and cap component materials, plan dimensions, elevations, and thickness)
- A discussion of the remedial actions that were implemented. This will include a description of the circumstances, actions taken, and results of retesting

7.5 Certification of Remedial Action Construction

Upon final completion of the construction involved with the former Peters Cartridge Facility RA, DuPont and the Engineer will submit to the USEPA, in conjunction with the

Final Construction Report, certification that the RA has been constructed in accordance with the specification requirements and approved modifications (if any) and is fully capable of being operated and maintained in accordance with the specifications and requirements of the RA. The certification report, including all plans, will be signed by a professional engineer registered in Ohio.

7.6 Storage of Records

During the remedial construction phase, the Engineer will be responsible for all facility QA documents. This includes the Engineer's copy of the design criteria, the Engineer's design plans and specifications, the CQAP, and the originals of all data sheets and reports. All originals will be maintained in the Engineer's office. Duplicate records will be kept in the field office to avoid loss of this information if the originals are destroyed. Where possible, records will be provided electronically or will be scanned and an electronic record maintained.

Once the RA construction is complete, the document originals will be stored by DuPont in a manner that protects them from any damage. A Final Construction Report will be kept by the USEPA for their official use. All documentation will be maintained in accordance with the RA contract specifications.

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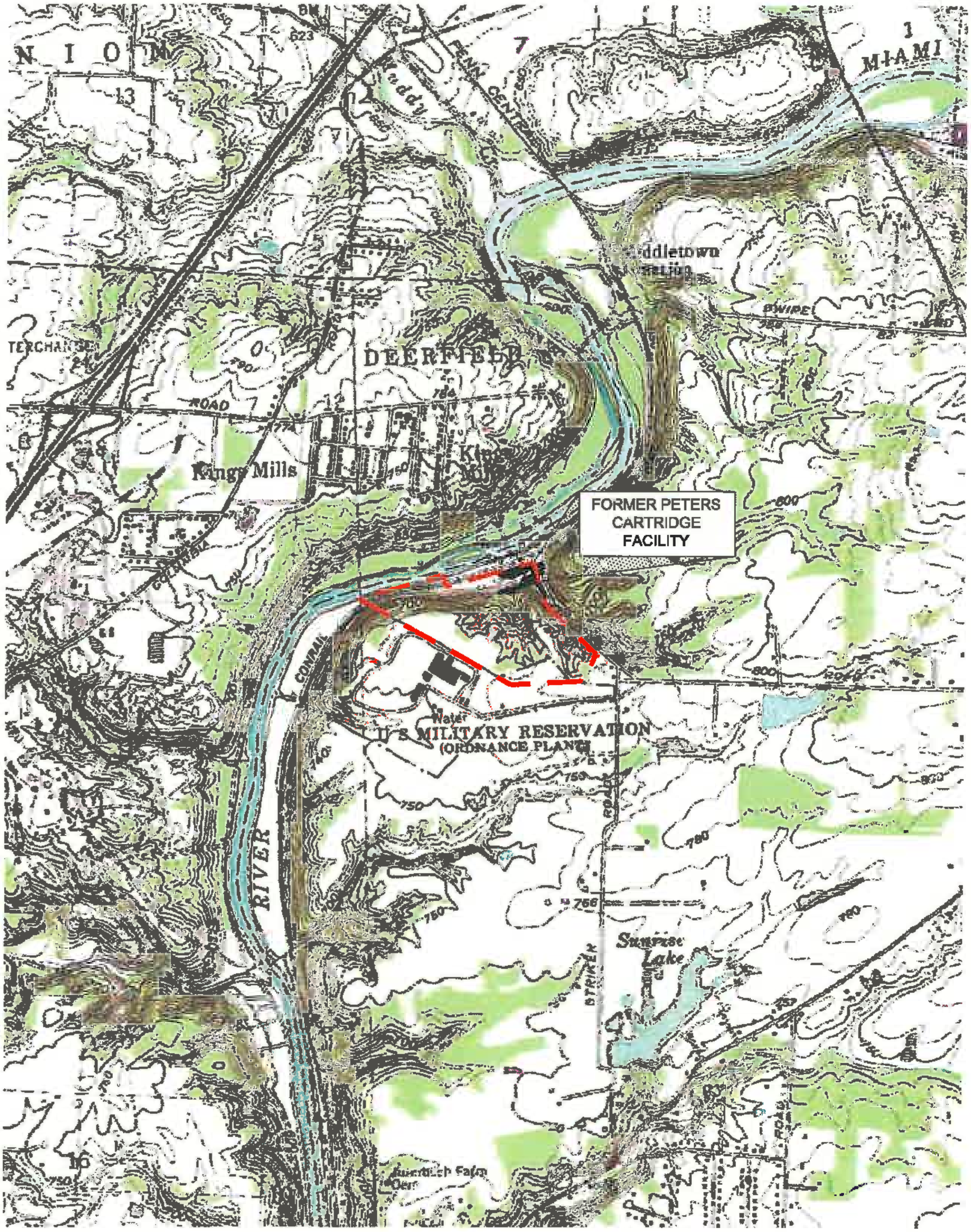
FIGURES



Latitude: N 39° 20' 55.5"
Longitude: W 84° 14' 32.8"

0 1/2 1 MILE

0 1000 2000 4000 6000 FEET

USGS 7.5-Minute Topographic Map; South Lebanon, OH Quadrangle 2000; Scale: 1:24,000

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

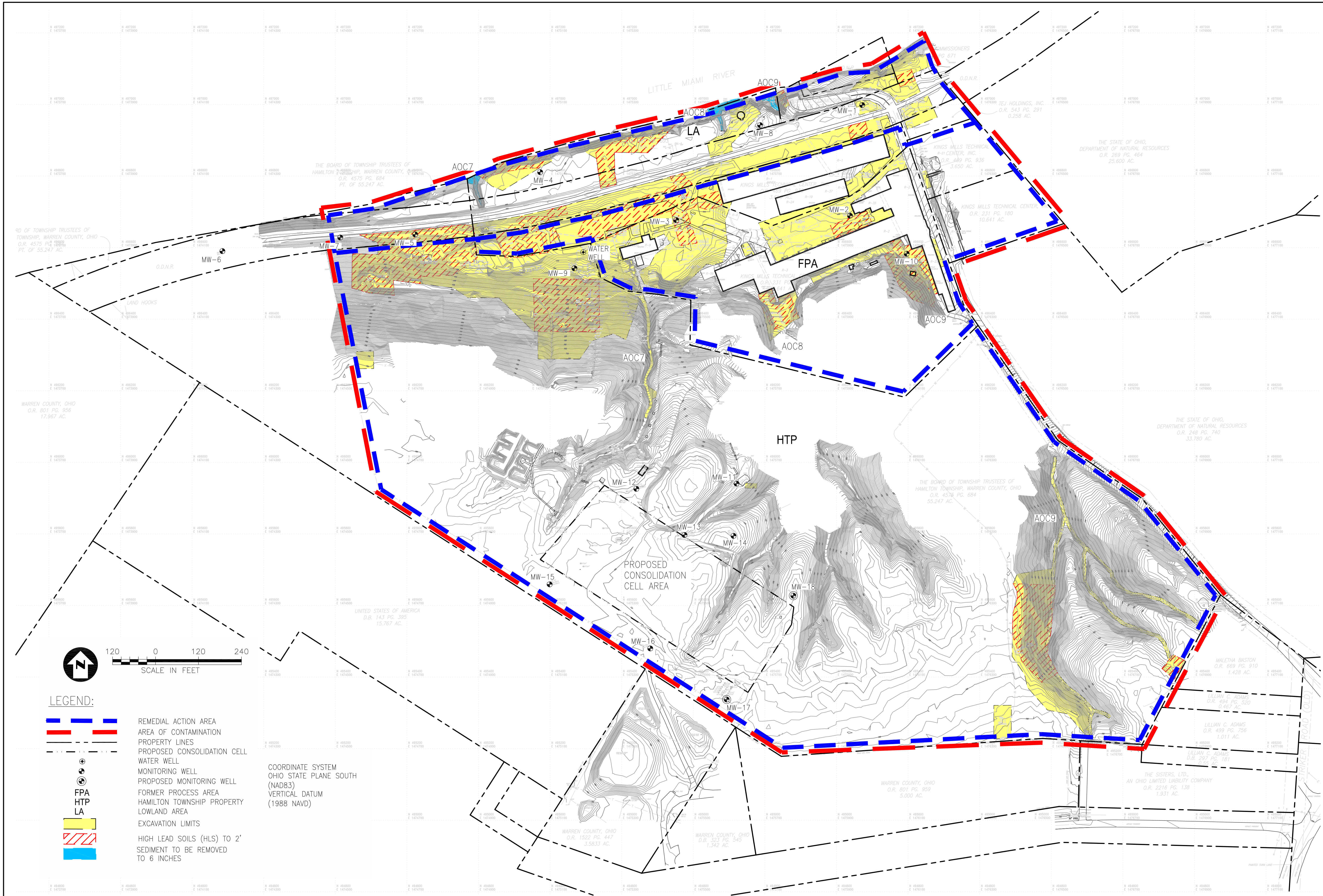
PARSONS
26301 CURTISS WRIGHT PKWY.
CLEVELAND, OHIO 44143
PHONE: 513-552-7044

FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LOCATION MAP

FIGURE NO. 1.1

REV. —



Rev.	Date	Description	By
B	2/21/14	PRE FINAL DESIGN REPORT TO USEPA	EJM
A	2/2/14	PRE FINAL DESIGN REPORT TO DUPONT	EJM

Dupont(Peters Cartridge)(Fig1.2)(Site Layout).dwg

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed SMA
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

PARSONS
2443 CROWNE POINT DRIVE,
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PHONE: 513-326-3040

DuPONT CORPORATE REMEDIATION
GROUP 974 CENTER ROAD
CRP 715/218
WILMINGTON, DE 19805

PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LAYOUT

FIGURE NO. 1.2

REV. B

TABLES

TABLE 4.1
QUALITY ASSURANCE AND QUALITY CONTROL

Specification Section	Subject	Contractor Action	Engineer Action	QA/QC Issue	Method of Quality Determination	Frequency
02100	Clearing	X		Work performed per Contract Documents and Contractor Plans	Observation	As needed
				Environmental control measures per Contract Documents and Contractor Plans	Observation	As needed
				Disposition of materials per Contract Documents and Contractor Plans	Observation	As needed
			X	Work performed per Contract Documents and Contractor Plans	Observation	As needed
02120	Site Demolition	X		Work performed per Contract Documents and Contractor Plans	Observation	As needed
			X	Work performed per Contract Documents and Contractor Plans	Observation	As needed
02165	Excavation and Handling of Potentially Contaminated Materials	X		Work performed per Contract Documents and Contractor Plans	Observation	As needed
				Survey control established to control depth and limit of excavations	Survey control	Continuous
				Confirm high lead soil have been rendered non-hazardous	Review of testing reports	1 report / 750 CY
				Environmental control measures per Contract Documents and Contractor Plans	Observation	As needed
			X	Work performed per Contract Documents and Contractor Plans	Observation	As needed
				Soil identified as non-hazardous excavation areas are classified as non-hazardous prior to placement in consolidation cell	TCLP metals (lead, arsenic, mercury)	1 / 750 CY
02170	Cleanout of Existing Culverts	X		Work performed per Contract Documents and Contractor Plans	Video	After culverts cleaned
				Environmental control measures per Contract Documents and Contractor Plans	Observation	As needed
			X	Work performed per Contract Documents and Contractor Plans	Observation	As needed
02205	Regrading and Backfill of Excavation Areas with Clean Soil	X		Work performed per Contract Documents and Contractor Plans	Observation	As needed
				Borrow Source: Soil Classification	ASTM D-2487	1 / source
				Borrow Source: Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / source
				Borrow Source: Specific Gravity	ASTM D-854	1 / source
				Borrow Source: Natural Moisture Content	ASTM D-2216	1 / source
				Borrow Source: Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / source
				Borrow Source: Chemical Screening (offsite material only): Volatile Organics, Semi-volatile Organics, PCBs, Pesticides, Herbicides	SW-846, 8260B, 8270C, 8082, 8081A, 8151A	1 / source
				Borrow Source: Metals – Ar, Ba, Cd, Cr, Pb, Hg, Ag, Se	SW-846, 6010 or 7000	1 / source
				Borrow Source: Angle of Internal Friction (only for material placed on slopes)	ASTM D-4767	1 / source
				In-Place Materials: Finished Surface Grade	Survey	Completion of fill
				In-Place Materials: Lift Depth	Observation	As needed.
				In-Place Materials: Nuclear Density /Moisture Content (density/moisture content only for material placed on slopes)	ASTM D2922/3017	1/ acre / lift, 2/ lift minimum
				During Placement of Materials: Soil Classification	ASTM D-2487	1 / 5,000 CY
				During Placement of Materials: Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / 5,000 CY
				During Placement of Materials: Specific Gravity	ASTM D-854	1 / 5,000 CY
				During Placement of Materials: Natural Moisture Content	ASTM D-2216	1 / 5,000 CY
				During Placement of Materials: Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / 5,000 CY
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Random testing of materials and placement	See above	If deemed necessary

Table 4.1
Quality Assurance and Quality Control

Specification Section	Subject	Contractor Action	Engineer Action	QA/QC Issue		Method of Quality Determination	Frequency
02210	Backfill and Compaction of Waste Soils at Consolidation Cell	X			Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Initial	Natural Moisture Content Standard Proctor Density-Moisture Relationship	ASTM D-2216 ASTM D-698	1/source 1/source
				During Placement of Materials	Natural Moisture Content Standard Proctor Density-Moisture Relationship	ASTM D-2216 ASTM D-698	1 / 5,000 CY 1 / 5,000 CY
				In-Place Materials	Finished Surface Grade Lift Depth Nuclear Density /Moisture Content	Survey Observation ASTM D2922/3017	Completion of fill As needed 1/ acre / lift, 2/ lift minimum
			X		Work Performed per Contract Documents and Contractor Plans Random Testing of Materials and Placement	Observation See above	As needed If deemed necessary
02220	Topsoil	X			Work Performed per Contract Documents and Contractor Plans	Observation	As needed.
				Topsoil Source	pH Organic Matter Particle Size Gradation Moisture Content	ASTM D-4972 AASHTO T-194 ASTM D-422 AASHTO T-88 ASTM D-2216	1 / source 1 / source 1 / source 1 / source 1 / source
					Chemical Screening: (offsite source) Volatile Organics, Semi-volatile Organics, PCBs, Pesticides, Herbicides Metals – Ar, Ba, Cd, Cr, Pb, Hg, Ag, Se	 SW-846, 8260B, 8270C, 8082, 8081A, 8151A SW-846, 6010 or 7000	 1 / source 1 / source
				Topsoil Placement	Graded Topsoil Lift Depth Particle Size Gradation Organic Content pH Moisture Content	Survey Observation ASTM D-422 AASHTO T-88 AASHTO T-194 ASTM D-4972 ASTM D-2216	Completion of layer As needed 1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY
			X		Work Performed per Contract Documents and Contractor Plans Random Testing of Materials and Placement	Observation See above	As needed If deemed necessary

Table 4.1
Quality Assurance and Quality Control

Specification Section	Subject	Contractor Action	Engineer Action	QA/QC Issue		Method of Quality Determination	Frequency
02230	Consolidation Cell Construction	X			Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Protective Cover Soil	Clogging Potential	ASTM D-5101 or D-5567	1/Type of soil materials
					Chemical Screening: (offsite source) Soil Classification Liquid Limit, Plastic Limit, and Plasticity Index Specific Gravity Natural Moisture Content	ASTM D-2487 ASTM D-4318 ASTM D-854 ASTM D-2216 ASTM D-698	1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY 1 / 5,000 CY
					Volatile Organics, Semi-volatile Organics, PCBs, Pesticides, Herbicides	SW-846, 8260B, 8270C, 8082, 8081A, 8151A	1/source
					Metals – Ar, Ba, Cd, Cr, Pb, Hg, Ag, Se	SW-846,6010 or 7000	1/source
					Finished Surface Grade	Survey	Completion of fill
					Lift Depth	Observation	As needed
					Nuclear Density /Moisture Content	ASTM D2922/3017	2 / lift minimum
					Geomaterials per Contract Documents and Contractor Plans	Material Certification	1 / source
			X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
					Random Testing of Materials and Placement	See above	If deemed necessary
02250	Rock Channel Protection	X			Work Performed per Contract Documents and Contractor Plans	Observation	As needed
					Materials per Contract Documents and Contractor Plans	Material Certification	1 / supplier
			X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02280	Recompacted Clay Barrier Liner Layer	X			Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Borrow Source	Soil Classification	ASTM D-2487	1 / source
					Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / source
					Sieve Analysis	ASTM D-422	1 / source
					Natural Moisture Content	ASTM D-2216	1 / source
					Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / source
				During Placement of Materials	Soil Classification	ASTM D-2487	1 / 1500 CY
					Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / 1500 CY
					Sieve Analysis	ASTM D-422	1 / 1500 CY
					Natural Moisture Content	ASTM D-2216	1 / 1500 CY
					Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / 1500 CY
					Remolded Permeability	ASTM D-5084	1 / 10,000 CY
				In-Place Materials	Finished Surface Grade	Survey	Completion of fill
					Lift Depth	Observation	As needed
					Nuclear Density /Moisture Content	ASTM D-2922 / D-3017	5 / acre / lift
				Test Pad	Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	2 / lift
					Sieve Analysis	ASTM D-422	2 / lift
					Natural Moisture Content	ASTM D-2216	2 / lift
					Standard Proctor Density-Moisture Relationship	ASTM D-698	2 / lift
					Nuclear Density /Moisture Content	ASTM D-2922 / D-3017 or D-1556 or D-2167	3 / lift
					Permeability	ASTM D-6391, D-3385, or D-5093	1 / test pad

Table 4.1
Quality Assurance and Quality Control

Specification Section	Subject	Contractor Action	Engineer Action	QA/QC Issue	Method of Quality Determination	Frequency
02280	Recompacted Clay Barrier Liner Layer		X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Random Testing of Materials and Placement	See above	If deemed necessary
02290	Engineered Subbase Cap Layer	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Borrow Source		
				Soil Classification	ASTM D-2487	1 / source
				Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / source
				Sieve Analysis	ASTM D-422	1 / source
				Natural Moisture Content	ASTM D-2216	1 / source
				Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / source
				During Placement of Materials		
				Soil Classification	ASTM D-2487	1 / 1500 CY
				Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D-4318	1 / 1500 CY
				Sieve Analysis	ASTM D-422	1 / 1500 CY
				Natural Moisture Content	ASTM D-2216	1 / 1500 CY
				Standard Proctor Density-Moisture Relationship	ASTM D-698	1 / 1500 CY
				In-Place Materials		
				Finished Surface Grade	Survey	Completion of fill
				Lift Depth	Observation	As needed
				Nuclear Density /Moisture Content	ASTM D-2922 / D-3017	5/ acre / lift
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Random Testing of Materials and Placement	See above	If deemed necessary
02340	Gabion Baskets and Gabion Mattresses	X		Foundations Are Properly Prepared	Observation	As needed
				Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Materials per Contract Documents and Contractor Plans	Material Certification	1/supplier
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02500	Paving and Surfacing	X		Work Performed per Contract Documents and Contractor Plans - Aggregate Base Compaction, Asphalt Temperature, Asphalt Compaction, Asphalt Thickness, Surface Preparation, Final Grade (no ponding)	Observation	As needed
				Asphalt Mix Analysis Concrete Mix Analysis	Analysis Report	1 / mix
				Compaction of Stone Roads	ODOT 304.05	Per spec
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Random Testing of Materials and Placement	Test Methods Vary	If deemed necessary
02630	Infiltration System	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Granular Filter Material per Contract Documents and Contractor Plans	ODOT 703.01 Size 8	1/source
				Granular Pipe Backfill Material - Nuclear Density /Moisture Content	ASTM D-2922 / D-3017	1 / 100 feet of pipe
				Piping and Appurtenances per Contract Documents and Contractor Plans	Material Certification	1 / source
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Random Testing of Materials and Placement	Test methods Vary	If deemed necessary

Table 4.1 Quality Assurance and Quality Control						
Specification Section	**Subject**	**Contractor Action**	**Engineer Action**	**QA/QC Issue**	**Method of Quality Determination**	**Frequency**
02640	Storm Sewer Systems	X		Work Performed per Contract Documents and Contractor Plans System Components per Contract Documents and Contractor Plans	Observation Material Certification	As needed 1 / source
			X	Work Performed per Contract Documents and Contractor Plans Random Testing of Materials and Placement	Observation Test methods vary	As needed If deemed necessary
02710	Onsite Soil Treatment of Contaminated Materials	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Verification that Treated Soil Meets Non-hazardous Criteria	TCLP Metals (lead, arsenic, mercury)	1/750 CY soil treated
				Environmental Control Measures per Contract Documents and Contractor Plans	Observation	As needed
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02740	Sampling and Analysis	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02750	Offsite Transportation	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02760	Offsite Treatment/ Disposal	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02770	Flexible Membrane Liner	X		Work Performed per Contract Documents and Contractor Plans Materials per Contract Documents and Contractor Plans Non-destructive Seam Testing Destructive Seam Testing (Peel Adhesion & Shear Strength) Interface Shear Testing	Observation Material Certification ASTM D-4437 ASTM D-5321	As needed 1 / source All 1 / 500’ seam 1/ type of materials
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02771	Geosynthetic Clay Liner	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Materials per Contract Documents and Contractor Plans	Material Certification	1 / Lot
				Interface Shear Testing	ASTM D6243 Modified	1 / Type of Materials / GCL Lot
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02777	Geocomposites	X		Work Performed per Contract Documents and Contractor Plans Materials per Contract Documents and Contractor Plans Interface Shear Testing Clogging Test	Observation Material Certification ASTM D-5321 ASTM D-5101 or ASTM D-5567	As needed 1 / Lot 1 / Type of Materials 1 / Type of Materials
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed

Table 4.1 Quality Assurance and Quality Control						
Specification Section	**Subject**	**Contractor Action**	**Engineer Action**	**QA/QC Issue**	**Method of Quality Determination**	**Frequency**
02830	Temporary Fences and Security Gates	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Materials per Contract Documents and Contractor Plans	Material Certification	1 / source
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
02920	Seeding, Fertilizing, Mulching, and Erosion Protection	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Materials per Contract Documents and Contractor Plans	Material Certification	1 / source
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed
03100, 03200, 03300	Concrete Box Culvert Extension	X		Work Performed per Contract Documents and Contractor Plans	Observation	As needed
				Materials per Contract Documents and Contractor Plans	Material Certification	1 / source
				Foundation Compaction – Nuclear Density / Moisture Compaction	ASTM D-2922 / D-3017	2 / lift
			X	Work Performed per Contract Documents and Contractor Plans	Observation	As needed

APPENDIX C
PERFORMANCE STANDARDS VERIFICATION PLAN

PARSONS

PERFORMANCE STANDARD VERIFICATION PLAN

PETERS CARTRIDGE FACILITY
WARREN COUNTY, OHIO

Prepared for:

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Chestnut Run Plaza
974 Centre Road
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February 2014

DuPont PN 507787
Parsons PN 446128

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APPENDICES[1]

[1] Health and Safety Plan and Field Sampling Plan are the documents approved for the Pre-design investigation, updated to cover the scope of work in the Remedial Action implementation.

ACRONYMS

Acronym	Definition / Description
ARARs	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Environmental Risk Assessment
bgs	Below ground surface
COC	Contaminant of concern
CQAP	Construction Quality Assurance Plan
DuPont	E. I. du Pont de Nemours and Company
FML	Flexible membrane liner
FPA	Former Process Area
FS	Feasibility study
FSP	Field sampling plan
HASP	Health and safety plan
HHBLRA	Human health baseline risk assessment
HTP	Hamilton Township Property
IC	Institutional control
LA	Lowland Area
mg/kg	Milligrams per kilogram
O&M	Operations and maintenance
Ohio EPA	Ohio Environmental Protection Agency
OMP	Operations and maintenance plan
PDI	Pre-design investigation
PDR	Preliminary design report
PSVP	Performance Standards Verification Plan
QAPP	Quality assurance project plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial design
RI	Remedial investigation
ROD	Record of decision
Site	Former Peters Cartridge Facility
SLERA	Screening-level ecological risk assessment
SOW	Statement of work
USEPA	U. S. Environmental Protection Agency

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1.0 INTRODUCTION

Parsons has prepared this Performance Standards Verification Plan (PSVP) Preliminary Design Report (PDR) on behalf of E. I. du Pont de Nemours and Company (DuPont) for the former Peters Cartridge Facility (Site) in Warren County, Ohio. This PSVP PDR describes the ways in which the remedial action at the Peters Cartridge Facility has been planned and designed and will be conducted to achieve the performance standards described in the Record of Decision (ROD) (United States Environmental Protection Agency [USEPA] 2009) and the Statement of Work (SOW) (USEPA 2012). As stated in the SOW, the purpose of the PSVP is to provide a mechanism to ensure that both short-term and long-term performance standards for the remedial action are met.

This document is organized into three sections, including this introduction describing the purpose of this Plan. Section 2.0 identifies the performance standards with which the remedial action must comply. Section 3.0 presents the methods that have been, or will be, used to ensure compliance with the performance standards. **Appendix C-1** provides the Field Sampling Plan (FSP) and **Appendix C-2** provides the Health and Safety Plan (HASP). The approved Quality Assurance Project Plan (QAPP) provided with the pre-design work plan will be used for the remedial action.

1.1 Remedial Action

For reference and evaluation, the Site has been divided into three areas: the Lowland Area (LA), the Former Process Area (FPA), and the Hamilton Township Property (HTP). The LA includes the portions of the Site along the southern bank of the Little Miami River, within the Little Miami River floodplain. Steel fencing, thick vegetation, and steep topography along the southern border of the Scenic Trail effectively differentiate the LA from the remainder of the Site. The FPA is the primary location where historic manufacturing operations were conducted and is also referred to as an Operational Area. The HTP was used primarily for storage of materials/supplies and is now owned by Hamilton Township. Some process operations (e.g., mixing) may also have been conducted at select HTP locations. A general site Location Map is provided as **Figure 1.1**. The site layout is depicted in **Figure 1.2**.

The remedial action specified in the ROD consists of the following elements:

- Excavate surface soil in the FPA to a depth of at least two feet below ground surface (bgs) in areas that exceed the USEPA commercial standard for lead of 800 milligrams per kilogram (mg/kg), and excavate surface soil in the LA and on the HTP to a depth of at least two feet bgs in areas that exceed the USEPA residential standard for lead of 400 mg/kg. The actual areas and depths to be excavated were determined and evaluated during the remedial design (RD) phase of the project. The excavated areas will be backfilled with clean fill material to the existing grade.
- Clean out and remove debris and erosional material at drainage culvert and outfall areas. Excavate three identified shoreline sediment areas to a depth of approximately six inches and backfill the shoreline sediment areas with clean fill material.
- Consolidate impacted soil, sediment, and erosional material in an on-site consolidation cell. The cell will be constructed with an impermeable composite liner and cap system developed to be consistent with established Applicable or Relevant and Appropriate Requirements (ARARs). A flexible membrane liner

with a geotextile cushion will be installed as the main component of the cell liner system.

- Cap the cell with a composite cap system consisting of a 6-inch-thick vegetative support layer, a 2-foot-thick layer of compacted low-permeability clay, a geocomposite drainage layer, a flexible geomembrane (FML), and a low-permeability clay layer beneath the geomembrane. The final cap design was developed to be compliant with ARARs during the RD phase of the project. During the RD phase, it was also determined that an access restriction will be required based on future use of the area.
- Monitor groundwater in accordance with the long-term monitoring plan to ensure that contaminants are not migrating from the cell.
- Institutional controls (ICs) in the form of deed restrictions will be required to accomplish the following: restrict land use to nonresidential purposes; limit future Site activities to prevent intrusive activities that could compromise the cell; and restrict on-site groundwater use to prevent ingestion exposures by a future resident using groundwater as a domestic water supply.

2.0 IDENTIFICATION OF PERFORMANCE STANDARDS

The performance standards for the Site are described in the ROD and the SOW and cover a range of items including remedial action objectives, professional standards of practice, and elements of the remedy. This section describes each of the performance standards.

2.1 Remedial Action Objectives

The ROD presents remedial action objectives for each separate medium at the Site.

The remedial action objective for soil is to minimize potential ingestion and dermal contact of contaminated surface soils. This includes excavating surface soil containing chemicals of concern (COCs) above cleanup levels. The Site COCs specified in the ROD and their respective soil cleanup levels are provided below.

FPA Soil Cleanup Levels (non-residential standards)

Lead	800 mg/kg
Arsenic	20.57 mg/kg*
Benzo(a)pyrene TEQ	2.1 mg/kg
Naphthalene	137 mg/kg

LA Soil Cleanup Levels (residential standards)

Lead	400 mg/kg

HTP Soil Cleanup Levels (residential standards)

Lead	400 mg/kg
Arsenic	20.57 mg/kg*
Benzo(a)pyrene TEQ	0.26 mg/kg
Antimony	225 mg/kg

Ecological Soil Cleanup Levels

Copper	291 mg/kg
Lead	2647 mg/kg
Mercury	85 mg/kg

* The 20.57 mg/kg value is the background value previously established for this Site.

Tables L-1 through L-4 of ROD provide the summary of cleanup levels (see Appendix A of the FSP provided in **Appendix C-1**).

Table L-2 of the ROD lists the groundwater cleanup levels which is a cleanup level for arsenic of 10 ug/l.

2.2 Professional Standards of Practice

All aspects of the remedial action will be conducted in accordance with professional standards of practice. Standard engineering practice and judgment will be used in the design and implementation of the remedial action to ensure that the remedy will be effective both short and long term. Each aspect of the remedial action (investigation, design, and construction) will be conducted and supervised by skilled personnel with experience applicable to the specific task. All onsite activities will be conducted in a manner that will be protective of the health and safety of onsite workers and the community surrounding the Site. Materials used in the remedial action will meet industry standards for all such construction.

2.3 Elements of the Remedy

The elements of the remedy are presented in Section 1.0. The proper execution of each element of the remedy is also a performance standard, as described below:

- All waste disposed off-site will be transported and disposed in accordance with applicable federal and state regulations and requirements.
- All materials disposed in the on-site consolidation cell will meet the restrictions on disposal described by the ROD and presented in the FSP (**Appendix C-1**). The cap will meet the requirements of an Ohio EPA solid waste cap, or equivalent.
- Institutional controls will be implemented in accordance with the requirements of the ROD. Environmental covenants will be used to restrict Site use to non-residential purposes, to prevent the installation of on-site drinking water wells, and to prevent disturbance of the cap.
- Groundwater monitoring will be conducted around the consolidation cell in a manner to confirm COCs are not migrating from the cell.

3.0 COMPLIANCE WITH PERFORMANCE STANDARDS

Compliance with performance standards has been the goal of all remedial design/remedial action activities performed at the Site. Some activities have been completed and some activities will be completed in the future. This section describes the methods that have been or will be used to ensure compliance with all performance standards.

3.1 Previous Activities

Environmental investigations have been conducted at the Site, starting in 1987. These investigations have had varying data quality objectives and work scopes and focused on the main manufacturing portion of the Site. The Remedial Investigation (RI) conducted beginning in 2005 addressed all three areas of the Site. Analytical results collected during the RI were used to prepare a Human Health Baseline Risk Assessment (HHBLRA), a Screening Level Ecological Risk Assessment (SLERA), and a Baseline Environmental Risk Assessment (BERA).

The Feasibility Study (FS) (Geosyntec 2009a) was conducted following completion of the RI. The FS used the data presented in the RI, the BERA, and the HHBLRA to determine the remedial action objectives and to evaluate remedial alternatives for the Site (Geosyntec 2009b).

Parsons completed a Pre-Design Investigation (PDI) between October 2012 and February 2013. Field activities included additional surface soil sampling throughout the Site, a geotechnical investigation, monitoring well installation around the proposed consolidation cell, and sitewide groundwater sampling. The field activities and a data summary are included in the PDI Report (Parsons 2013a). The Preliminary Design (30% Design) Report (Parsons 2013b) included an analysis of available data and preliminary design elements of the proposed consolidation cell.

3.2 Remedial Design

The remedial design was prepared to be compliant with the requirements of the ROD and professional standards of practice to ensure that the remedial action achieves all applicable performance standards. The cap included in the design is equivalent to, and meets the requirements of, an Ohio EPA solid waste cap. Design parameters such as slope stability and water infiltration through the cap were evaluated and are provided in the Final Design Report, of which this PSVP is a part.

The Final Design Report includes Specifications and Drawings governing construction, the types of materials that will be used, and quality assurance standards that must be met by both the materials and construction techniques. This PSVP, including the FSP and a QAPP, is part of the Final Design Report, as is the HASP, which describes how the health and safety of onsite personnel and the community will be protected.

3.3 Remedial Action Construction

A Construction Quality Assurance Plan (CQAP) has been prepared as part of the Final Design Report to ensure that remedial action construction is conducted to achieve all performance standards. The CQAP describes quality assurance procedures that will be followed to ensure that the remedial action is constructed in accordance with all approved plans and specifications.

Sampling of the excavated soils will be completed to determine if special handling is required. Any soils not meeting FSP and QAPP guidelines will either be amended on-site or may be disposed off-site. Amended soil will be tested to ensure the soil to be disposed on site meets the established guidelines. Soil not requiring special handling will be placed in the proposed consolidation cell.

Oversight will be provided by DuPont representatives, USEPA, and Ohio EPA to further ensure that all performance standards are achieved.

3.4 Operation and Maintenance

Operation and maintenance (O&M) activities to be conducted following construction will be described in the O&M Plan (OMP). The draft OMP describes O&M activities that will be performed to ensure the consolidation cell and its associated structures continue to be effective.

3.5 Long-Term Monitoring

Long-term groundwater quality monitoring will be needed to verify the attainment of performance standards for this medium. The FSP contains the procedures and requirements for monitoring and installation of the monitor wells, collection of samples, and analytical methods. Groundwater samples will be collected and evaluated semi-annually. The results of the monitoring will be submitted in annual reports to the USEPA and Ohio EPA.

4.0 REFERENCES

Specific to this Text

Geosyntec. 2009a. Feasibility Study Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. June 23.

Parsons. 2013a. Pre-Design Investigation Report, Peters Cartridge Facility, Warren County, Ohio. May.

Parsons. 2013b. Preliminary Design Report, Peters Cartridge Facility, Warren County, Ohio. May.

USEPA. 2009. Record of Decision, Former Peters Cartridge Facility, Warren County, Ohio.

USEPA. 2012. Statement of Work, Former Peters Cartridge Facility, Warren County, Ohio.

Background References

Geosyntec, 2008. Interim Remedial Measure Work Plan Area of Concern 9. Draft. March 26.

Geosyntec, 2009. Remedial Investigation Report, Former Peters Cartridge Facility. Hamilton Township, Warren County, Ohio. February 25.

Parsons. 2012a. Field Sampling Plan Pre-Design Investigation, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons. 2012b. Health and Safety Plan for Pre-Design Investigation, DuPont Peters Cartridge Site. June.

Parsons. 2012c. Quality Assurance Project Plan Pre-Design Investigation, Peters Cartridge Facility, Warren County, Ohio. October.

Parsons. 2012d. Remedial Design Work Plan, Peters Cartridge Facility, Warren County, Ohio. October.

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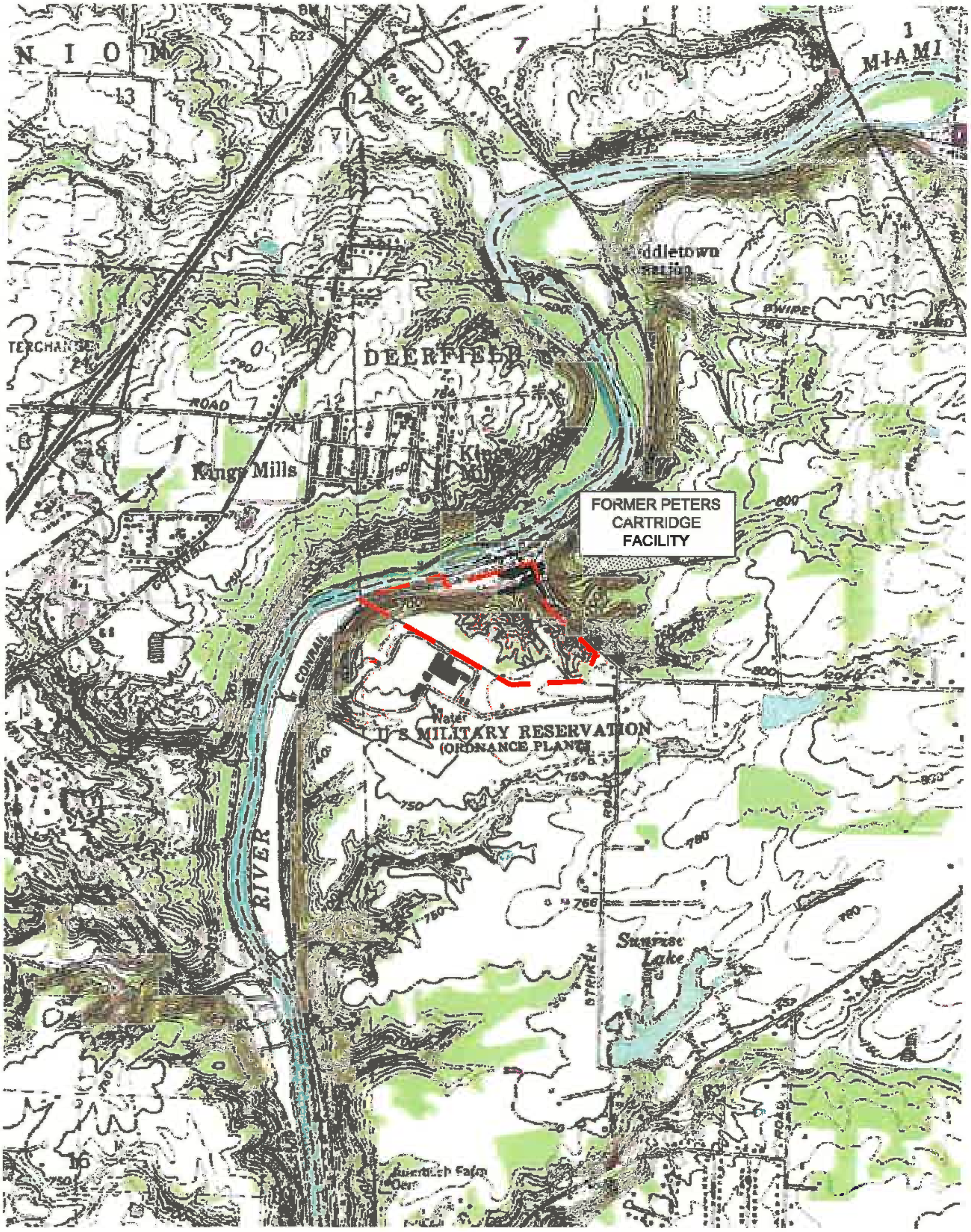
FIGURES



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Longitude: W 84° 14' 32.8"

0 1/2 1 MILE

0 1000 2000 4000 6000 FEET

USGS 7.5-Minute Topographic Map; South Lebanon, OH Quadrangle 2000; Scale: 1:24,000

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

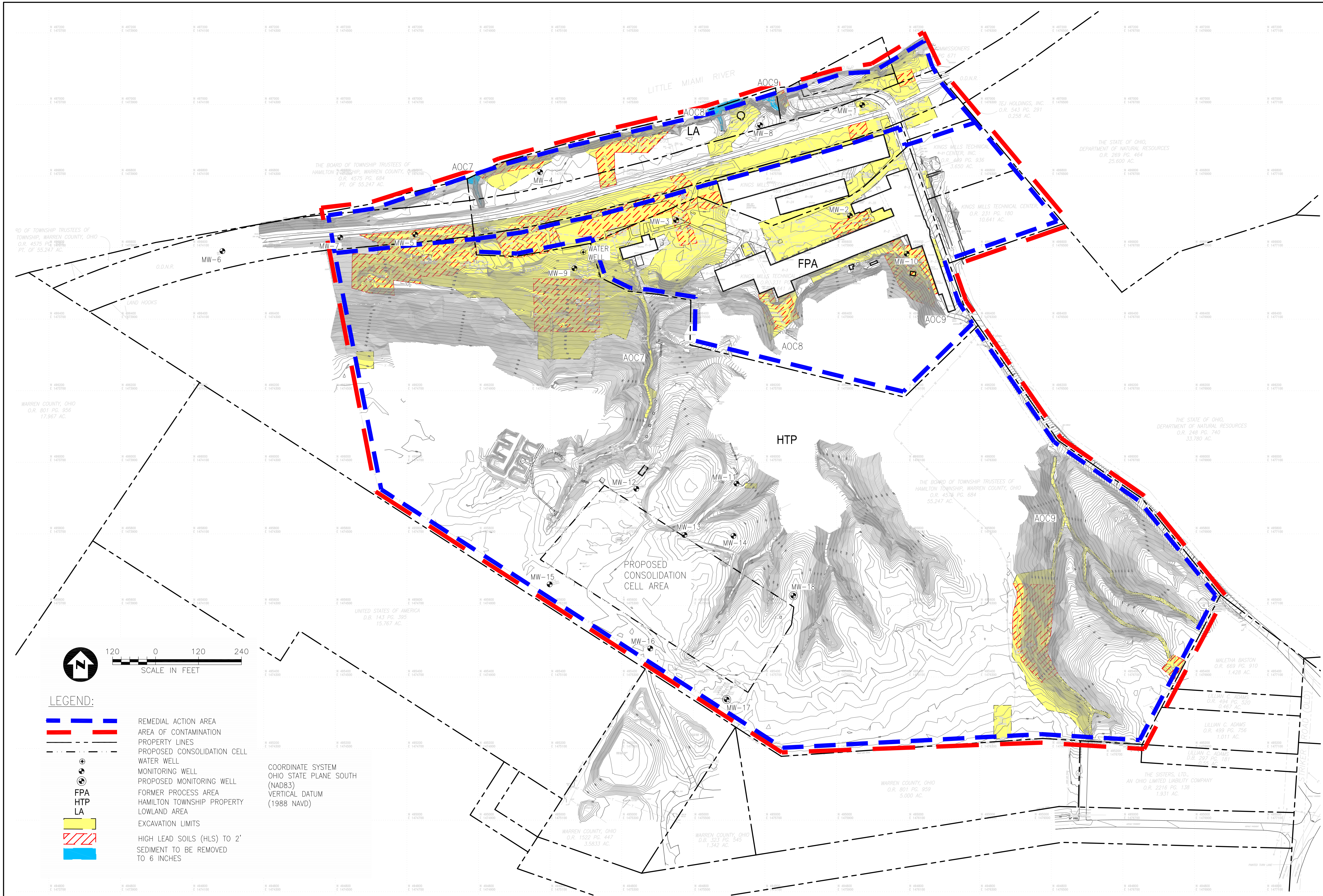
PARSONS
26301 CURTISS WRIGHT PKWY.
CLEVELAND, OHIO 44143
PHONE: 513-552-7044

FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LOCATION MAP

FIGURE NO. 1.1

REV. —



Rev.	Date	Description	By
B	2/21/14	PRE FINAL DESIGN REPORT TO USEPA	EJM
A	2/2/14	PRE FINAL DESIGN REPORT TO DUPONT	EJM

Job No. 446128
Designed EJM
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PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LAYOUT

FIGURE NO. 1.2
REV. B

APPENDIX C-1
FIELD SAMPLING PLAN

PARSONS

Field Sampling Plan
Remedial Action

Peters Cartridge Facility
Hamilton Township, Warren County, OH

Prepared for:

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March 2014

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APPENDIX

ACRONYMS

Acronym	Definition / Description
ACM	Asbestos Containing Material
ASTM	American Society of Testing and Materials
bgs	Below ground surface
COC	Contaminant of concern
C-O-C	Chain-of-custody
CQAP	Construction Quality Assurance Plan
DO	Dissolved oxygen
DOT	Department of Transportation
DuPont	E. I. du Pont de Nemours and Company
FPA	Former Process Area
FSP	Field sampling plan
HASP	Health and Safety Plan
HTP	Hamilton Township Property
LA	Lowland Area – Area designation on figures (previously established)
LOW	Lowland Area – Sampling Code (previously established)
µm	Micrometer
mg/kg	Milligrams per kilogram
ml/min	Milliliters per minute
mS/cm	Microsiemens per centimeter
NTU	Nephelometric turbidity unit
O&M	Operation and Maintenance
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORP	Oxidation reduction potential
PAH	Polynuclear aromatic hydrocarbon
PDI	Pre-Design Investigation
PSWMP	Project Specific Waste Management Plan (DuPont)
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
SVOC	Semi-volatile organic compound

Acronym	Definition / Description
TAL	Target Analyte List
TCL	Target compound list
TCLP	Toxicity characteristic leaching procedure
TGM	Technical Guidance Manual (Ohio EPA)
TEQ	Toxicity Equivalency
TOC	Top of (well) casing
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

1.0 INTRODUCTION

Parsons has developed this Field Sampling Plan (FSP) on behalf of E. I. du Pont de Nemours and Company (DuPont). It provides specific details about the sampling and analyses that will be performed during the Remedial Action (RA) and subsequent operation and maintenance activities at the former Peters Cartridge Facility in Hamilton Township, Warren County, Ohio (the Site) (see **Figure 1.1)**. The RA to be implemented was developed in the Record of Decision (ROD) and described in the Remedial Action Work Plan (RAWP) that is being submitted as part of the Pre-Final Design package. The sampling and analysis activities described herein will be conducted in accordance with the approved Quality Assurance Project Plan (QAPP) dated May 2012 and the Construction Quality Assurance Plan (CQAP) and Health and Safety Plan (HASP) that is submitted as part of the Pre-Final Design package.

1.1 History and Background

For reference and evaluation, the Site has been divided into three areas: the Lowland Area (LA), the Former Process Area (FPA), and the Hamilton Township Property (HTP). The LA includes the portions of the Site along the southern bank of the Little Miami River, within the Little Miami River floodplain. Steel fencing, thick vegetation, and steep topography along the southern border of the Scenic Trail effectively differentiate the LA from the remainder of the Site. The FPA is the primary location where historic manufacturing operations were conducted and is also referred to as an Operational Area. The HTP was used primarily for storage of materials/supplies and is now owned by Hamilton Township. Some process operations (e.g., mixing) may also have been conducted at select HTP locations. The site layout is depicted on **Figure 1.2**.

The Ohio Environmental Protection Agency (Ohio EPA) listed the Site as a discovery site in 1992 and conducted a preliminary assessment in 1993. The Ohio EPA subsequently brought the Site to the attention of the United States Environmental Protection Agency (USEPA), resulting in several site screening investigations/evaluations between 1994 and 1999. A remedial investigation was conducted under an Administrative Order on Consent (effective July 7, 2004, and included human health and ecological risk assessments. The results of the remedial investigation formed the basis for identifying remediation needs and approaches for the Site that were evaluated in a feasibility study. The USEPA issued the ROD on 28 September 2009 and executed the Unilateral Administrative Order for the Remedial Design (RD) and RA with an effective date of 30 April 2012. The Site was listed on the National Priorities List on September 18, 2012, thereby becoming a Superfund site.

As summarized in the Pre-Design Investigation (PDI) Report (May 2013), the following field sampling activities were conducted between October 2012 and May 2013:

- Completed 255 hand auger soil borings and collected 982 samples to delineate soil excavation limits (November 2012 through January 2013)
- Completed 39 hand auger soil borings and collected 74 samples to determine if soil in previously identified areas with high lead concentrations will require special handling (November 2012 through January 2013)
- Completed three geotechnical test pits and four geotechnical soil borings and collected soil samples to evaluate the availability of borrow soils on-site; soil samples were tested for chemical and physical properties (October through December 2012)

Note: Sampling of potential off-site borrow soils was not completed during the initial mobilization due to project logistics, but was completed in April 2013.

- Collected soil samples to determine the geotechnical properties of in-situ Site soil to evaluate soil stability under the on-site consolidation cell (October through May 2013)
- Installed five new monitoring wells (November through December 2012) and collected groundwater samples from them to determine baseline conditions for groundwater quality in the consolidation cell area (January through February 2013)

  Note: Eleven existing monitoring wells were redeveloped and groundwater samples collected from them to assess current sitewide groundwater conditions (January through February 2013).

- Collected 10 geotechnical soil samples within the limits of excavation to evaluate the geotechnical characteristics of the materials for the consolidation cell design (October through December 2012)
- Inspected AOC 9 culvert with a video camera (January 2013)

The following additional field activities were conducted between June and December 2013 in support of the RD:

- Completed an expanded topographic survey and tree survey in proposed RA work areas where trees may need to be removed (June 2013)
- Contracted EA Group to complete a survey of asbestos containing materials (ACMs) in the AOC 9 trash areas by collecting and analyzing 12 bulk samples (June 2013)
- Completed an Indiana Bat Mist Net Survey (July 2013) to confirm the probable absence of Indiana Bats
- Completed a treatability study of high lead soils by collecting composite soil samples from the three areas containing the highest total lead concentrations and treating the soil with a variety of amendments to immobilize lead (July through September 2013)
- Inspected AOC 7 and AOC 8 culverts with a video camera (August 2013)
- Completed 33 hand auger soil borings and collected 66 samples to delineate the horizontal and vertical extent of soil that will require special handling (November through December 2013)

1.2 Contaminants of Concern

Tables L-1 through L-4 of the ROD summarize the cleanup levels and are provided in **Appendix A.** Site-specific contaminants of concerns (COCs) noted in the ROD and their respective soil cleanup levels for the RAWP tasks are listed below.

FPA Soil Cleanup Levels (non-residential standards)

Lead	800 milligrams per kilogram (mg/kg)
Arsenic	20.57 mg/kg (the background value previously established for this Site)

Benzo(a)pyrene TEQ[1]	2.1 mg/kg
Naphthalene	137 mg/kg

LA Soil Cleanup Levels (residential standards)

Lead	400 mg/kg

HTP Soil Cleanup Levels (residential standards)

Lead	400 mg/kg
Arsenic	20.57 mg/kg (the background value previously established for this Site)
Benzo(a)pyrene TEQ	0.26 mg/kg
Antimony	225 mg/kg

Ecological Soil Cleanup Levels

Copper	291 mg/kg
Lead	2647 mg/kg
Mercury	85 mg/kg

1.3 Purpose and Scope

All sampling and analysis will be completed per the requirements of the RAWP. The media to be sampled and analyzed include soil within the RA areas that exceed the Site cleanup levels listed above, soil containing high concentrations of lead that that has received on-site treatment prior to disposal in the on-site containment cell, and groundwater. Soil analyses will include laboratory analysis for Site COCs as well as Toxicity Characteristic Leaching Procedure (TCLP) analysis to confirm that materials placed in the on-site consolidation cell are not characteristically hazardous. Groundwater sampling will be conducted at monitoring wells MW-001, MW-002, MW-003, MW-004, MW-005, MW-008, MW-010, at existing consolidation cell monitoring wells MW-012 through MW-016. Additionally, two new monitoring wells may be installed in areas surrounding the approved on-site consolidation cell (MW-017 and MW-018 just after the completion of RA to complete the network of monitoring wells for the post remediation O&M. The O&M plan will provide additional details of the post remediation monitoring activities.

Field sampling will include the following actions:

- Pre-excavation soil sampling and analysis will be conducted within the TEJ Holdings Property which is part of the LA section of the Site. The samples will be analyzed for Site COCs to confirm the proposed excavation limits. Sampling on this parcel was not performed during the PDI because access had not been obtained.
- Soils in the areas delineated during previous investigations as exceeding the Site cleanup levels will be sampled to confirm that they are not characteristically hazardous. Soil samples from these areas will be analyzed for TCLP lead, mercury and arsenic.

[1] TEQ – Toxicity equivalency

- On-site soils delineated during previous investigations as characteristically hazardous will be sampled after treatment and prior to disposal in the on-site consolidation cell to confirm they have been treated successfully and are no longer characteristically hazardous.
- Groundwater analytical data will be obtained upgradient and downgradient of the consolidation cell during the RA as a baseline for long-term monitoring. Groundwater quality will also be monitored in the existing monitoring wells located in or downgradient of excavation areas and upgradient of the Little Miami River.
- Wells that are not suitable for long-term groundwater monitoring will be decommissioned.

2.0 SAMPLING STRATEGY

2.1 Soil Sampling

Sampling is being conducted to confirm excavation limits prior to excavation and to confirm that soils are non-hazardous before they are either moved off-site or placed in the on-site consolidation cell. Proposed soil sampling locations are illustrated on **Figures 2.1NE** and **2.1NW**. Field procedures and analytical methods to be employed for this investigation are detailed in Sections 3 and 4. The rationale for the selection of sampling locations, depths, and analyses were presented in the RDWP and the RAWP.

Soil sampling will be conducted in the following areas.

- Within the TEJ Holdings Property to confirm excavation limits within that property
- Excavation area soils not requiring treatment identified as containing Site COCs above Site cleanup levels to confirm they are non-hazardous before they are hauled to the consolidation cell
- Soils requiring treatment prior to placement in the onsite consolidation cell to confirm that they have been successfully treated to non-hazardous before they are hauled to the consolidation cell

2.1.1 Delineation of Excavation Limits on the TEJ Holdings Property

No soil samples were collected during the PDI from proposed borings LOWCL-002 and LOWCL-003 because no access agreement was in place at the time. Additional soil sampling is required to delineate the extent of soil above site cleanup levels on this property. Soil samples will be collected using hand tools in six-inch intervals to a depth of two feet. The soil samples will be sent to the laboratory for analysis of Site COCs. If any of the Site COC concentrations exceed cleanup levels at either location, additional step-out boring locations will be advanced 25 feet outward from the initial boring.

2.1.2 Confirmation That Soil is Non-Hazardous in Excavation Areas

Additional soil sampling is required to confirm that soil within the proposed excavation limits but not identified as requiring stabilization is below TCLP limits for lead, arsenic, and mercury. This soil sampling is proposed prior to excavation to avoid delays during the RA. At least one composite soil sample will be collected at the 0- to 2-foot depth interval for every 750 cubic yards (a 100-foot by 100-foot grid, assuming a 2-foot excavation depth). Approximately 50 additional soil samples are proposed to characterize the soil.

These sampling locations are identified on **Figures 2.1NE** and **2.1NW**. They will be staked out by a surveyor, and hand auger soil borings will be advanced and samples collected using the procedures and methodologies detailed in Section 3.0.

2.1.3 Confirmation of Soil Stabilization Effectiveness

The Contractor will sample and analyze post-processed, stabilized soil for TCLP lead, arsenic and mercury on every 750 cubic yards of material processed (every 100-foot x 100-foot x 2-foot deep excavation grid). Soil sampling requirements for the contractor are described in the CQAP.

2.2 Groundwater Monitoring Program

During the RA, groundwater samples will be collected to determine baseline conditions that can be used for long-term groundwater monitoring. The long-term groundwater monitoring program is described in the O&M Plan for the Site. Long-term groundwater monitoring will confirm that no COCs are migrating from the cell or from the excavation areas. Monitoring wells MW-001, MW-002, MW-003, MW-004, MW-005, MW-008, and MW-010 will be used to confirm that no COCs are migrating from excavation areas to the Little Miami River or the associated aquifer. Monitoring wells MW-012 through MW-018 installed around the location of the proposed consolidation cell, will be used to verify that no COCs are migrating from the cell.

Monitoring wells MW-006, MW-007, MW-009, and MW-011 will be decommissioned prior to RA because they are not suitable for long-term groundwater monitoring (as described in Pre-Final Design Report) and could be potential pathways for vertical migration of COCs. Well decommissioning, installation and development are described in Section 3.3, as are well installation and development procedures. A former well was discovered in the HTP area of the Site (location shown on **Figure 1.2**) after submission of the Preliminary Design Report. According to an ODNR Well Log and Drilling Report (644283) with the property address of 1415 Grandin Road, this well was installed by previous property owners in 1987. The current property owner and their tenants have been exclusively using the public (Warren County) water supply for the past 20 years and were not aware that this recently discovered well existed. DuPont will attempt to determine the current conditions of the well and evaluate decommissioning this well during remedial action.

2.2.1 Groundwater Sampling and Analysis

Groundwater samples will be collected from monitoring wells MW-001, MW-002, MW-003, MW-004, MW-005, MW-008, and MW-010 located in or downgradient of proposed excavation areas and upgradient of the Little Miami River. Groundwater sampling will be conducted using the consolidation cell monitoring wells. If there is sufficient well yield, groundwater purging and sampling will be performed using a low-flow (minimum drawdown) groundwater sampling procedures. If there is insufficient recharge to the well for low-flow sampling, the monitoring wells will be purged dry using a disposable bailer, and a groundwater sample will be collected after the well recharges to within 10% of static conditions, not to exceed 24 hours after purging. Groundwater samples collected from existing wells (MW-001 through MW-005, MW-008, MW-010, and MW-012 through MW-016) will be analyzed for select COCs such as total and dissolved metals and total PAHs.

Groundwater samples will also be monitored and measured in the field for temperature, specific conductivity, dissolved oxygen (DO), and turbidity. Groundwater sampling and analysis will be conducted in accordance with the procedures detailed in Sections 3.4 and 4.2.

2.2.2 Groundwater Well Survey and Water Level Gauging

After installation, each new well location will be documented by a licensed land surveyor. The survey datum is to be Ohio State Plane (south; NAD83 and NAVD88). Survey data will include the ground surface location and elevation and the top of the well casing (TOC) elevation. The TOC survey point will be marked or notched for future reference during gauging activities.

Following development and prior to commencement of each groundwater sampling event, the depth to water in each well will be measured and recorded to the nearest 0.01 foot using an electronic water level indicator attached to a graduated tape. The depth to water will be measured from the surveyed TOC point (north rim of well casing). To prevent cross-contamination between wells, the instrument used to measure the depth to water will be cleaned prior to use in each well. The protocols to be employed for cleaning monitoring equipment (decontamination procedures) are discussed in Section 3.3 and in the HASP. The depth to groundwater and well survey data will be used to evaluate the groundwater gradient and flow direction beneath the Site.

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3.0 INVESTIGATION METHODS

This section describes the field methodologies and procedures proposed for this the field sampling effort. The field activities will be conducted in accordance with this FSP, the HASP, the CQAP and QAPP. Analytical testing methods are listed in **Table 3.1.**

3.1 General Field Procedure Guidelines Prior to Drilling

A utility survey will be conducted prior to drilling to locate and mark the location of underground utility hazards in the vicinity of the new monitoring wells. The survey will include reviewing available Site construction drawings and notifying the Ohio Utility Protection Service at least 72 hours prior to initiating any intrusive activities. The field team leader will review each sampling location. If a sampling location is inaccessible or deemed to present unacceptable health and safety concerns, an alternate location will be selected that is as near to the original location as practical. The top five feet of each drilling location will be excavated using a hand auger to verify that no underground obstructions such as utilities are in the top five feet of soil.

To ensure that sampling is implemented correctly and safely, the following six actions will be completed prior to the start of field activities:

- The quality assurance (QA) officer will notify the laboratory of the upcoming sampling event so that the laboratory can prepare the appropriate type and number of sample containers. The anticipated number of samples, a list of analytes, the replicate requirements, and the number of extra bottles needed for quality control (QC) testing will be specified to the laboratory manager.
- The field team will inspect all equipment to be used during the sampling event.
- The field team will check field instruments to be used during sampling to assure it is calibrated to manufacturer's specifications and precision response.
- The field sampling team and/or the QA officer will assemble all forms to be used in the field, including the field log book, chain-of-custody (C-O-C) sheets and seals, and sample analysis request forms.
- Laboratory personnel will partially pre-label sample containers to improve accuracy and increase efficiency in the field. This information (e.g., preservative and type of parameters) may be modified during pre-field activities should a review of sample information necessitate doing so. Other information (e.g., sample identification number, sample time and date, samplers' initials) will be added to the label only after the sample is collected.
- Sampling personnel will review proper sampling protocols and proper health and safety protocols, as identified in the site HASP, prior to sampling.

Sampling preparation will include acquiring all necessary monitoring equipment and site-specific information. Field maps depicting the locations of initial sampling points will be provided to the field staff prior to field mobilization. The proposed soil sample and monitoring well locations will be surveyed and staked prior to each respective task. Scheduling and coordination of the sampling program with the sampling team will be completed prior to field mobilization and then reviewed periodically. Equipment calibration and inspection will be performed whenever the equipment is in use at a frequency specified in the QAPP. Review of procedures and protocols will be completed as required.

The field team leader or a senior member of the field team will be responsible for coordinating with fixed laboratory services (refer to Section 4.0). The laboratory will provide necessary pre-preserved sample containers with the shipping containers. Containers and any preservative added to the containers will be in accordance with USEPA SW-846 protocols (1998b). All samples requiring refrigeration will be shipped at 4 degrees Celsius, +/- 2 degrees (4°C±2°C).

3.2 Soil Sampling Procedures for Chemical Sampling

3.2.1 Soil Sampling to Delineate Excavation Limits on TEJ Holdings Property

Soil sampling will be performed to determine limits of excavation on the TEJ Holdings Property and to confirm that TCLP is below limits within the proposed excavation areas. Due to the shallow depth (0 to 2 feet), this pre-excavation soil sampling will be performed using hand augers or steel trowels. Each soil boring will be advanced to 2 feet below ground surface (bgs) or to refusal if large debris (concrete rubble or large rock) is encountered. Soil samples will be collected from each six-inch interval from the surface to the bottom of the boring.

At each boring location, the field geologist will record a soil description using the Visual-Manual Procedures (ASTM[2] D 2488) based on the classification system described in the USCS[3] (equivalent to ASTM D2487) and the Burmeister Soil Classification System. Soil descriptions and the depth of sample collection will be recorded in the field logbook. Lithologic descriptions will include at a minimum: color, grain size, sorting, relative moisture content and plasticity (where applicable). Observations of unusual color, odor, or staining will also be noted.

Sampling for Site metals (total antimony, arsenic, copper, lead, and mercury) will be performed at the proposed soil sample locations shown on **Figure 2.1NE** to delineate excavation limits.

An Ohio-licensed land surveyor will stake the sampling locations and record the ground surface elevation on the stake. Any additional sampling points installed by the field crew where laboratory confirmation samples are taken will be staked by the field sampling crew and the sample point number placed on the stake. All points where laboratory confirmation samples were obtained will be located by a licensed surveyor who will record the ground surface elevation at the sample point.

Sampling equipment will be cleaned according to the decontamination procedures detailed in Section 3.7 before each sample is collected.

Upon completion, borings will be backfilled with the materials removed. Material will be placed back in the borings at the same intervals from which they were removed.

3.2.2 Soil Sampling to Confirm Soil is Non-Hazardous in Excavation Areas

Soil sampling will be performed within the limits of excavation of areas not required to be treated, to confirm TCLP is below limits within the proposed excavation areas. Due to the shallow depth (0 to 2 feet) and the rough or steep terrain, this pre-excavation soil sampling will be performed using hand augers or steel trowels. Each soil boring will be advanced to 2 feet bgs or to refusal if large debris (concrete rubble or large rock) is

[2] ASTM – American Society of Testing and Materials
[3] USCS – Unified Soil Classification System

encountered. The soil from each boring will be composited into one sample over the entire depth of the boring.

At each boring location, the field geologist will record a soil description using the Visual-Manual Procedures (ASTM D 2488) based on the classification system described in the USCS (equivalent to ASTM D2487) and the Burmeister Soil Classification System. Soil descriptions and depth of sample collection will be recorded in the field logbook. Lithologic descriptions will include at a minimum: color, grain size, sorting, relative moisture content and plasticity (where applicable). Observations of unusual color, odor, or staining will also be noted. Boring logs will be prepared for all borings. The logs will record, at a minimum, the sample point number, soil descriptions, sampling intervals, and location / total depth of borings.

Sampling for TCLP lead, arsenic and mercury will be performed at the proposed soil sample locations shown on **Figures 2.1NE** and **2.1NW** to aid in delineating the limits of areas requiring special handling.

An Ohio-licensed land surveyor will stake the proposed sampling locations and record the ground surface elevation on the stake. The field sampling crew will stake any additional sampling points they install and from which they collect laboratory confirmation samples. The sample point number will be placed on the stake. A licensed surveyor will locate all points where laboratory confirmation samples were obtained and record the ground surface elevation.

Sampling equipment will be cleaned according to the decontamination procedures detailed in Section 3.7 before each sample is collected.

Upon completion, shallow hand-auger soil borings will be backfilled with the materials removed. The materials will be placed back in the borings at the same intervals from which they were removed.

Soil sampling requirements for the Contractor to ensure that the soil stabilization procedures meet established requirements are detailed in the CQAP.

3.2.3 Confirmation of Soil Stabilization Effectiveness

Before it is excavated during the RA, soil that has been stabilized will be sampled to confirm the TCLP values are below the established limits. These soil samples will be collected by the using hand tools such as shovels, hand augers or steel trowels. At least one composite soil sample will be collected from every 750 cubic yards of stabilized soil.

Sampling equipment will be cleaned according to the decontamination procedures detailed in Section 3.7 before each sample is collected.

Soil sampling requirements for the Contractor to ensure that the soil stabilization procedures meet established requirements are detailed in the CQAP.

3.3 Groundwater Monitoring Well Decommissioning, Installation and Development Procedures

Two additional monitoring wells (MW-017 and MW-018) will be installed around the perimeter of the on-site consolidation cell after the completion of the RA. The proposed locations of the monitoring wells are shown on **Figure 1.2**. The locations will be staked in the field by a licensed surveyor, who will record the ground surface elevation on the stake. These two new monitoring wells will be sampled during all groundwater sampling events as described in the O&M Plan.

3.3.1 Well Decommissioning

The following procedures will be followed for decommissioning monitoring wells MW-006, MW-007, MW-009, and MW-011.

- All well decommissioning activities will be completed in accordance with the Ohio EPA Technical Guidance Manual (TGM) for Ground Water Investigations, Chapter 9, Sealing Abandoned Monitoring Wells and Boreholes (Ohio State Coordinating Committee on Ground Water, Revision 2, 2009).
- The total depth of each well will be gauged before it is sealed to confirm there are no obstructions and total depth measurement is in agreement with well construction log data. If obstructions are present within or above a high permeability zone or if a well log is not available, the well will be overdrilled or the well casing will be removed during decommissioning.
- Depth to water will be recorded prior to sealing.
- The wells will be sealed by carefully pouring dry bentonite medium chips into the well to within two feet of the surface. The volume of bentonite required will be calculated to ensure the bentonite does not bridge in the well. If the bentonite bridges the well or if the well does not accept the calculated volume of dry bentonite, then the well will be over drilled. Once dry bentonite is correctly placed in the well it will be hydrated with an appropriate amount of clean water.
- The protective cover, manhole, well pad and casing will be removed to within two feet below grade.
- Per Ohio EPA TGM requirements, a short length of rebar or similar steel material will be placed in the sealed borehole two feet below grade to aid relocating the decommissioned well with a metal detector, if necessary.
- The surface will be restored with materials similar to those surrounding the well– topsoil, asphalt or concrete. Care will be taken to correctly compact the surface to prevent settling.
- If wells are to be overdrilled, the well will be overdrilled with tooling of a larger outer diameter then the well outer diameter. The drilling contractor will ensure the tool string remains centered over the well during overdrilling. The clean-out boring will be sealed as described above with dry bentonite or 100% Portland cement grout. If grout is used as a sealant, it will be allowed to settle for at least 24 hours, and additional grout will be added as necessary before the surface is restored. Soil cuttings and well debris will be disposed of in the on-site consolidation cell.
- Well abandonment forms will be completed and submitted to the Ohio Department of Natural Resources (ODNR) Division of Water.

3.3.2 Monitoring Well Installation

The following procedures will be followed for the installation of the two new monitoring wells (MW-017 and MW-018).

- All monitoring well installation activities will be completed in accordance with OAC 3724-9 and Technical Guidance Manual for Groundwater Investigations (Ohio EPA 2009).
- Two 2-inch-diameter monitoring wells will be installed into the subsurface eight feet into the first encountered water table.
- The monitoring wells will be drilled using hollow-stem auger drilling techniques. Continuous soil sampling will be conducted in each monitoring well for lithologic data. At each boring location, the field geologist will record a soil description using the Visual-Manual Procedures (ASTM D 2488) based on the classification system described in the USCS (equivalent to ASTM D2487) and the Burmeister Soil Classification System. Soil descriptions and depth of sample collection will be recorded in the field logbook. Lithologic descriptions will include at a minimum: color, grain size, sorting, relative moisture content and plasticity (where applicable). Observations of unusual color, odor, or staining will also be noted. Boring logs will be prepared for all borings. The logs will record, at a minimum, the sample point number, soil descriptions, sampling intervals, and location / total depth of borings.
- Drill cuttings generated during installation of the monitoring wells are assumed to be uncontaminated, but will be placed in 55-gallon steel drums and staged adjacent to the monitoring well location. The soil cuttings will be disposed of in the consolidation cell during the remedial phase. The drilling equipment (e.g., augers, core barrels, drill casing, drill rods, and sampling equipment) must be cleaned between monitoring well installations. Water generated from the cleaning process is assumed to be uncontaminated, but will be placed in 55-gallon, closed head, steel drums to await subsequent disposal. All waste disposal procedures are described in the Project Specific Waste Management Plan (PSWMP).
- The depth to groundwater and soil descriptions observed during drilling will be used to determine the approximate depth to groundwater at each boring location.
- Monitoring wells will be installed with the top of well screens placed 2 feet above the uppermost zone of saturation. The length of the well screens will be 10 feet. The top of the riser pipe (casing) installed above the screen will be extended to approximately 3 feet above the ground surface.
- Monitoring wells will be completed with the following: Schedule 40, polyvinyl chloride (PVC) risers and Schedule 40 PVC, 0.010-inch slot screens; #5 Global or similar filter sand extending 2 feet above the screen slots; and an annular seal consisting of hydrated bentonite chips placed 3 feet above the filter pack. The remainder of each borehole will be sealed with an appropriate grout mixture (5% bentonite/Portland cement by weight) per the Technical Guidance Manual for Groundwater Investigations (Ohio EPA 2008).
- Surface completion/well development will not begin until grout has cured for at least 24 hours.
- All monitoring wells will be completed with a lockable protective steel casing. The steel casing will be placed over the well and painted with two coats of weather resistant, yellow enamel paint. A weep hole will also be drilled at the base of the outer casing to allow any water between the inner and outer casing to drain.

- A 4-foot by 4-foot concrete pad with four bollards will be constructed around the well and will be sloped to channel water away from the well.
- The drilling subcontractor will complete and submit ODNR well logs when all activities are completed.

3.3.3 New Monitoring Well Development

The following procedures will be followed for the development of the two new monitoring wells.

- Monitoring well development will be performed to remove any drilling fluid residues remaining in the borehole or surrounding formation material, remove imported drilling water lost to the formation during drilling, and restore the properties of the formation around the monitoring well. Each well will be developed to a turbid-free discharge.
- Monitoring well development will begin at least 24 hours after well installation.
- Each monitoring well will be developed using pumping/over-pumping and surging methods until the water is turbid free or until the well has been purged dry at least three times or five well volumes have been purged.
- Well development will start with pumping/over-pumping with intermittent surging; at least two surging events will be performed.
- The final step will involve pumping the well to remove fines.
- During well development, pH, temperature, conductivity and turbidity will be measured by the on-site Parsons representative. At least three rounds of measurements will be recorded, including a final round upon development completion.
- Although the monitoring wells will be installed in areas known to be uncontaminated, purge water generated from these wells during development, purging and sampling events will be containerized in DOT[4] approved 55-gallon closed head steel drums for subsequent disposal. Handling of this water is discussed in the PSWMP.

3.4 Groundwater Sampling– Monitoring Wells

Following development of the new consolidation cell monitoring wells (MW-017 and MW-018), each well will be allowed to equilibrate for a minimum of 48 hours prior to sampling. Groundwater samples will be collected from the two new monitoring wells, the five existing consolidation cell monitoring wells (MW-011 through MW-016), and monitoring wells MW-001, MW-002, MW-003, MW-004, MW-005, MW-008, and MW-010 located in or downgradient of proposed excavation areas. The samples will be analyzed as described in Section 2.3.1 for analytes listed in Section 4.3. Depth to water will be measured prior to sampling as described in Section 3.7.1. Wells will be purged and sampled as described below.

A field map depicting the locations of monitoring wells will be provided to the groundwater sampling staff prior to field mobilization. Dissolved samples will be field filtered using 0.45 micrometer (µm) filters. Groundwater sampling techniques were

[4] DOT – Department of Transportation

developed using the Compendium of ERT Groundwater Sampling Procedures (USEPA 1991), Technical Guidance Manual for Groundwater Investigations Chapter 10 Groundwater Sampling (Ohio EPA 2012), Ground Water Sampling Procedure Low Stress (Low Flow) purging and Sampling (USEPA Region 2 1998a), and Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (Puls and Barcelona 1996) documents as guidance.

3.4.1 Water Level Measurements

The water level in each well will be measured prior to purging and groundwater sample collection. Water level measurements from all wells (MW-11 through MW-18) will be collected in one day no more than 24 hours prior to commencement of purging and sampling. The depth to water in each well will be measured to the nearest 0.01, relative to the surveyed TOC using an electronic water level meter. Depth measurements will be collected from the mark on the north rim of the well casing. Depths to water will be recorded on field logbooks.

3.4.2 Low-Flow Purging and Sampling

A minimum of 24 hours will separate well development and sampling. To the extent possible, monitoring wells will be purged and sampled in the order of increasing potential COC impacts to minimize the potential for cross-contamination. Each well will be purged prior to sample collection to ensure that samples collected are representative of formation groundwater conditions. Purging will involve removing casing water from the well while allowing groundwater from the aquifer to recharge the well. Traditional high-flow pump/bail well purging and sampling methods may contribute to high turbidity that can influence the amount of metals in groundwater. Therefore, a low-flow purging and sampling method will be used if there is sufficient groundwater recharge to not exceed drawdown criteria during low-flow purging. In addition to reducing the potential for a turbid sample, low-flow sampling has the benefit of reducing purge water volume when compared to high-flow methods. If drawdown during low-flow exceeds 0.5 feet, the flow rate will be reduced to 100 milliliters per minute (ml/min), and low-flow procedures will continue. If drawdown continues while pumping at 100 ml/min and the well screen is exposed but readings are not stable, then the sample will be collected.

A low-flow capable pump will be used to purge and sample each groundwater monitoring well. The pump will be lowered to a depth corresponding to the center of the well screen. Tubing will be connected to the flow-through cell of a multi-parameter water quality meter. The target purge rates will be between 200 to 400 ml/min. The objective is to minimize water level drawdown in the well (less than 0.5 feet). The flow rate may be adjusted as necessary to achieve this objective but will not be adjusted below 100 ml/min.

During purging, water quality indicator parameters from the multi parameter meter, such as turbidity, temperature, specific conductance, pH, oxidation-reduction potential (ORP), and DO, will be collected from the in-line flow cell, and monitored at 3 minute intervals. The multi-parameter in the device will be calibrated as described in the manufacturer's manual and as described in Section 3.6. The results of the initial calibration and subsequent checks will be recorded in the field logbook or electronically on the instrument data logger.

Groundwater will be considered representative and ready for sample collection once the field indicator parameter values remain within the range specified below for three consecutive readings, or until purging has continued for one hour.

Stabilization Parameter	Stabilization Range
pH	+/- 0.2 units
DO	+/- 0.2 mg/L
Conductivity	+/-0.020 mS/cm
ORP (Redox)	+/-20 millivolts
Turbidity	+/-10 % or < 10 NTUs

mS/cm – microsiemens per centimeter
NTU – Nephelometric turbidity unit

When the groundwater parameters have met the above criteria, samples will be collected directly from the output tubing. Non-filtered samples for inorganic analyses (e.g., total metals) will be collected first. Thereafter, a disposable, single-use 0.45 µm membrane filter will be affixed to the output tubing and filtered samples for dissolved analysis (i.e., dissolved metals) will be collected. After the sample containers are filled, they will be labeled appropriately and placed in a sample shuttle containing ice or ice packs. Samples requiring refrigeration for preservation will be stored at approximately 4°C during storage and shipment. Groundwater analyses to be performed are discussed in Sections 2.4 and 4.2. Further details regarding sample handling and analysis are provided in Section 3.10 and the QAPP.

3.5 Field Log Book

A bound field notebook with consecutively numbered pages will be maintained for all field activities. All daily field activities will be documented in indelible ink in this notebook. The field team leader will record at least the following information in the daily notebook:

- Date and time of entry (24-hour clock)
- Project name and location
- Project number
- Time and duration of daily sampling activities
- Weather conditions
- Sample identifier and analysis code for each sample to be submitted for laboratory analysis
- Variations, if any, from specified sampling protocols and reasons for deviations
- Name of person making entries and other field personnel
- On-site visitors, if any
- Specific information on each type of sampling activity
- Comments and observations at time of sample withdrawal (relevant factors that might influence sample integrity)

- Signature and date at bottom of logbook page completed at the conclusion of each day of activities

The field team leader is responsible for proper completion of all forms. Field logbook entries will completed at the time observations are made. In addition, sample location maps will be updated during sampling and maintained throughout the sampling events.

A complete description of the sample naming and identification procedure, along with matrix codes and instructions on completing C-O-Cs are included in the QAPP.

Copies of these field observations and records will be submitted to the project file at the conclusion of field activities. Field activities may be documented in photographs to provide visual information and verification of field data by project personnel. Photographs will be referenced appropriately in the field logbook.

3.6 Calibration Procedures

Calibration is the process of establishing a relationship between the measured output and the known input and provides a point of reference to which other sample analyses can be correlated. Each instrument will be calibrated prior to its first use each day and in accordance with the manufacturer's recommendations thereafter. More frequent calibration will be conducted, as necessary, based on instrument performance quality checks. All calibrations will be performed using standard industry practices and per manufacturer's recommendations.

3.6.1 Field Procedures

The multi-parameter meter used during groundwater sampling (i.e., pH, conductivity, ORP, DO and turbidity) will be checked for calibration consistent with manufacturer-recommended procedures. Where the manufacturer has not specified a calibration interval for an instrument, it will be established based on industry practice or by the sampling team. The sampling team will supply and maintain field equipment.

The pH sensor calibration will be performed using at least two different buffer solutions that bracket the expected range of pH in water samples to be collected. The meter will be calibrated daily in accordance with the manufacturer's specifications and SW-846 standards (USEPA 1998b). The probe and sampling cups will be thoroughly rinsed with distilled water before and after use. Additional calibration procedures are described in the manufacturer's guidelines for this instrument.

The specific conductivity sensor will be checked daily against the manufacturer's specified standard solution. When the meter exhibits unacceptable error (greater than five percent), it will be recalibrated according to the procedure defined in the manufacturer's guidelines for this instrument. The probe and the sampling cups will be thoroughly rinsed with distilled water before and after use.

The ORP sensor will be checked daily against the manufacturer's specified standard solution. When the meter exhibits unacceptable error (greater than five percent), it will be recalibrated according to the procedure defined in the manufacturer's guidelines for this instrument. The probe and the sampling cups will be thoroughly rinsed with distilled water before and after use.

The turbidity meter calibration will be performed using at least two different standards that bracket the expected range of turbidity in monitoring wells to be developed or sampled. Calibration of the turbidity meter will be conducted daily and will be repeated if anomalous results are observed. Additional calibration procedures are described in the manufacturer's guidelines for this instrument.

DO readings will be collected using an optical type sensor that does not need routine calibration per the principles of operation. The DO sensor will be spot checked each week against the standards of zero oxygen and 100% saturation.

All calibrations will be completed in a clean environment such as an onsite office, field trailer, or at the Parsons Cincinnati office.

3.6.2 Standards

Buffers for the pH sensor will be at pH 4, pH 7, and pH 10. Two of the three buffers will be used to calibrate the meter. The third buffer will be used for periodic calibration checks. The pH 7 buffer will always be one of the calibration buffers. The buffers will be purchased from a laboratory chemical supply manufacturer, and the exact pH will be noted on a calibration form.

At least two standards will be used to calibrate the turbidity sensor. The lower standard will be 10 NTUs or less. The upper standard will typically be in the range of 100 to 800 NTUs. Calibration standards will be supplied by the vendor or instrument manufacturer.

For the conductivity and ORP the sensors will be calibrated in standards referenced by the manufacturer for the specific sensor specifications.

For the optical DO sensor, zero DO bump checks will be performed in a sodium sulfide solution, and 100% saturation bump checks will be performed in a 100% oxygen saturated environment.

Only standards and calibration procedures referenced by the sensor manufacturer will be used.

3.7 Cleaning of Field Equipment

Non-disposable soil and groundwater chemical sampling equipment will be cleaned between sampling at each hand augered soil boring or monitoring well. Waste from decontamination procedures will be disposed of per the PSWMP. Cleaning will consist of the steps described below.

3.7.1 Hand Auger and Soil Sampling Tools

1. Physically remove soil to the most extent feasible with a scraper or brush;
2. Mud Knockoff - scrub in clean tap water with a stiff brush to remove bulk soil in a dedicated pail with a dedicated brush;
3. Soap Scrub - scrub in a solution of clean tap water and phosphate-free detergent (e.g., Liquinox™) in a dedicated pail with a dedicated brush;
4. Clean Rinse – rinse with clean city water by submerging hand auger bucket in a dedicated pail;
5. Distilled Rinse – rinse with fresh distilled water by pouring water over and through the equipment;

6. Wrap clean equipment in aluminum foil; and
7. Change out decontamination fluids every four soil borings or as needed when clean rinse water appears to have turbidity.

3.7.2 Groundwater Sampling Pump

1. Soap Scrub - scrub pump and motor lead (if equipped) in a solution of clean tap water or distilled water and phosphate-free detergent (e.g., Liquinox™) in a dedicated pail with a dedicated brush or sponge;
2. Clean Rinse – rinse with clean tap water or distilled water by submerging pump and motor lead (if equipped) in a dedicated pail;
3. Distilled Rinse – rinse with fresh distilled water by submerging the pump and motor lead (if equipped) in a pail; change out the distilled rinse bucket between wells;
4. Place clean equipment in large, zip close bags; and
5. Change out decontamination fluids between samples.

3.7.3 Water Level Indicator

1. Soap Spray – spray probe and length of tape in contact with groundwater with a solution of clean tap water and phosphate-free detergent (e.g., Liquinox™) using a pump sprayer or hand sprayer;
2. Distilled Rinse – rinse with fresh distilled water by pouring water over the probe and tape; and
3. Place clean equipment in large, zip close bags or dedicated storage bags.

3.8 Sample Labeling and Identification

An adhesive sample label will be affixed to the outside of each sample container. The sample label will specify the sample identification number, name of sampler(s), location sampled, date and time sampled, preservatives used, and parameter(s) to be analyzed. The information will be recorded on the sample label with indelible ink.

Sample identifications (IDs) will be created using the DuPont specified format:

Soil Samples: Event – Location – Top Depth - Sample Type

The sample ID will include a code for sample location for the FPA, HTP, and Lowland Area (LOW). The sample ID will also include the boring description code for Soil Classification (SC) samples. For example, if pre-excavation soil samples were collected during March 2014, a composite soil sample in the FPA collected from boring number 012, at 0 to 2 feet bgs would appear as follows:

SB0314-SCFPA-012-0-C

Sample type codes include:

C Composite

D Duplicate

Matrix spike and matrix spike duplicate samples will have the same sample ID as the normal sample they are associated with. Normal field grab samples do not have a sample type code.

The sample ID will also include the boring description code for Post Treatment (PT) samples. For example, if pre-excavation soil samples were collected during July 2014, a composite soil sample in the HTP collected from sample number 007, from the amended would appear as follows:

SB0714-PTHTP-007-0-C

Groundwater samples would include a sample event code and the well ID in a three digit number format. A groundwater sample collected from MW-014 in August 2014 would have the following ID:

GW0814-MW-014

3.9 Sample Handling/Shipment

Samples will be collected using the procedures detailed in the preceding sections of this FSP. Sample coolers and ice will be available to maintain the samples at a cool temperature (4°C, ±2°C) from the time of collection until the coolers arrive at the laboratory.

The custody of samples collected during a field investigation will be traceable at all times. The C-O-C form documents possession of the samples from the time of collection until final disposition the sample. A sample is considered under custody if any of the following apply.

- It is in the possession of the investigator.
- It is in the view of the investigator after possession has been established.
- The investigator locks up the sample after possession.
- It is in a designated secure area.

The laboratory will provide all sample containers. Only new sample containers (i.e., I-CHEM 200 or industrial glassware or equivalent) will be used to collect samples. The appropriate size and type of container will be provided by the laboratory with the applicable preservatives, as specified in Work Sheet #26 of the QAPP. Sample containers purchased by the laboratory will be pre-cleaned by the vendor. Certificates of analysis that document cleanliness are available upon request from the laboratory for every lot of bottles purchased.

To the extent practical, sample labels will be prepared by the laboratory and shipped with the bottles. The laboratory will prepare pre-printed C-O-C forms for use by the field sampling teams. The pre-printed C-O-C forms and bottle labels will be delivered to the field location prior to sampling to allow samplers time for a final accuracy check. In addition, the laboratory will include extra blank labels and bottles that may be needed.

Sample containers will be kept closed and in a cooler or appropriate storage location until needed. As they are collected, samples will be labeled and recorded in the field notebook along with other pertinent collection data. Immediately after the sample containers have been filled and labeled. All sample containers will be placed on ice in a cooler or in a refrigerated storage unit at 4°C±2°C.

Soil and water samples for all chemical analyses will be shipped on ice (4°C±2°C) to the testing laboratories where they will be appropriately stored until analysis and final disposition. All field samples, except archived chemical samples, will be analyzed as soon as possible after receipt at the laboratory. Maximum sample holding times are indicated in the QAPP.

Samples in glass jars or bottles that are shipped or delivered by courier to the Site will be packed in bubble-wrap or foam plastic to prevent breakage. C-O-C forms will be enclosed in the coolers, and C-O-C seals will be placed across the cooler lids. A copy of the form, signed upon receipt at the laboratory, will be sent to the field team leader and placed in the project file. Sample packaging and shipping requirements are described in the QAPP.

Samples shipped from the Site to the laboratory by a commercial courier will be transported in an insulated shipping container sealed with tamper-evident tape or a tamper-evident custody seal. If any custody seal is received broken, that fact will be recorded on the C-O-C form upon receipt at the laboratory and project personnel will be notified in accordance with procedures detailed in the QAPP.

3.10 Chain-of-Custody

Each sample may consist of several individual sample aliquots contained in separate sample containers. Each sample container will be logged on the C-O-C form prior to shipment to the laboratory. The C-O-C form may be initiated at the laboratory when the sample containers are shipped to the field.

The following information will be recorded on the C-O-C form:

- Origin of sample containers
- Name of the collector
- Dates and times of sample collection
- Sample identification numbers
- Number of containers for each sample aliquot
- Container size
- Type of preservation (including ice)
- Analysis requested (analytes from each sample aliquot)
- Turn-around time requested
- Special handling instructions
- Destination of samples
- Name, date, time, and signature of each individual possessing the samples
- Shipping container identification number

The C-O-C form will be signed by each individual responsible for custody of the sample containers and will accompany the samples to the laboratory. A sample C-O-C form is presented in the QAPP. A completed C-O-C form will accompany all samples, including geotechnical samples.

Sample custody is defined as actual physical possession, in view after physical possession, or locked and/or sealed in a tamper-resistant container after physical possession. At the time of custody transfer, the individual relinquishing the samples will observe as the transferee inspects the samples for integrity and dates and signs the C-O-C form. The original, signed C-O-C form (white copy) along with the carbon copy (canary copy) will accompany the samples to the laboratory. The canary copy will remain at the laboratory and the original C-O-C form will be sent to the project chemist with the data. The field team leader or designate will be responsible for custody of the samples taken during the field investigation.

Field Custody Procedures

At the time of sample collection, the following field activities will be performed and documented by field sampling personnel:

- All procedures regarding preparation of reagents or supplies to be used in sample collection and/or sample preservation.
- Sample quantity, type (i.e., composite or grab), location, and depth will be documented in the field log.
- Sample labels will be prepared including sample identification numbers, time and date of collection, requested laboratory analyses, and name of sampler.

Samples collected in the field by a team of investigators will be the responsibility of each sampler until the samples are transferred to a person designated as the field sample custodian. C-O-C forms will not be required for samples analyzed in the field; however, custody procedures will be maintained at all times prior to analysis, and samples will be documented in field logs.

Prior to sample transport to the laboratory, a C-O-C form will be completed by the field sample custodian. Sample locations, sample identification numbers, description of samples, number of samples collected, and specific laboratory analyses to be conducted on each sample will be recorded on a C-O-C form. The field sample custodian will sign and date the C-O-C form and retain a copy for the project records.

Prior to sample delivery to a courier, the sample shipping carton (e.g., cooler, box) will be sealed with the signed C-O-C forms inside. The authorized laboratory custodian who receives the samples will sign the C-O-C forms, thus terminating custody of the field sample custodian. If the samples are not shipped on the same day they are collected, they will be placed in an iced cooler and stored within a locked storage area at a secure area of the Site until shipped.

Laboratory Custody Procedures

Sample custody at the analytical laboratory is maintained through systematic sample control procedures, including the following:

- Sample receipt
- Sample log-in
- Sample storage
- Sample archival or disposal

The laboratory C-O-C procedures are documented in the QA plan for the laboratory, which is provided as an attachment to the QAPP.

3.11 Quality Assurance/Quality Control

QA/QC procedures will be performed to ensure that the data collected are both valid and representative of Site conditions. Sufficient sample volume will be collected to meet the QA/QC requirements specified in the QAPP (matrix spike/matrix spike duplicates, duplicates, field blanks and equipment blanks). QA/QC samples will be collected at the frequency noted below.

3.11.1 QC Sample Procedures

The following QC samples will be collected in the field and analyzed by the laboratory with original samples.

- Field Duplicates - Field duplicate samples will be collected and analyzed to assess the variability of chemical concentrations in sample matrices/locations. Field duplicates provide a measure of the total analytical bias (field and laboratory variance), including bias resulting from the heterogeneity of the replicate sample set itself. Field duplicates will be collected at a minimum frequency of 1 per 20 samples or once per sampling event, whichever is more frequent.
- Matrix Spike/Matrix Spike Duplicates - These samples will be collected at a minimum frequency of 1 per 20 samples or once per sampling event, whichever is more frequent. Matrix spikes provide information about the effect of the sample matrix on digestion or extraction and measurement methodology.
- Equipment Blanks - Equipment blanks will be collected to help identify possible contamination from the sampling environment or from the sampling equipment (e.g., grab, bowls, spoons, pump or tubing). Equipment blank samples will be collected by passing and containerizing deionized water over clean, non-dedicated sampling equipment at a frequency of one per sampling event or when procedures or equipment changes.
- Trip Blanks – Trip blanks will be collected one per shipment whenever volatile organic compounds (VOCs) are included in a shipment.
- Ambient Blank - Collected only if needed, based on potential for contamination from ambient VOC emissions.

Unless otherwise noted, field QC samples will be collected in accordance with procedures detailed in the QAPP.

3.12 Laboratory Checks

The analytical laboratory may be audited periodically by the project QA/QC officer (or the designated individual) to assess if proper analytical protocols are being followed concerning sample analysis and laboratory QC checks.

3.13 Field Checks

The following select field activities are performed to conduct QA/QC checks include the following:

- Use of standardized data collection formats
- Field equipment calibration

- Duplicate sample and field blank collection
- Regular field audits

Field equipment will be calibrated prior to use in accordance with the standardized procedures contained in the equipment manual. Field and laboratory audits may be performed by the QA/QC officer (or the designated individual) to evaluate if proper protocols and procedures are being employed.

4.0 ANALYTICAL TESTING PROGRAM

Chemical testing will be completed on soil and/or water samples collected during the RA and subsequent field activities. Specific details regarding sampling locations and analyses to be performed for specific samples are discussed in Section 2. Analyses will be performed in accordance with the QAPP and USEPA guidance documents (USEPA 1998b). The analytical test methods to be employed for given parameters in each sample media are summarized below. Further details regarding analytical methods and procedures are provided in the QAPP. All chemical laboratory testing will be performed by TestAmerica Laboratories in North Canton, Ohio.

4.1 Soil Sample Analytical Methods

Soil samples collected to delineate the extent of excavation limits will be analyzed for Site COCs applicable to the area in which they are collected. The soil samples proposed to be collected on the TEJ Holdings Property are in the LA. The site COCs applicable to that area are total metals including antimony, arsenic, copper, lead, and mercury.

Soil samples collected for confirming non-hazardous characteristics will be analyzed by the fixed chemical laboratory using USEPA Method 1311 –TCLP for lead, arsenic, and mercury.

4.2 Groundwater Sample Analytical Methods

Groundwater samples will be analyzed for site COCs for all existing consolidation cell monitoring wells. The two new wells (MW-017 and MW-018) will be sampled after construction for a baseline sampling event for target compound list (TCL) organics (VOCs, semivolatile organic compounds (SVOCs), herbicides and pesticides) and target analyte list (TAL) metals (including mercury and cyanide) using the following USEPA methods:

Parameter	Analytical Method
Site COCs including metals (antimony, arsenic, copper, mercury, and lead), and SVOCs (naphthalene and benzo(a)pyrene)	Antimony, arsenic, lead using Method 6010B and/or 6020, mercury using Method 7471A, and SVOCs using Method 8270C.
TCL VOCs	Method 8260B
TCL SVOCs (including herbicides and pesticides)	Methods 8270C for SVOCs, 8081A for pesticides, 8151A for herbicides
TAL metals	Methods 6010B and/or 6020, mercury using Method 7471A, and cyanide using Method 9012A.

For following long-term sampling events in accordance with the O&M Plan, the site monitoring wells will be sampled and analyzed for the Site COCs using the following USEPA methods.

Parameter	Analytical Method
Site COCs including metals (antimony, arsenic, copper, mercury, and lead), and SVOCs (naphthalene and benzo(a)pyrene)	Antimony, arsenic, lead using Method 6010B and/or 6020, mercury using Method 7471A, and SVOCs using Method 8270C.

5.0 WASTE MANAGEMENT

Investigation-derived wastes will be left on-site and will be handled in accordance with the PSWMP.

Soil will not be containerized except for soil cuttings generated during new monitoring well installation.

Purge and development water from the two new monitoring wells (MW-017 and MW-018) will be containerized in drums and left on-site for subsequent disposal off-site in accordance with the PSWMP. Purge water from the remaining monitoring wells at the Site that have previous analytical results confirming the groundwater has not been impacted will be poured on the ground surface.

Personal protective equipment worn during the soil investigation and other disposable materials that come in contact with soil in areas of known contamination will be containerized in drums and handled in accordance with the PSWMP.

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6.0 REFERENCES

Ohio EPA. 2008. Technical Guidance Manual for Groundwater Investigations, Chapter 7 Monitoring Well Design and Installation. Revision 1. February

Ohio EPA. 2009. Technical Guidance Manual for Groundwater Investigations, Chapter 9 Sealing Abandoned Monitoring Wells and Boreholes. Revision 2. October

Ohio EPA. 2012. Technical Guidance Manual for Groundwater Investigations, Chapter 10 Groundwater Sampling. Revision 2. May

Puls and Barcelona, 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, April.

USEPA, 1991. Compendium of ERT Groundwater Sampling Procedures. January.

USEPA. April 1998b. Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Revision 5.

USEPA, 1998a. Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling.

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FIGURES

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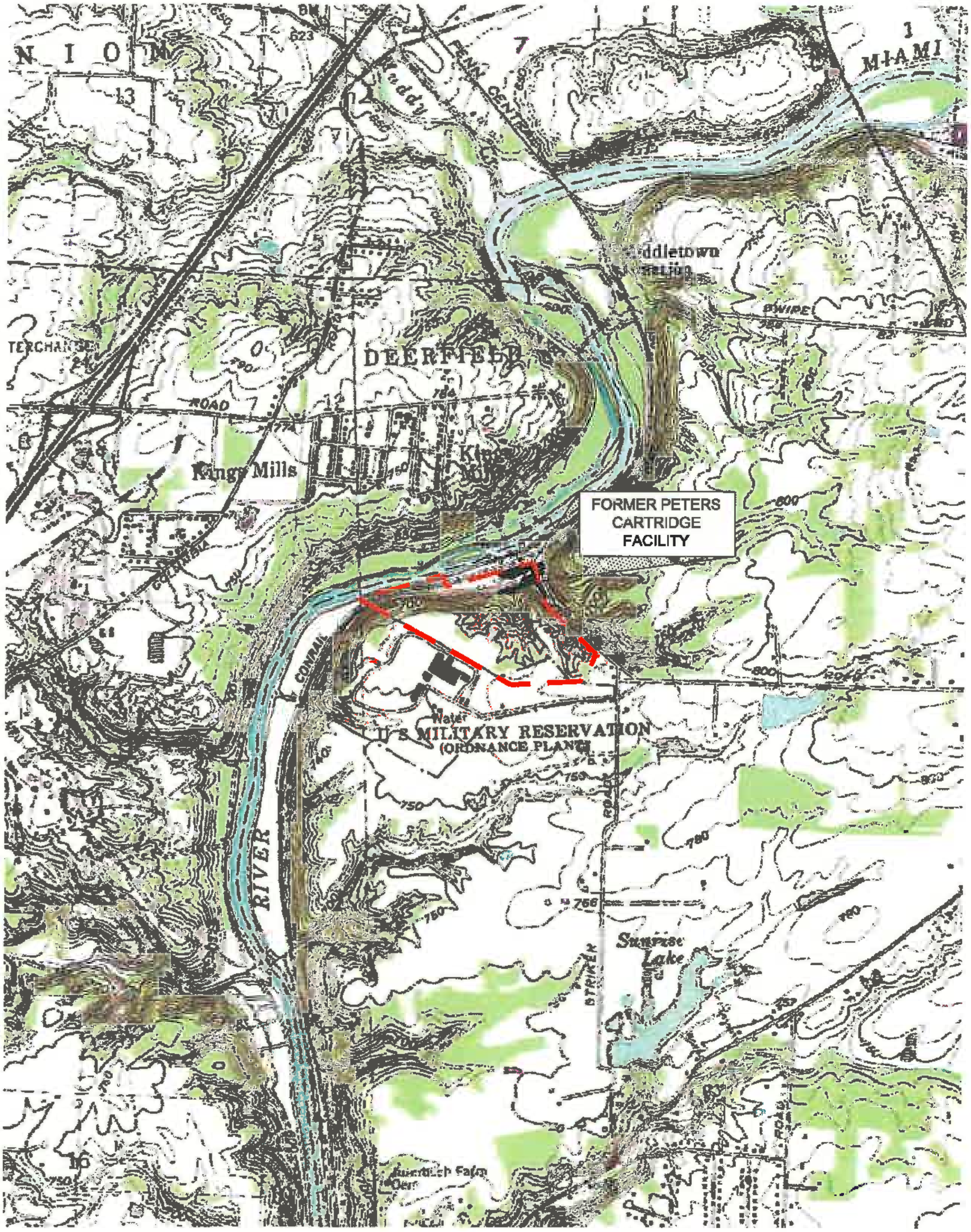


0 1/2 1 MILE

0 1000 2000 4000 6000 FEET

Latitude: N 39° 20' 55.5"
Longitude: W 84° 14' 32.8"

USGS 7.5-Minute Topographic Map; South Lebanon, OH Quadrangle 2000; Scale: 1:24,000

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

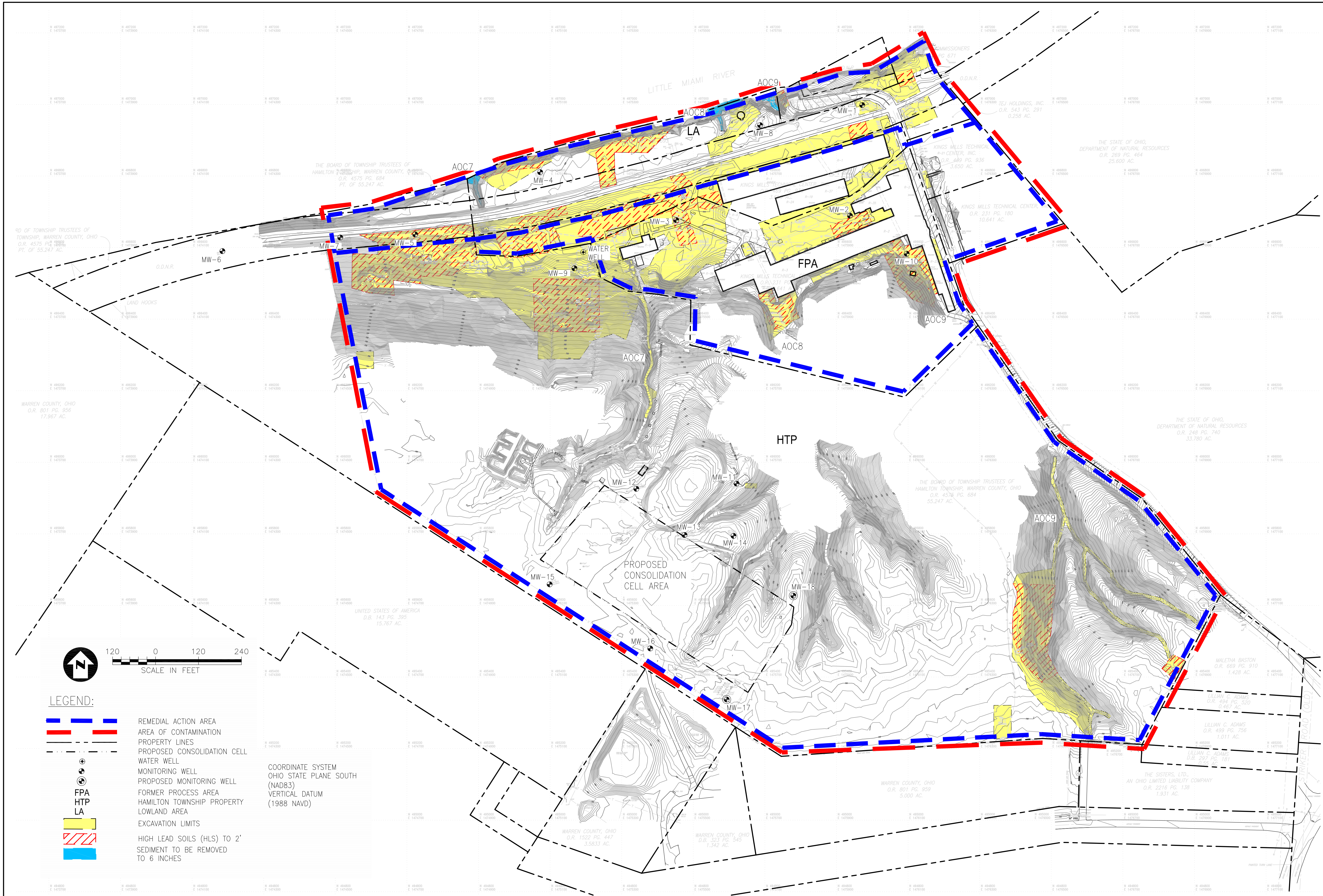
PARSONS
26301 CURTISS WRIGHT PKWY.
CLEVELAND, OHIO 44143
PHONE: 513-552-7044

FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LOCATION MAP

FIGURE NO. 1.1

REV. —



Rev.	Date	Description	By
B	2/21/14	PRE FINAL DESIGN REPORT TO USEPA	EJM
A	2/2/14	PRE FINAL DESIGN REPORT TO DUPONT	EJM

Dupont(Peters Cartridge)(Fig1.2)(Site Layout).dwg

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed SMA
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

PARSONS
2443 CROWNE POINT DRIVE,
SHARONVILLE, OHIO 45241
PHONE: 513-326-3040

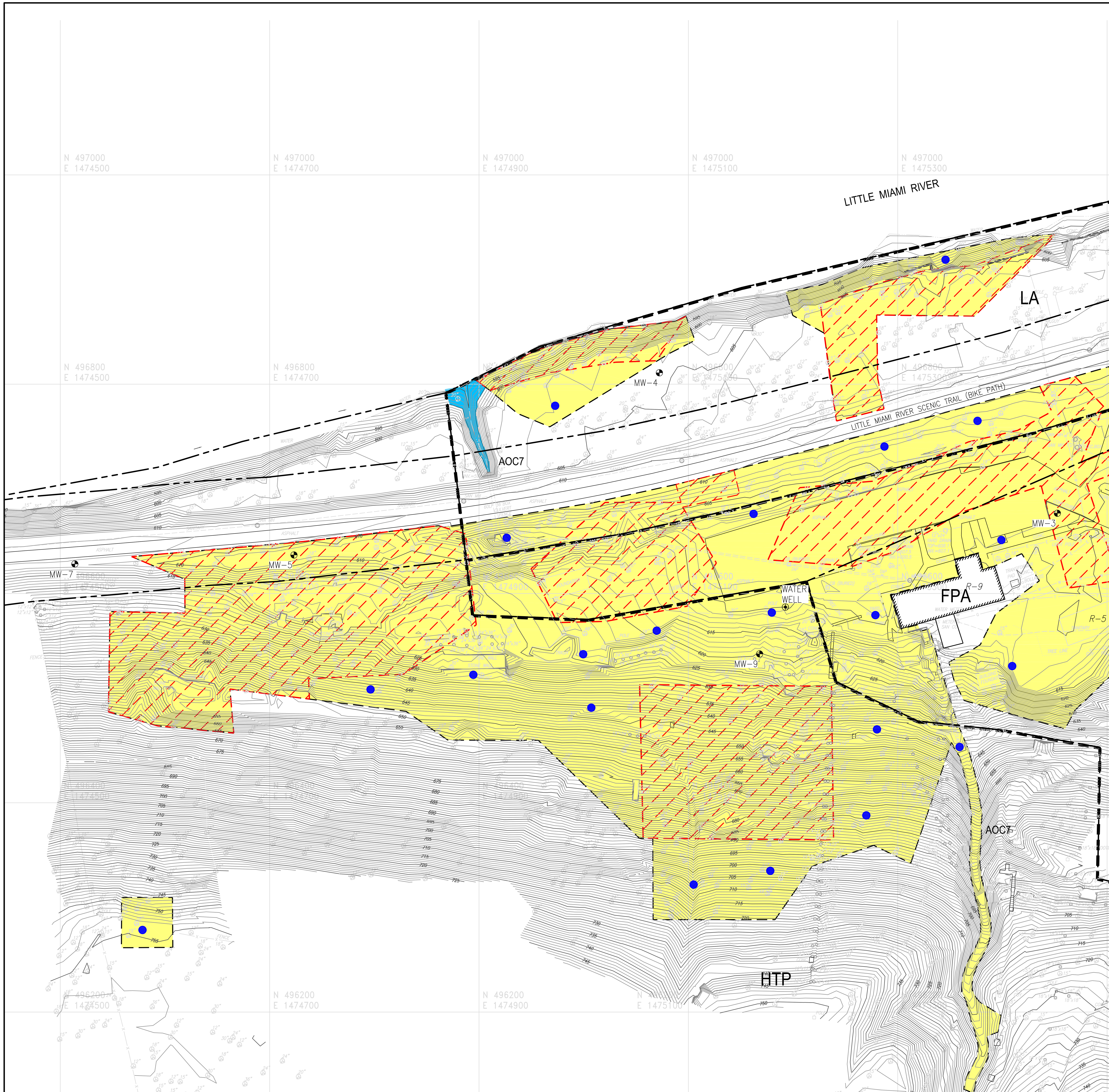
DuPONT CORPORATE REMEDIATION
GROUP 974 CENTER ROAD
CRP 715/218
WILMINGTON, DE 19805

PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

SITE LAYOUT

FIGURE NO. 1.2

REV. B



LEGEND:

FPA FORMER PROCESS AREA
HTP HAMILTON TOWNSHIP PROPERTY
LA LOWLAND AREA
REMEDIAL ACTION AREA
PROPERTY LINES
IRON PIN
IRON PIPE
CONCRETE MONUMENT
TREE (SIZE NOTED)
PIER/FOOTING (SIZE NOTED)
POST/BOLLARD (TYPE NOTED)
MONITORING WELL
WATER WELL
SIGN
UTILITY POLE
GUY WIRE
GAS METER
GAS VALVE
GAS BOX
LIGHT POLE
SANITARY MANHOLE
SANITARY CLEANOUT/VALVE
STORM MANHOLE
STORM CATCH BASIN
WATER METER
WATER VALVE
FIRE HYDRANT
BOUNDARY LINE
RIGHT-OF-WAY
CENTERLINE OF STREET
1-FOOT CONTOUR
5-FOOT CONTOUR
TREE LINE
ASPHALT PAVEMENT
CONCRETE PAVEMENT
BUILDING
DITCH/EDGE OF WATER
FENCE
GUARDRAIL
FOUNDATION, ETC.
WALL
ELECTRIC LINE
GAS LINE
TELEPHONE LINE
SANITARY SEWER
STORM SEWER
WATER LINE
EXCAVATION LIMITS
HIGH LEAD SOILS (HLS) TO 2'
SEDIMENT TO BE REMOVED TO 6 INCHES
PROPOSED SOIL BORING LOCATION

50 0 50 100
SCALE IN FEET

COORDINATE SYSTEM
OHIO STATE PLANE SOUTH
(NAD83)
VERTICAL DATUM
(1988 NAVD)

B 2/21/14 PRE FINAL DESIGN REPORT TO USEPA EJM

Dupont(Peters Cartridge)(Fig2.1)(Proposed Soil Sampling Locations).dwg

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed SMA
Approved
Reg. No.
Date 2/7/14

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

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FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

PROPOSED SOIL SAMPLING LOCATIONS
NW QUADRANT

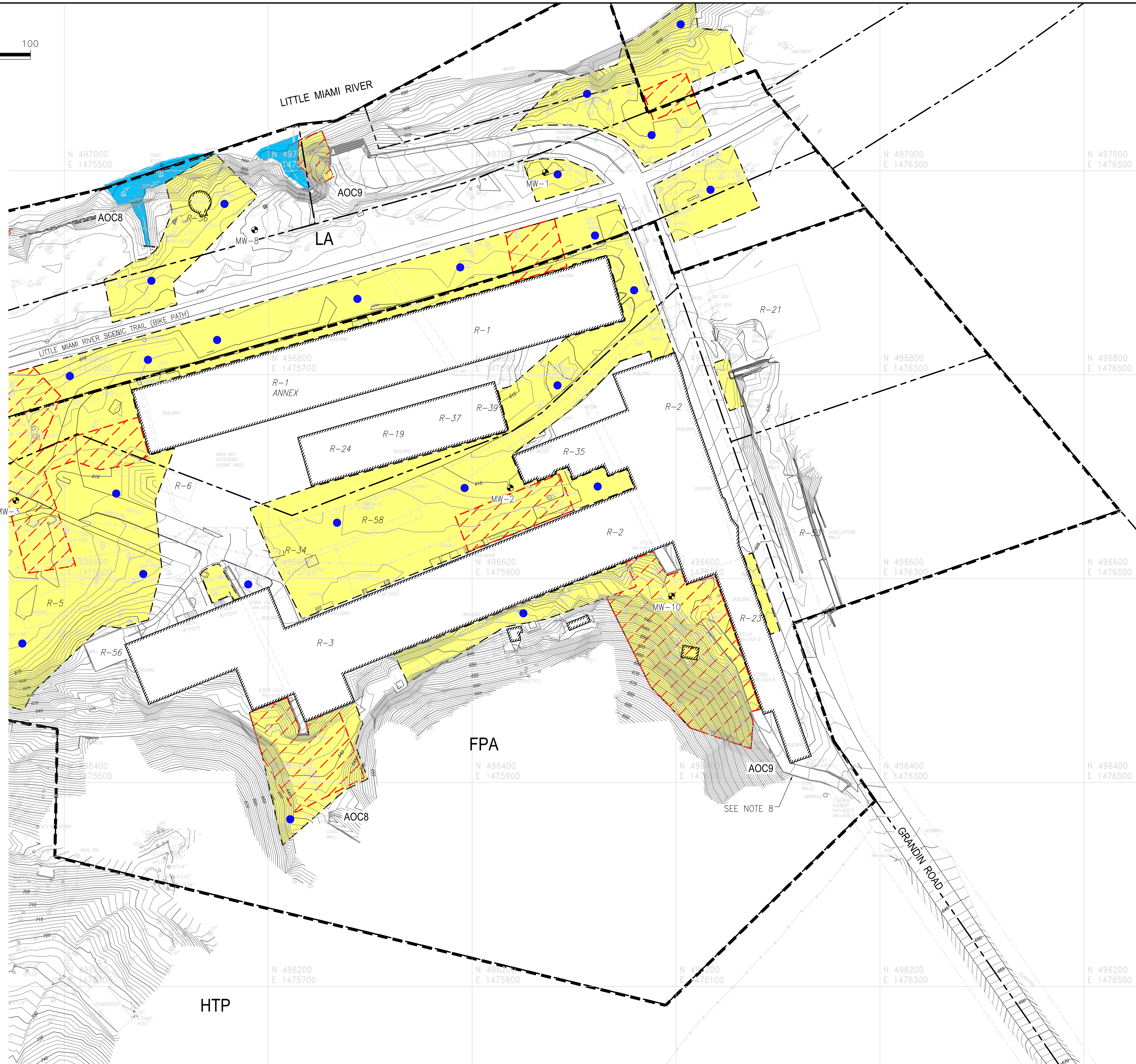
FIGURE NO. 2.1NW
REV. B

LEGEND:

- FPA — FORMER PROCESS AREA
- HTP — HAMILTON TOWNSHIP PROPERTY
- LA — LOWLAND AREA
- REMEDIAL ACTION AREA
- PROPERTY LINES
- IRON PIN
- IRON PIPE
- CONCRETE MONUMENT
- TREE (SIZE NOTED)
- PIER/FOOTING (SIZE NOTED)
- POST/BOLLARD (TYPE NOTED)
- MONITORING WELL
- SIGN
- UTILITY POLE
- GUY WIRE
- GAS METER
- GAS VALVE
- GAS BOX
- LIGHT POLE
- SANITARY MANHOLE
- SANITARY CLEANOUT/VALVE
- STORM MANHOLE
- STORM CATCH BASIN
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- BOUNDARY LINE
- RIGHT-OF-WAY
- CENTERLINE OF STREET
- 1-FOOT CONTOUR
- 5-FOOT CONTOUR
- TREE LINE
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- BUILDING
- DITCH/EDGE OF WATER
- FENCE
- GUARDRAIL
- FOUNDATION, ETC.
- WALL
- ELECTRIC LINE
- GAS LINE
- TELEPHONE LINE
- SANITARY SEWER
- STORM SEWER
- WATER LINE
- EXCAVATION LIMITS
- HIGH LEAD SOILS (HLS) TO 2'
- SEDIMENT TO BE REMOVED TO 6 INCHES
- PROPOSED SOIL BORING LOCATION

50 0 50 100
SCALE IN FEET

COORDINATE SYSTEM
OHIO STATE PLANE SOUTH
(NAD83)
VERTICAL DATUM
(1988 NAVD)



Rev.	Date	Description	By
B	2/21/14	PRE FINAL DESIGN REPORT TO USEPA	EJM

Dupont(Peters Cartridge)(Fig2.1)(Proposed Soil Sampling Locations).dwg

Job No. 446128
Designed EJM
Drawn SBM
Checked KER
Reviewed SMA
Approved
Reg. No.
Date 2/7/14

Issue Certification
NOT FOR BIDDING OR CONSTRUCTION

PARSONS
26301 CURTISS WRIGHT PKWY
CLEVELAND, OHIO 44143
PHONE: 216-486-9005

FORMER PETERS CARTRIDGE FACILITY
HAMILTON TOWNSHIP, WARREN COUNTY, OHIO

PROPOSED SOIL SAMPLING LOCATIONS
NE QUADRANT

FIGURE NO. 2.1NE
REV. B

TABLE

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Table 3.1
Analytical Testing Summary
Field Sampling Plan, Remedial Action
Peters Cartridge Facility
Hamilton Township, Warren County, Ohio

Sample ID	Location code	Depth (feet bsg)	TCLP Pb, As, Hg	Site COC Metals As, Cu, Hg, Pb, Sb	Site PAHs Benzo(a)pyrene	TAL VOCs	TAL SVOCs	TAL Metals	Herbicides, PCBs Pesticides, Cyanide	Comments
				6010B, 7471A	8270C	8260B	8270C	6010B, 7471A	8151A, 8082, 8081A, 9012A	
SBxx14-LOWCL002-0	LOW	0-0.5		X						soil delineation TEJ Property
SBxx14-LOWCL002-0.5	LOW	0.5-1		X						soil delineation TEJ Property
SBxx14-LOWCL002-1	LOW	1-1.5		X						soil delineation TEJ Property
SBxx14-LOWCL002-1.5	LOW	1.5-2		X						soil delineation TEJ Property
SBxx14-LOWCL003-0	LOW	0-0.5		X						soil delineation TEJ Property
SBxx14-LOWCL003-0.5	LOW	0.5-1		X						soil delineation TEJ Property
SBxx14-LOWCL003-1	LOW	1-1.5		X						soil delineation TEJ Property
SBxx14-LOWCL003-1.5	LOW	1.5-2		X						soil delineation TEJ Property
SBxx14-SCFPA-001-0-C	FPA	0-2	X							Soil Classification (SC), composite (0-2 feet)
SBxx14-SCHTP-001-0-C	HTP	0-2	X							Soil Classification (SC), composite (0-2 feet)
SBxx14-SCLOW-001-0-C	LOW	0-2	X							Soil Classification (SC), composite (0-2 feet)
SBxx14-PTFPA-001-0-C	FPA	NA	X							Post Treatment (PT)
SBxx14-PTHTP-001-0-C	HTP	NA	X							Post Treatment (PT)
SBxx14-PTLOW-001-0-C	LOW	NA	X							Post Treatment (PT)

Table 3.1
Analytical Testing Summary
Field Sampling Plan, Remedial Action
Peters Cartridge Facility
Hamilton Township, Warren County, Ohio

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				6010B, 7471A	8270C	8260B	8270C	6010B, 7471A	8151A, 8082, 8081A, 9012A	
GWxx14-MW-001				X (LTM)	X (LTM)					
GWxx14-MW-002				X (LTM)	X (LTM)					
GWxx14-MW-003				X (LTM)	X (LTM)					
GWxx14-MW-004				X (LTM)	X (LTM)					
GWxx14-MW-005				X (LTM)	X (LTM)					
GWxx14-MW-008				X (LTM)	X (LTM)					
GWxx14-MW-010				X (LTM)	X (LTM)					
GWxx14-MW-012				X (LTM)	X (LTM)					
GWxx14-MW-013				X (LTM)	X (LTM)					
GWxx14-MW-014				X (LTM)	X (LTM)					
GWxx14-MW-015				X (LTM)	X (LTM)					
GWxx14-MW-016				X (LTM)	X (LTM)					
GWxx14-MW-017				X (LTM)	X (LTM)	X	X	X	X	proposed wells
GWxx14-MW-018				X (LTM)	X (LTM)	X	X	X	X	proposed wells

Footnotes:

x = month in "MM" format
As = Arsenic
Cu = Copper
Hg = Mercury
Pb = Lead
Sb = Antimony

FPA = Former Process Area
HTP = Hamilton Township Property
LOW = Lowland Area

COC = Contaminants of Concern
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
TAL = Target Analyte List
TBD = To Be Determined
TCLP = Toxicity characteristic leaching procedure
LTM = Long-term monitoring

APPENDIX A
TABLES L-1 THROUGH L-4 OF THE RECORD OF DECISION

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Table L-1: Soil Cleanup Levels for the Protection of Human Health

Former Process Area, Surface Soil (0-2') - Site Worker Scenario

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Levels (mg/kg)	Basis	RME Hazard Quotient
Lead	Developmental	800	EPA Commercial/Industrial Screening Level	N/A [1]
Arsenic	Dermal; Cardiovascular	20.57	Background	0.081
Carcinogenic Chemical of Concern	**Cancer Classification**	**Cleanup Levels (mg/kg)**	**Basis**	**RME Risk**
Arsenic	A	20.57	Background	1E-05
Benzo(a)pyrene TEQ	B2	2.1	risk	1E-05
Naphthalene	C	137	risk	1E-05

Lowland Area, Surface Soil (0-2') - Recreational User Scenario

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Levels (mg/kg)	Basis	RME Hazard Quotient
Lead	Developmental	400	EPA Residential Screening Level	N/A [1]

Hamilton Township Property, Surface Soil (0-2') - Recreational User Scenario

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Levels (mg/kg)	Basis	RME Hazard Quotient
Lead	Developmental	400	EPA Residential Screening Level	N/A [1]
Antimony	Blood	225	Hazard Quotient	1
Arsenic	Dermal; Cardiovascular	20.57	Background	0.17
Carcinogenic Chemical of Concern	**Cancer Classification**	**Cleanup Levels (mg/kg)**	**Basis**	**RME Risk**
Arsenic	A	20.57	Background	3E-05
Benzo(a)pyrene TEQ	B2	0.26	risk	1E-05

Key

(1) For adult site workers, the PRG is based on the ORNL regional screening level (May 19, 2009) for industrial exposures of 800 mg/kg, protective of all subpopulations including pregnant workers. For future recreational users, the PRG is based on the ORNL regional residential screening level of 400 mg/kg, developed by EPA using the Integrated Exposure Uptake Biokinetic Model specifically for evaluating lead exposures in young children.

Cancer Classification

A - Human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

Table L-2: Interim Groundwater Cleanup Levels - Residential Scenario				
Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Levels (ug/L)	Basis	RME Risk
Arsenic	A	10	MCL	2E-04
Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Levels (ug/L)	Basis	RME Hazard Quotient
Arsenic	Skin	10	MCL	9E-01

Key
MCL - Maximum Contaminant Level

Table L-3: Soil Cleanup Levels for the Protection of Ecological Receptors

On-Property, Surface Soil

Chemical of Concern	Receptor	Cleanup Level (mg/kg)	Basis
Copper	Terrestrial invertivore	291	LOAEL TRV, HQ = 1
Lead	Terrestrial invertivore	2647	LOAEL TRV, HQ = 1
Mercury	Terrestrial herbivore	85	LOAEL TRV, HQ = 1

Key

HQ - Hazard Quotient

TRV - Toxicity Reference Value

LOAEL - Lowest observed adverse effects level

Table L-4: Sediment Outfall Material Cleanup Levels for the Protection of Ecological Receptors		
Outfall Sediment [1]		
Chemical of Concern	**Cleanup Level (mg/kg)**	**Basis**
Arsenic	33	PEC
Lead	128	PEC
Mercury	1	PEC
Benzo(a)pyrene	1.45*	PEC

Key

* PAHs were identified as chemicals of concern in sediments. The protective level is based on the PEC for Benzo(a)pyrene, as representative of PAHs present in the outfall material

1. Protection of aquatic receptors from direct exposure to contaminated erosional material associated with outfalls, and protection of receptors in the Little Miami River from potential transport of COCs in outfall material to the surface water or sediment of the Little Miami River.

COC - Chemical of Concern

PEC - Probable Effects Concentrations are consensus-based sediment quality guidelines (MacDonald et al., 2000)

APPENDIX C-2
HEALTH AND SAFETY PLAN