DOE/LX/07-1287&D2/A1
Primary Document

Remedial Action Work Plan for *In Situ* Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Date Issued—December 2013

Date Revised—May 2014

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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APPENDIX C

ADDENDUM TO THE RAWP

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ADDENDUM

***Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1287&D2/A1**

Introduction: This addendum documents information developed by the Federal Facility Agreement (FFA) parties for the purposes of implementing additional investigation activities and closing the uncertainties described in the 2013 *Remedial Design Report In Situ Source Treatment Using Deep Soil Mixing for the Southwest Groundwater Plume Volatile Organic Compound Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1276&D2/R1 (RDR). The RDR indicates the following in Section 1.5, Sequencing with Other Remedies:

> Historical photographic documentation analysis performed by the FFA parties of SWMU 1 and information gathered from interviews of past workers at the SWMU 1 Landfarm have identified that activities (captured as images/shadows on air photographs) occurred at SWMU 1 east of the area planned for soil mixing operations. These activities, although unidentified, are not expected to have been actual landfarming of contaminated oil. Information collected to date, including WAG 27 RI test pit descriptions, place two oil landfarm plots in the western one-half of the SWMU 1 area. These activities, however, result in a level of uncertainty in landfarming plot location that cannot be addressed with the available current soil contaminant analytical data. To address this uncertainty, additional investigation activities will be performed in the southern and eastern areas of SWMU 1.

The FFA Parties discussed the scope of sampling activities to investigate this uncertainty during a conference call on March 24, 2014, and the decision rules and sampling strategy contained herein are the result of these discussions.

Purpose: Reduce the uncertainty of the presence of trichloroethene (TCE) and specific degradation products in two areas (to the east and south of the soil mixing area defined in the RDR) where oil landfarm activities may have occurred and that are not part of the currently planned soil mixing area. The FFA parties have agreed that the following sampling approach will provide a sufficient basis to evaluate the two areas for the presence of TCE and specific degradation products, and satisfy any questions concerning uncertainty:

- Drill and sample 3 soil borings in the Solid Waste Management Unit (SWMU) 1 area identified by dark areas in the 1970s Paducah Gaseous Diffusion Plant (PGDP) air photos; and

- Drill and sample 1 soil boring in SWMU 1 in an area adjacent to Test Pit TB3, Waste Area Grouping (WAG) 27 Remedial Investigation Report, Geophysical Survey and Excavation Report, Volume 2, DOE/OR/07-1777&D2.

Boundary: Areas identified on map to 60 ft below ground surface [see Figure C.1 (based on Figure 5 from the RDR)]. Areas correspond to (1) aerial photo depiction of *possible* drum storage location and (2) trenching performed during WAG 27 Remedial Investigation.

Number of Soil Borings: 4 [see Figure C.1 (based on Figure 5 from the RDR)]—The approximate coordinates for planned soil borings are shown in Table 1.

Table 1. SWMU 1 Soil Borings

Soil Boring Number	Approximate Plant Coordinates	
	East	North
001-359	-6,672	-1,741
001-360	-6,706	-1,751
001-361	-6,748	-1,764
001-362	-6,827	-1,779

Drilling Technology: Direct push

Sampling Method: The sampling approach previously was approved in Section 8 of the *Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1287&D2 (RAWP).

1. Continuous soil core in 5-ft increments to the top of the Regional Gravel Aquifer (~ 60 ft to 62 ft).

2. Scan the soil core with the field photoionization detector (PID) by inserting a clean awl through the polyvinyl chloride core liner into the soil creating a small void in the soil core at each 0.5-ft depth increment and immediately scanning the soil core with a PID (using a water separator on the PID sample tube) at each 0.5-ft point of access. Record each PID reading in a field logbook. The field PID measurements will be used to identify sections of the soil core containing higher volatile organic compound (VOC) levels (if present) for subsampling with an En Core® sampler.

3. Cut open the soil core liner. Perform a radiological scan of the soil core if required by the field radiological technician to ensure the safety of the field sample crew.

4. Where the highest PID response is detected, collect a soil subsample for VOC analysis using an En Core® sampler. (12 subsamples per soil boring).

5. If no elevated PID response is measured, collect the soil subsample based on observations of greater sand content, if present and apparent. If no sandy zones

are obvious, collect the soil subsample for (VOC) analysis from the middle point of the length of the soil core.

6. Submit soil subsample to an existing DOE Sample Management Office Laboratory for analysis of the following VOCs, with standard 30-day turnaround:

   - TCE
   - *cis*-1,2-Dichloroethene
   - *trans*-1,2-Dichloroethene
   - Vinyl chloride

Quality assurance and health and safety requirements will be as included in the approved RAWP, DOE/LX/07-1287&D2.

Project Documentation: The results of this additional sampling will be documented by technical memorandum to FFA parties and inclusion in the post-*Record of Decision for Solid Waste Management Units 1, 211-A, 211-B, and Part of 102 Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plan, Paducah, Kentucky*, DOE/LX/07-0365&D2/R1 (ROD) post-ROD Administrative Record project file.

Decision Rules:

- IF an analysis of soil samples finds average TCE ≥ 1,000 ppb in any single boring, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).

- IF an analysis of soil samples finds average TCE < 1,000 ppb and ≥ 75 ppb in any single boring AND any individual result from that boring finds TCE ≥ 1,000 ppb, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).

- IF an analysis of soil samples finds an individual result of TCE ≥ 1,000 ppb in any single boring, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).

- IF an analysis of soil samples finds average TCE < 1,000 ppb and ≥ 75 ppb in any single boring and all individual results TCE < 1,000 ppb, THEN those areas will be addressed by the action through long-term monitoring consistent with the ROD.

- IF an analysis of soil samples finds average TCE < 75 ppb in any single boring, THEN uncertainty for that boring will be considered addressed and the final remedial action completion report will document that no further CERCLA remedial action is necessary for that boring.

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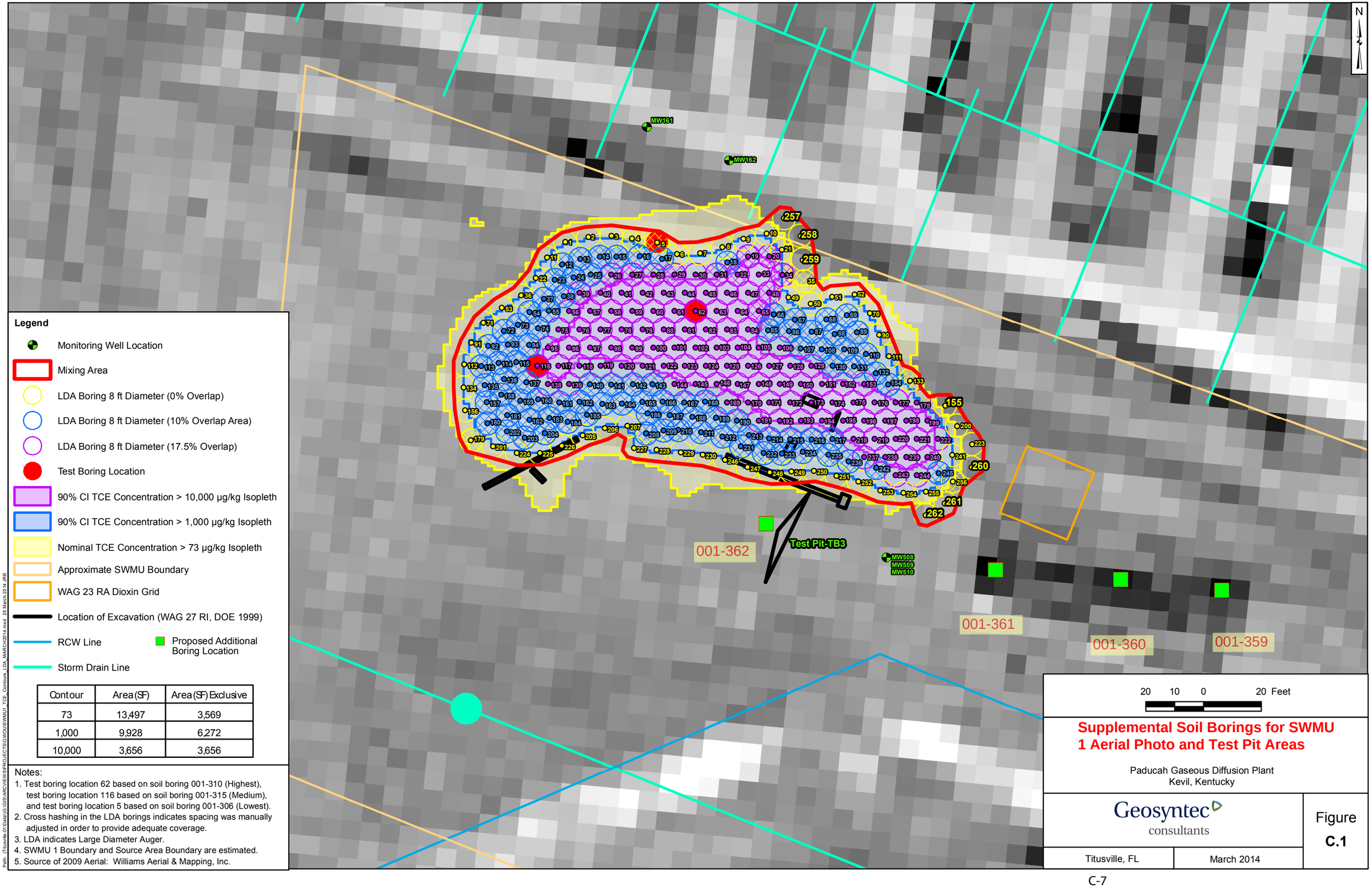

Contour	Area (SF)	Area (SF) Exclusive
73	13,497	3,569
1,000	9,928	6,272
10,000	3,656	3,656

Notes:
1. Test boring location 62 based on soil boring 001-310 (Highest), test boring location 116 based on soil boring 001-315 (Medium), and test boring location 5 based on soil boring 001-306 (Lowest).
2. Cross hashing in the LDA borings indicates spacing was manually adjusted in order to provide adequate coverage.
3. LDA indicates Large Diameter Auger.
4. SWMU 1 Boundary and Source Area Boundary are estimated.
5. Source of 2009 Aerial: Williams Aerial & Mapping, Inc.

20 10 0 20 Feet

Supplemental Soil Borings for SWMU 1 Aerial Photo and Test Pit Areas

Paducah Gaseous Diffusion Plant
Kevil, Kentucky

Geosyntec consultants

Figure **C.1**

Titusville, FL | March 2014

Path: (Titusville-sh1\data\GIS\GIS\ARCVIEW\SPROJECTS\GW\OU5\SWMU1_TCE_Contours_LDA_MARCH2014.mxd 22 March 2014 JRB

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