TETRA TECH

December 2, 2014

Mr. Heath Smith
EPA On-Scene Coordinator
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Subject: **Removal Action Report, Revision No. 2**
Ellisville Site (RV007), Wildwood, Missouri
U.S. EPA Region 7 START 4, Contract No. EP-S7-13-06, Task Order No. 0048
Task Monitor: Heath Smith, EPA On-Scene Coordinator

Dear Mr. Smith:

Tetra Tech, Inc. is submitting the attached revised Removal Action Report regarding the Ellisville site (RV007) in Wildwood, Missouri. If you have any questions or comments, please contact the project manager at (913) 908-4649.

Sincerely,

for Rick Claytor, CHMM
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

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REMOVAL ACTION REPORT
REVISION NO. 2

REGARDING THE

ELLISVILLE SITE (RV007)

WILDWOOD, MISSOURI

Superfund Technical Assessment and Response Team (START)
Contract No. EP-S7-13-06, Task Order 0048

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
11201 Renner Boulevard
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December 2, 2014

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1.0 INTRODUCTION

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to assist with a removal action (RA) at the Ellisville site (RV007) in Wildwood, Missouri. Specific elements of this task included (1) collection of post-excavation soil samples to confirm that site-specific removal action levels (RAL) had been met, (2) sampling of excavated soils for disposal profiling analyses, (3) real-time air monitoring during soil excavation, and (4) soil sampling adjacent to excavation areas to better define the extent of contamination. START also assisted with analytical services procurement, sample management, documentation of removal activities, and preparation of detailed maps and diagrams depicting excavated and sampled areas. The START project managers (PM) were Dave Kinroth and Rick Claytor, and the EPA Region 7 task monitor was On-scene Coordinator (OSC) Heath Smith.

2.0 SITE LOCATION

The proposed Strecker Forest development includes three parcels of land encompassing 18.3 acres north of Strecker Road in Wildwood, Saint Louis County, Missouri (see Appendix A, Figure 1). The three parcels include the former Dozier property at 165 Strecker Road (approximately 5 acres), the former Primm property at 173 Strecker Road (approximately 10 acres), and the former Schoessel property at 177 Strecker Road (approximately 3 acres). These three properties were purchased by Claymont Development, LLC with intent to develop the area as a residential subdivision (Strecker Forest). Geographic coordinates at the area are 38.597578 degrees north latitude and 90.605617 degrees west longitude (see Appendix A, Figure 1). The proposed Strecker Forest subdivision is adjacent to (south and west of) the Bliss-Ellisville subsite of the Ellisville site.

3.0 SITE DESCRIPTION

The proposed subdivision area is mostly undeveloped, except for remnants of foundations remaining from previously demolished structures (a garage and two abandoned homes) on the former Dozier and Primm properties. The northern two-thirds of the area is covered mostly by hardwood forest. The property is surrounded by suburban residential areas, except to the north and east, where a 12-acre tract hosts a residence, horse arena, and stables. A portion of the Strecker Forest property includes some of the Bliss-Ellisville subsite. Previous investigations had identified elevated dioxin concentrations in the northeast portion of the proposed Strecker Forest residential development area, which overlaps the western and southern boundaries of the Bliss-Ellisville subsite.

The terrain at the property slopes downward to the north from Strecker Road. Relatively steep slopes are present that vary in elevation from approximately 720 feet above mean sea level (msl) at Strecker Road to approximately 635 feet above msl along a tributary of Caulks Creek at the northeast perimeter of the site. The intermittent Caulks Creek tributary flows to the north along a ravine in the central portion of the property, and intersects another intermittent tributary crossing the northeast corner of the property. All surface water and drainage pathways on the site flow in a northerly direction toward this area (EPA 2013).

4.0 SITE HISTORY/PREVIOUS INVESTIGATIONS

The following is a brief summary of the Bliss-Ellisville subsite immediately north and east of the proposed Strecker Forest subdivision:

> The Bliss-Ellisville subsite borders the proposed Strecker Forest development to the north and east, and includes a small portion of a proposed preservation area at the northeast corner of the Strecker Forest property. Investigative activities beginning on September 16, 1980, identified two waste disposal areas northwest of a horse arena on the property. On June 2, 1981, trenching operations guided by eyewitness accounts identified buried drums at the Bliss-Ellisville subsite. Several followup geophysical surveys starting in June 1982 and continuing through August 1990 identified buried waste at a number of locations at the Bliss-Ellisville subsite and contiguous properties. In August 1985, the Missouri Department of Natural Resources (MDNR) placed a liner in the stream bed of the Caulks Creek tributary to stabilize the stream banks, and constructed a berm to divert overland flow from the eroding stream. EPA implemented a removal action (RA) in 1996, involving excavation and management of soil impacted by dioxin and non-dioxin wastes, along with bulk wastes in buried drums and other materials. During the RA, dioxin-contaminated materials were transported to the Times Beach site for thermal treatment (incineration). All non-dioxin hazardous wastes were managed off site at commercial Resource Conservation and Recovery Act (RCRA) permitted hazardous waste facilities. Non-hazardous materials were disposed of at a sanitary landfill. In all, 24,700 tons of dioxin-contaminated soil, 581 tons of soil contaminated with hazardous substances other than dioxin, and 480 buried drums and other containers of wastes were removed from the site. Soil samples were collected to confirm that cleanup goals had been achieved. Once cleanup activities had been completed, excavated areas were backfilled, re-graded, and seeded. The removal activities included a 0.15-acre area at the extreme northeast corner of the Strecker Forest property (referred to as the "NPL Area" of Strecker Forest during past investigations). MDNR continues to monitor groundwater and soil vapor conditions at the Bliss subsite (Tetra Tech EM Inc. 2012).

Because of its proximity to the Bliss-Ellisville subsite, the proposed Strecker Forest residential development property came under scrutiny related to environmental health concerns. From September 2011 to spring 2012, EPA and START conducted soil sampling over the entire 18.3-acre property to support an Expanded Site Review (ESR) to characterize potential impacts on human health and the environment (Tetra Tech EM Inc. 2012).

The scope of the ESR included investigation of these previously sampled areas of the development property, as well as several new areas. These included the southern portion of the Strecker Forest property where 23 home sites have been proposed for development, and an undeveloped area designated as the preservation area in the northern portion of the property. Sampling activities during the ESR occurred between September 2011 and January 2012. Initially, 39 decision units (DU) were established at the proposed Strecker Forest development site to characterize surface soils for a removal site evaluation (RSE) by application of an incremental composite sampling (ICS) approach. Follow-up sampling was conducted in July 2013, when six DUs were added (total of 45 DUs) (see Appendix A, Figure 2). Some

of the DUs were divided into smaller sampling units (SU); physical features within the SUs sometimes dictated further delineation of the SU areas for sampling purposes. These ICS activities are described in the *Removal Site Evaluation Report, Bliss-Ellisville Site – Strecker Forest Subsite, Wildwood, Missouri* (Tetra Tech 2014). The soil samples collected during the RSE were submitted to Cape Fear Analytical, LLC (CFA) in Wilmington, North Carolina, for analysis for dioxin toxic equivalence (TEQ) compounds via Method 1613B.

Elevated dioxin TEQ levels were limited to three areas covering a total of approximately 1.0 acre in the northeast portion of the property proposed for residential development. By implementing the ICS sampling methodology, it was determined that in seven of the SUs, dioxin TEQ concentrations exceeded the Preliminary Remediation Goal (PRG) of 820 parts per trillion (ppt) for non-residential, undeveloped areas of the site (see left side of Figure 2 in Appendix A). TEQ concentrations as high as 5,822 ppt were detected in surface soils. Five subsurface samples collected within and near these areas contained dioxin TEQ concentrations that exceeded the PRG of 2,460 ppt for depths greater than 1 foot. Dioxin TEQ concentrations as high as 26,684 ppt were detected in subsurface soils. EPA Region 7 determined that site conditions could pose a threat to public health and welfare, based on levels of dioxin-related compounds (specifically 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD]) above the site-specific PRGs. The site qualified for RA consideration, based on National Contingency Plan (NCP) criteria in 40 *Code of Federal Regulations* (CFR) 300.415(b).

5.0 REMOVAL ACTIVITIES

Excavation to at least 3 feet below ground surface (bgs) at localized areas of the site was determined necessary to achieve cleanup goals. The map on the right side of Figure 2 in Appendix A identifies the areas addressed during removal activities (Excavation Areas [EA] 1, 2, and 3). Photos from the RA are in Appendix B. Field sheets for all samples collected during this RA are in Appendix C (provided on compact disk [CD]).

5.1 PRELIMINARY REMOVAL ACTIVITIES

On February 13, 2014, Mr. Kinroth collected samples of rock (SFRA-1 and SFRA-2) that would be used to improve an on-site roadway for the RA. These samples were screened for metals by use of a portable x-ray fluorescence (XRF) spectrometer, and for volatile organic compounds (VOC) by use of a MultiRAE Plus with built-in photoionization detector (PID). No elevated concentrations of metals were detected, and no VOC readings above background were observed. Mr. Kinroth also collected a composite sample (SFRA-3) of proposed topsoil to be used as backfill for areas excavated during the RA. The sample was submitted to GEL Laboratories in Charleston, South Carolina, for analysis for semivolatile organic compounds (SVOC), VOCs, polychlorinated biphenyls (PCB), and metals regulated by the Resource Conservation and Recovery Act (RCRA) (including mercury). Sample SFRA-3 did not contain concentrations of contaminants above any level of concern (see Appendix D [on CD]). A portion of this sample was also submitted to CFA for analysis for dioxins/furans (TEQ compounds) via Method 1613B. This sample contained a dioxin TEQ concentration of 1.34 ppt. The proposed topsoil source was subsequently deemed acceptable for use as backfill material for restoration of the site following excavation activities. In addition, Mr. Kinroth collected a nine-aliquot soil sample from 0-1 foot bgs at EA 1 (cells H and I) for disposal profiling analyses. This sample (SFRA-4) was provided to Clean Harbors, the firm that would be handling disposal of the excavated soil. Based on the sample results obtained by Clean Harbors (see Appendix D [on CD]), the proposed receiving facility—Lone Mountain Landfill in Waynoka, Oklahoma—agreed to accept the waste from the site.

On March 24, 2014, EPA OSC Smith, START PM Kinroth, and personnel from the EPA Region 7 Emergency and Rapid Response Services (ERRS) contractor, Environmental Restoration, LLC (ER), were on site to initiate the RA. Preliminary activities at that time included tree and brush removal, haul road preparation, establishment of staging areas for an office trailer and 25-cubic-yard roll-off boxes that would be used for off-site transportation of excavated soil, and background air monitoring (see Appendix B).

5.2 SOIL EXCAVATION

For this RA, removal action levels (RAL) for dioxin (TEQ) were as follows: 820 ppt in soil from the surface to 12 inches bgs, and 2,460 ppt in soil at depths greater than 12 inches bgs. Throughout the removal process, excavation activities depended on weather, pending sample results, and availability of empty roll-off boxes. Dioxin-contaminated waste generated at this site was treated as F027 (dioxin-bearing) waste. The Universal Treatment Standard (UTS) for F027 waste is 1 part per billion (ppb) for dioxin (40 CFR § 268.48). The alternative Land Disposal Restrictions (LDR) treatment standard (40 CFR § 268.49) states that treatment to achieve a constituent concentration less than 10 times the UTS is not required. Waste generated during the removal that contained up to 10 ppb of 2,3,7,8-TCDD was transported to the RCRA-permitted hazardous waste facility (Lone Mountain Landfill) in Waynoka, Oklahoma, for proper management. Dioxin-contaminated materials with average concentrations greater than 10 ppb were managed by Recupere Sol, Inc., in Saint-Ambroise, Quebec, Canada, a facility capable of meeting the UTS for F027 waste via incineration/thermal treatment prior to disposal.

After excavation of the cells to the depth that had been indicated during RSE activities, post-excavation samples were collected. A nine-aliquot surface soil sample was collected from the floor of the excavated cells. Additionally, a nine-aliquot soil sample was collected from each of the completed side wall faces. Equal portions of each of the side wall samples were then homogenized into one ICS sample and submitted with the floor sample to CFA for dioxin TEQ analysis. Laboratory data were typically provided on a 72-hour turnaround basis. Additional excavation was conducted when the sample results exceeded RALs. If a combined side wall sample for an excavation area exceeded the appropriate RAL, archived samples from each of the individual walls (following ICS protocol) were submitted for analysis to determine where additional excavation would be required.

5.2.1 Excavation Area 3

On April 7, 2014, after the roadway to the removal area had been established, excavation activities were initiated at the south portion of EA 3 in cells H and I (see Appendix A, Figure 2). A Komatsu 200 excavator was used by ERRS to remove 1 foot of soil from those cells; the excavated soil was placed into poly-lined, 25-cubic-yard, roll-off boxes. Post-excavation soil samples for dioxin TEQ analysis were collected by START from the floor and side walls of the (combined) excavated cells. Laboratory data confirmed that the RALs for those cells had been met. A representative sample of excavated soil was also collected for possible laboratory analysis for disposal profiling parameters, if determined necessary by the OSC.

The excavation process continued to the north, as cells F and G were excavated and sampled separately. Post-excavation sampling in cells F and G confirmed that the RALs for those cells had been achieved. The depth of excavation correlated with assessment projections until odorous stained soil containing trash, debris, and metal drum fragments was exposed near the boundary between cells D and E. Excavation was halted, and a soil sample (SFRA-25) was collected to identify potential contaminants other than dioxins. The sample was submitted to Teklab in Collinsville, Illinois, for analysis for Code R parameters and PCBs, and for Toxicity Characteristic Leaching Procedure (TCLP) analyses for metals, pesticides, herbicides, SVOCs, and VOCs. The laboratory data, received on April 28, 2014, did not indicate elevated contaminant concentrations that would result in additional disposal requirements. These data are in Appendix D (provided on CD).

On April 29, 2014, additional excavation was conducted in EA 3 cells D and E, because previous post-excavation sample results remained above the dioxin TEQ RAL. In the central portion of these cells, additional odorous, stained soil and debris were exposed; excavation was again halted, and it was determined that additional disposal profile sampling would occur. On May 6, 2014, three multi-aliquot subsurface soil samples were collected by START and EPA from the stained portion of cells D and E. The samples were collected at depths of 0 to1, 1 to 2, and 2 to 3 feet bgs. These samples (SFRA-34, 35, and 36) were submitted to Test America Laboratory in Earth City, Missouri, for disposal profiling analyses (VOCs, SVOCs, PCBs, and TCLP metals). The laboratory data, received on May 15, 2014, did not indicate elevated contaminant concentrations that would result in additional disposal requirements. These data are in Appendix D (provided on CD).

On May 7, 2014, excavation activities were conducted in EA 3 cells A, B, and C to 1 foot bgs. No further excavation occurred in EA 3 until May 19, 2014, when approximately 5 feet of dark (stained) soil was excavated from the eastern portion of cell F, along with stained soil in adjacent cell E. On May 21, 2014, excavation in cells D and E continued until the stained soil had been removed (final depth of 5-6 feet bgs). For post-excavation sampling, cells D and E were combined, and cells A, B, and C were combined. Most of EA 3 had been excavated and backfilled by June 9, 2014. Completion of excavation at EA 3 occurred on June 27, 2014, when the final portion of contaminated soil was excavated from cell A. Achievement of RALs was confirmed by post-excavation sample results. All excavated portions of EA 3 were backfilled after the laboratory data had been received. Table 1 below summarizes sampling activities at EA 3.

TABLE 1

POST-EXCAVATION SAMPLES AT EA 3
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Sample Date	Excavated Cell(s)	Sample Description	Excavation Comment	Dioxin TEQ (ppt)
SFRA-5	4/8/14	H/I	Floor, 1-foot depth	Complete	13.09
SFRA-6	4/8/14	H/I	Side walls A, B, and D (east, south, and west), 1-foot depth	Complete	4.45
SFRA-10	4/10/14	G	Floor, 1- to 2-foot depth	Complete	6.88
SFRA-11	4/10/14	G	Side walls B and D (west and east), 1- to 2-foot depth	Additional required	4,953.87
SFRA-17	4/16/14	G	Side wall B (west), 1- to 2-foot depth	Complete	<4.5
SFRA-18	4/16/14	G	Side wall D (east), 1- to 2-foot depth	Additional required	4,844.54
SFRA-21	4/21/14	F	Floor, 2-foot depth	Complete	1,507.99
SFRA-22	4/21/14	F	Side walls B and D (west and east), 1- to 2-foot depth	Complete	296.93
SFRA-23	4/23/14	D/E	Floor, 1-foot depth	Additional required	4,736.93
SFRA-24	4/23/14	D/E	Side walls B and D (west and east), 1-foot depth	Complete	424.95
SFRA-28	4/30/14	G	Side wall D (east), 4-foot depth	Complete	1,226.96
SFRA-29	4/30/14	D/E	Floor, 2-foot depth, light color	Complete	12.41
SFRA-30	4/30/14	D/E	Floor, 2-foot depth, dark color	Additional required	11,100.02
SFRA-86	6/6/14	D/E	Floor, 3- to 4-foot depth	Complete	752.89
SFRA-87	6/6/14	D/E	Side wall D (east), 5-foot depth	Complete	230.43
SFRA-88	6/6/14	B/C	Side wall D (east), 6-foot depth	Complete	144.71
SFRA-89	6/6/14	A	Side wall A (north), 7-foot depth	Complete	616.63
SFRA-123	6/26/14	A/B/C	Side walls A, B, and C (west), top 0 to 12 inches	Complete	417.55
SFRA-124	6/27/14	A/B	Floor, 6- to 7-foot depth	Complete	69.79
SFRA-130	7/2/14	A	Side walls (north and east), 6-to 8-foot depth	Complete	528.06

Notes

ppt Parts per trillion
TEQ Toxic equivalence
< Less than

5.2.2 Excavation Area 2

On April 24 and 25, 2014, excavation activities were conducted at EA 2 (see Appendix A, Figure 2), where 6 to 12 inches of soil was excavated by use of a Caterpillar 308 excavator. Confirmation samples were collected from the floor of the area (SFRA-26) and from the side walls (SFRA-27). Laboratory data confirmed that the RALs had been achieved. Table 2 summarizes the sampling activities at EA 2.

TABLE 2

POST-EXCAVATION SAMPLES AT EA 2
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Date	Sample Description	Excavation Comment	Dioxin TEQ (ppt)
SFRA-26	4/28/14	Floor, 6- to 12-inch depth	Complete	597.30
SFRA-27	4/28/14	Side walls, all, 6- to 12-inch depth	Complete	184.69

Notes:

ppt Parts per trillion
TEQ Toxic equivalence

5.2.3 Excavation Area 1

Additional roadway construction and tree clearing were required before excavation at EA 1 to allow movement of roll-off boxes to the area. On May 1 and 2, 2014, the contaminated area that had been identified during assessment activities was excavated to 3 feet bgs. Post-excavation sampling results exceeded the RALs, so additional excavation was required. On May 16, 2014, additional soil was excavated from EA 1; the area was expanded in all directions, and an additional foot was excavated from the floor of the area. Laboratory results from post-excavation samples collected from the floor and walls (SFRA-46 through -51) were received on May 23, 2014, and all results still exceeded the RALs.

Excavation activities at EA 1 resumed June 11, 2014. At the southeast corner of EA 1, approximately 8 feet of debris and stained soil was excavated before the RAL was achieved (see Appendix B). A composite sample (SFRA-128) was collected from two roll-off boxes containing soil excavated from the southeast portion of EA 1. This sample was submitted to Test America in Earth City, Missouri, for analysis for PCBs and SVOCs. The boxes were held until the laboratory results confirmed that concentrations of those analytes were not elevated.

In the northwest portion of EA 1, no debris or discoloration was observed, but additional excavation was still required before the RALs were reached. The north wall of EA 1 was excavated to the level of the adjoining creek bed, approximately 4.5 feet below the initial surface level of EA 1. Samples SRFA-157 and -158 were collected from the north wall at the level of the creek. Excavation of EA 1 was completed on July 21, 2014, and final confirmation samples were collected on July 23, 2014. Large gabion rock (3 to 5 inches) was placed on the slope between the creek and EA 1 (after backfilling) to stabilize the bank (see Appendix B). Table 3 summarizes results of post-excavation sampling at EA 1.

TABLE 3

POST-EXCAVATION SAMPLES AT EA 1
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Date	Sample Description	Excavation Comment	Dioxin TEQ (ppt)
SFRA-31	5/2/14	Floor, 3-foot depth	Additional required	20,387.39
SFRA-32	5/2/14	Side walls A-D, 3-foot depth	Additional required	3,210.59
SFRA-37	5/8/14	Side wall A (west), 0- to 4-foot depth	Additional required	6,705.19
SFRA-38	5/8/14	Side wall B (south), 0- to 4-foot depth	Additional required	2,575.89
SFRA-39	5/8/14	Side walls C/D (east and north), 0- to 6-foot depth	Additional required	3,219.04
SFRA-46	5/16/14	Floor A (east half), 4-foot depth	Additional required	30,753.48
SFRA-47	5/16/14	Floor B (west half), 4-foot depth	Additional required	4,316.88
SFRA-48	5/16/14	Side wall A (west), 0- to 4-foot depth	Additional required	7,336.55
SFRA-49	5/16/14	Side wall B (south), 0- to 4-foot depth	Additional required	1,420.36
SFRA-50	5/16/14	Side wall D (east), 0- to 4-foot depth	Additional required	2,677.48
SFRA-51	5/16/14	Side wall D (north), 0- to 4-foot depth	Additional required	4,399.71
SFRA-105	6/20/14	Floor (west half), 4- to 6-foot depth	Complete	182.36
SFRA-106	6/20/14	Side wall (northwest corner), 5- to 6-foot depth	Complete	13,949.15
SFRA-107	6/20/14	Side wall (southwest corner), 4- to 6-foot depth	Complete	1040.42
SFRA-113	6/23/14	Floor (east half), 4-foot depth	Complete	181.03
SFRA-114	6/23/14	Side wall (east), 0- to 8-foot depth	Complete	355.94
SFRA-115	6/24/14	Floor (southeast corner), 6- to 7-foot depth	Complete	416.97
SFRA-116	6/24/14	Side wall A (west; southeast corner), 0- to 6-foot depth	Complete	868.81
SFRA-117	6/24/14	Side wall B (south; southeast corner), 0- to 6-foot depth	Complete	1,199.16
SFRA-118	6/24/14	Side wall C (east; southeast corner), 8-foot depth	Complete	1,160.06
SFRA-125	6/30/14	Side walls (west and south), 0- to 12-inch depth	Complete	500.12
SFRA-126	6/30/14	Side wall (notch to northeast corner), 0- to 12-inch depth	Additional required	924.55
SFRA-131	7/2/14	Side wall (north, green stained), 4- to 5-foot depth	Additional required	10,537.08
SFRA-132	7/2/14	Side wall (northwest corner), 4-foot depth	Additional required	4,865.26
SFRA-134	7/8/14	Floor (southeast corner), 12-inch depth at edge	Complete	846.71
SFRA-135	7/8/14	Side wall (southeast corner), 0- to 12-inch depth	Complete	364.33
SFRA-138	7/10/14	Floor (northwest corner), 4-foot depth	Complete	745.36
SFRA-139	7/10/14	Side wall A (south; northwest corner), 0- to 4-foot depth	Complete	8,395.30
SFRA-140	7/10/14	Side wall B (west; northwest corner), 0- to 4-foot depth	Complete	8,251.49
SFRA-141	7/10/14	Side wall C (north; northwest corner), 0- to 4-foot depth	Complete	3,470.36
SFRA-147	7/17/14	Side wall (northwest corner), 0- to 4-foot depth	Complete	339.07
SFRA-157	7/22/14	North wall, east portion (creek level)	Complete	7,172.86
SFRA-158	7/22/14	North wall, west portion (creek level)	Complete	3,383.55
SFRA-159	7/22/14	Side wall (south; northwest corner), 0- to 12-inch depth	Complete	289.59
SFRA-160	7/23/14	Side wall (west; northwest corner), 1- to 4-foot depth	Complete	2,371.78
SFRA-161	7/23/14	Side wall (west; northwest corner), 1- to 12-inch depth	Complete	347.88

Notes:

ppt Parts per trillion
TEQ Toxic equivalence

Analytical data packages received from CFA were forwarded to Deanna Crumbling, sampling statistician at EPA Headquarters (HQ) in Washington, D.C., for calculation of Kaplan-Meier TEQ values. These TEQ values are listed in tables in Appendix E (provided on CD).

5.3 SAMPLING FOR DISPOSAL COORDINATION

As soil was excavated, it was loaded directly into poly-lined, 25-cubic-yard, roll-off boxes and sampled for laboratory analysis for dioxin. Initially, samples from three roll-off boxes were combined into one sample for analysis. In addition, soil from each roll-off box was held and analyzed individually if the combined dioxin concentration exceeded 10,000 ppt (10 ppb) ―the maximum concentration that could be accepted by the Lone Mountain Landfill in Waynoka, Oklahoma. However, because of the time required to receive follow-up data from samples from individual roll-off boxes if needed, combined roll-off box sampling was later discontinued. The filled roll-off boxes were staged on site until all necessary laboratory results for dioxin were received, allowing coordination of disposal arrangements. Excavated dioxin-contaminated material found to contain concentrations greater than the alternative LDR treatment standard (10 ppb) was trucked to the Recupere Sol, Inc., facility in Saint-Ambroise, Quebec, Canada, for thermal treatment prior to disposal. During the project, 101 roll-off boxes were shipped off site for disposal. Seventeen boxes, containing 267.06 tons of dioxin-contaminated soil, were shipped to the Recupere Sol, Inc., facility in Canada for incineration. The remaining 84 boxes, containing 1,277.58 tons of dioxin-contaminated soil, were trucked to the Lone Mountain Landfill in Oklahoma for disposal. Table 4 summarizes results from samples of excavated soils in the roll-off boxes.

TABLE 4

ROLL-OFF BOX SAMPLES
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Excavation Area	Roll-off Box IDs	Dioxin TEQ (ppt)
SFRA-7	EA 3, cells H/I	4, 5, and 6	1,084.49
SFRA-8	EA 3, cell G	7, 8, and 9	10,333.60
SFRA-9	EA 3, cell G	10, 11, and 12	3,592.32
SFRA-12	EA 3, cell G	13, 14, and 15	1,085.86
SFRA-13	EA 3, cell G	16, 17, and 18	3,092.32
SFRA-14	EA 3, cell G	7	5,681.17
SFRA-15	EA 3, cell G	8	17,455.32
SFRA-16	EA 3, cell G	9	3,720.36
SFRA-19	EA 3, cell G	19, 20, and 21	4,556.90
SFRA-20	EA 3, cell F	22, 23, and 24	5,870.79
SFRA-33	EA 1	39	24,434.89
SFRA-41	EA 1	41	13,355.69

TABLE 4 (Continued)

ROLL-OFF BOX SAMPLES
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Excavation Area	Roll-off Box IDs	Dioxin TEQ (ppt)
SFRA-42	EA 1	42	6,189.20
SFRA-43	EA 1	44	20,743.61
SFRA-44	EA 1	45	14,092.96
SFRA-45	EA 1	46	10,626.04
SFRA-52	EA 3, cell F (dark)	47	2,413.04
SFRA-53	EA 3, cell F (dark)	48	42,642.51
SFRA-54	EA 3, cell E (dark)	49	19,731.13
SFRA-55	EA 1	38	13,865.29
SFRA-56	EA 3, cell E (dark)	50	15,742.86
SFRA-57	EA 3, cell E (dark)	51	360.06
SFRA-58	EA 3, cell E (dark)	52	26,048.09
SFRA-59	EA 3, cell E (dark)	53	3,907.01
SFRA-60	EA 3, cell E (dark)	54	5,548.15
SFRA-61	EA 3, cells D/E	55	2,504.09
SFRA-62	EA 3, cells D/E	56	1,476.54
SFRA-73	EA 3, cells D/E	57	3,121.50
SFRA-74	EA 3, cells D/E	58	12,056.80
SFRA-75	EA 3, cells D/E	59	4,735.13
SFRA-76	EA 3, cell C	60	949.66
SFRA-77	EA 3, cell C	61	1,040.53
SFRA-78	EA 3, cell C	62	2,469.24
SFRA-79	EA 3, cell C	63	1,518.06
SFRA-80	EA 3, cells A/B	64	757.17
SFRA-81	EA 3, cells A/B	65	247.25
SFRA-82	EA 3, cells A/B	66	702.66
SFRA-83	EA 3, cells A/B	67	914.29
SFRA-84	EA 3, cells A/B	68	445.52
SFRA-85	EA 3, cells A/B	69	1,272.33
SFRA-96	EA 3, cells A/B	70	980.29
SFRA-97	EA 3, cells A/B	71	151.62
SFRA-98	EA 1	72	3,223.35
SFRA-99	EA 1	73	3,963.41
SFRA-100	EA 1	74	13,840.16
SFRA-101	EA 1	75	3,050.08
SFRA-102	EA 1	76	3,952.01
SFRA-103	EA 1	77	3,108.85
SFRA-104	EA 1	78	615.78
SFRA-108	EA 1	79	962.47
SFRA-109	EA 1	80	14,230.69
SFRA-110	EA 1	81	2,811.13
SFRA-111	EA 1	82	1,556.76
SFRA-112	EA 1	83	7,721.91
SFRA-119	EA 1	84	597.46
SFRA-120	EA 1	85	677.38
SFRA-121	EA 1	86	1,577.75

TABLE 4 (Continued)

ROLL-OFF BOX SAMPLES
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Excavation Area	Roll-off Box IDs	Dioxin TEQ (ppt)
SFRA-122	EA 3, cells A/B	87	257.91
SFRA-127	EA 3, cells A/B	88	164.00
SFRA-128	EA 1	87 and 88	PCBs and SVOCs only
SFRA-129	EA 3, cell A	89	386.18
SFRA-133	EA 1	90	5,750.93
SFRA-136	EA 1	91	320.81
SFRA-137	EA 1	92	272.42
SFRA-142	EA 1	93	4,10273
SFRA-143	EA 1, northwest corner	94	14,965.92
SFRA-144	EA 1, northwest corner	95	3,117.52
SFRA-145	EA 1, northwest corner	96	5,716.19
SFRA-146	EA 1, north wall	97	3,592.18
SFRA-148	EA 1, north wall	98	24,473.49
SFRA-149	EA 1, north wall	99	11,324.35
SFRA-150	EA 1, north wall	100	1,786.36
SFRA-162	EA 1, northwest corner	101	1,121.32

Notes:

PCB Polychlorinated biphenyl
ppt Parts per trillion
SVOC Semivolatile organic compound
TEQ Toxic equivalence

5.4 ADDITIONAL SOIL SAMPLING

Additional soil sampling activities occurred during the RA to confirm that no additional dioxin-contaminated areas would have to be addressed. The area between EA 3 and EA 2 was divided into two subareas: the south half was identified as EA 4, and the north half was designated as EA 5. The east boundary of these areas was the horse arena, and the west boundary was the roadway next to the west side of EA 3 and EA 2 (see Appendix A, Figure 3). Previous surface soil sampling had not identified elevated concentrations of dioxin within these areas.

On May 29, 2014, EPA Geoprobe® direct push technology (DPT) equipment was used by EPA and START to collect subsurface soil samples (SFRA-63 through -72) within EA 4 and EA 5, as well as within EA 2 (see Appendix C [on CD]). Six, three-aliquot samples were collected within EA 4; three samples were collected at 0 to 2 feet bgs, and three were collected at 2 to 4 feet bgs. Each sample represented one-third of the area at the sampled depth. At EA 5, two composite samples were collected within the central third of the area. The sample depths were the same as those at EA 4. Additionally, two composite samples were collected in a ditch along the western edge of EA 2 at 2 to 4 feet bgs. EA 2 had already been excavated to 1 foot bgs and backfilled. No dioxin concentrations exceeding the RAL were

identified in any of these samples; therefore, no further excavation occurred. Table 5 includes a summary of these sample results.

On June 6, 2014, the EPA Geoprobe® DPT equipment was used by EPA and START to collect subsurface soil samples to further define the extent and estimated volume of contaminated soil adjacent to the southeast corner of EA 1. At one location southeast of EA 1, three grab samples were collected (SFRA-93, -94, and -95): one at 0 to 2 feet bgs, a second at 2 to 4 feet bgs, and a third at 4 to 6 feet bgs. Results from these samples indicated that at least 6 feet of soil would have to be excavated from EA 1 to achieve the RAL (completed later in June 2014).

A retention pond was constructed to hold rainwater so that excavation could continue after rain events. Previous surface soil sampling of this retention pond area, between EA 2 and EA 6, had not identified elevated dioxin concentrations. Soil was pushed out to form a basin for the retention pond, with the soil creating a 3-foot-high berm. A nine-aliquot surface soil sample was collected from the floor of the pond; the dioxin TEQ result was less than the RAL. When rainwater collected in EA 3, it was pumped into the retention pond, where it infiltrated and evaporated.

EA 6 was identified as the area between the retention pond and EA 1 (see Appendix A, Figure 3). Two three-aliquot soil samples were collected from a ditch running through the middle of this area at 0 to 2 feet bgs (SFRA-90) and at 2 to 4 feet bgs (SFRA-91). Dioxin TEQs in these samples did not exceed RALs. No removal activities were subsequently required at EA 6. These laboratory results are summarized in Table 5, and the complete laboratory data are in Appendix D (provided on CD). The retention pond area was re-graded, leveled, and seeded, as were the other excavated and backfilled areas.

TABLE 5

ADDITIONAL SOIL SAMPLES
ELLISVILLE SITE – WILDWOOD, MISSOURI

Sample No.	Date	Sampled Area	Sample Depth	Comment	Dioxin TEQ (ppt)
SFRA-40	5/15/14	Retention pond floor before use	0 to 2 inches	No excavation required	216.90
SFRA-63	5/29/14	EA 4, cell A	2 to 4 feet	No excavation required	5.41
SFRA-64	5/29/14	EA 4, cell A	2 to 4 feet	No excavation required	8.91
SFRA-65	5/29/14	EA 4, cell C	2 to 4 feet	No excavation required	44.71
SFRA-66	5/29/14	EA 4, cell C	0 to 2 feet	No excavation required	251.19
SFRA-67	5/29/14	EA 4, cell B	2 to 4 feet	No excavation required	<3.2
SFRA-68	5/29/14	EA 4, cell B	0 to 2 feet	No excavation required	148.94
SFRA-69	5/29/14	EA 5, cell B	2 to 4 feet	No excavation required	<2
SFRA-70	5/29/14	EA 5, cell B	0 to 2 feet	No excavation required	96.26
SFRA-71	5/29/14	EA 2, cell D	2 to 4 feet	No excavation required	<5
SFRA-72	5/29/14	EA 2, cell C	2 to 4 feet	No excavation required	874.17
SFRA-90	6/6/14	EA 6, cell B	0 to 2 feet	No excavation required	603.35
SFRA-91	6/6/14	EA 6, cell B	2 to 4 feet	No excavation required	811.14
SFRA-92	6/6/14	East of retention pond	2 to 4 feet	No excavation required	5.43
SFRA-93	6/6/14	EA 1, southeast corner	0 to 2 feet	Excavation required	919.68
SFRA-94	6/6/14	EA 1, southeast corner	2 to 4 feet	Excavation required	2,995.55
SFRA-95	6/6/14	EA 1, southeast corner	4 to 6 feet	Excavation required	16,343.59
SFRA-156	7/22/14	Retention pond floor after use	0 to 2 inches	No excavation required	102.82

Notes:

ppt Parts per trillion
TEQ Toxic equivalence

5.5 AIR MONITORING

During soil excavation activities, real-time air monitoring was performed by START. Two monitoring stations were established—one upwind and one downwind of the excavation area. At each station, an MIE DataRAM 4™ aerosol monitor was used to measure concentrations of airborne particulate matter, and a MultiRAE Plus multi-gas monitor with a built-in PID was used to monitor for VOCs. The DataRAM 4™ was fitted with a size-selective impactor head to monitor only particulate matter 10 micrometers or less in size (PM-10). Data were logged by each unit and later downloaded and tabulated. No concentrations that would pose health threats to site workers or nearby residents were recorded. The air monitoring data are in Appendix F (provided on CD).

5.6 SITE SURVEY AND CLOSURE OF STAGING AREAS AND ROADWAY

START collected five multi-aliquot surface samples from the roadway and staging areas for dioxin TEQ analysis on July 22, 2014. The samples (SFRA-151 through -155) were collected to confirm that contaminated soil had not been transferred to the road and staging areas during the removal process. The road was divided into three sections for sampling. The northern third—the section of the road adjacent to the excavation areas—was found to contain a dioxin TEQ value of 17.07 ppt (SFRA-151). The samples from the central and southern sections (SFRA-153 and -154) were found to contain dioxin TEQ results less than 1.93 ppt. Two staging areas were sampled: (1) the north staging area, just south of the excavation areas, and (2) the south staging area, near the EPA Command Post and site entrance. The north staging area sample (SFRA-152) contained a dioxin TEQ value of 1.9 ppt, and the dioxin TEQ value for the southern staging area sample (SFRA-155) was 1.46 ppt.

After discussions among EPA, the developer, and the property owner, it was determined that the rock that had been used on the roadway and staging areas for the RA would be removed from the site. The rock sample results obtained in July 2014 were submitted to the receiving facility for approval. The rock was removed and transported to the Champ Landfill in Maryland Heights, Missouri, in late October 2014. Restoration work was completed on October 31, 2014.

On August 1, 2014, The Sterling Company (Sterling) from St. Louis, Missouri, conducted land survey activities at the site. The excavation areas, the roadway, and the Bliss-Ellisville site property line were surveyed. The final survey information appears on Figures 2 and 3 in Appendix A.

6.0 LABORATORY DATA REVIEW

The EPA Region 7 Environmental Services Assistance Team (ESAT) was requested to review the CFA data packages. Summary reports indicating that overall data quality and completeness were acceptable are in Appendix D (provided on CD). The final data packages from CFA were sent to Deana Crumbling, sampling statistician at EPA HQ in Washington, D.C., for review and calculation of Kaplan-Meier dioxin TEQ concentrations. Those calculated values were used in the tables included in this report.

7.0 SUMMARY

Tetra Tech START was tasked by the EPA Region 7 Superfund Division to assist with an RA at the Ellisville site in Wildwood, Missouri. Elevated dioxin concentrations had been identified at three areas within a proposed residential development area (Strecker Forest) during previous assessments. These soils were excavated during the RA for off-site disposal. For this RA, the site-specific RALs for dioxin TEQ levels were as follows: 820 ppt in surface soil (less than 12 inches bgs); 2,460 ppt in soil at depths greater than 12 inches bgs.

Specific elements of this task included (1) collection of post-excavation soil samples to confirm that site-specific RALs had been met, (2) sampling of excavated soils for disposal profiling analyses, (3) real-time air monitoring during soil excavation, and (4) soil sampling in the central and northern portions of the site to better define the extent of contamination. START also assisted with analytical services procurement, sample management, documentation of removal activities, and preparation of detailed maps and diagrams depicting excavated and sampled areas.

Nineteen pre-removal site characterization samples were submitted for TEQ analysis (including samples collected at the roadway, staging areas, and retention pond area). START also collected 63 post-excavation samples to confirm that the site-specific RALs had been met. From the roll-off boxes containing excavated soil, 72 samples were submitted for dioxin TEQ analysis. Another seven samples were submitted for laboratory analysis for waste profiling purposes. Two of the samples (roadway rock) collected during site activities were not submitted to the laboratory for analysis, but were screened by START for metals and VOCs by use of an XRF and PID, respectively.

Removal activities began on March 24, 2014, and excavation was completed on July 21, 2014. During the project, 101 roll-off boxes were filled and shipped off site for disposal. Seventeen boxes, containing 267.06 tons of dioxin-contaminated soil, were shipped to Canada for incineration. The remaining 84 boxes, containing 1,277.58 tons of dioxin-contaminated soil, were trucked to a RCRA-permitted landfill in Oklahoma for disposal.

After the excavated areas (including the retention pond) had been backfilled with clean soil and graded, they were seeded and mulched. Drainage pathways were covered with rock. Finally, rock was removed from the roadway used during the RA. The roadway that was in the work area was covered with 3 to 6 inches of backfill soil, seeded, and mulched. The remainder of the road was seeded. Site restoration activities were completed October 31, 2014.

8.0 REFERENCES

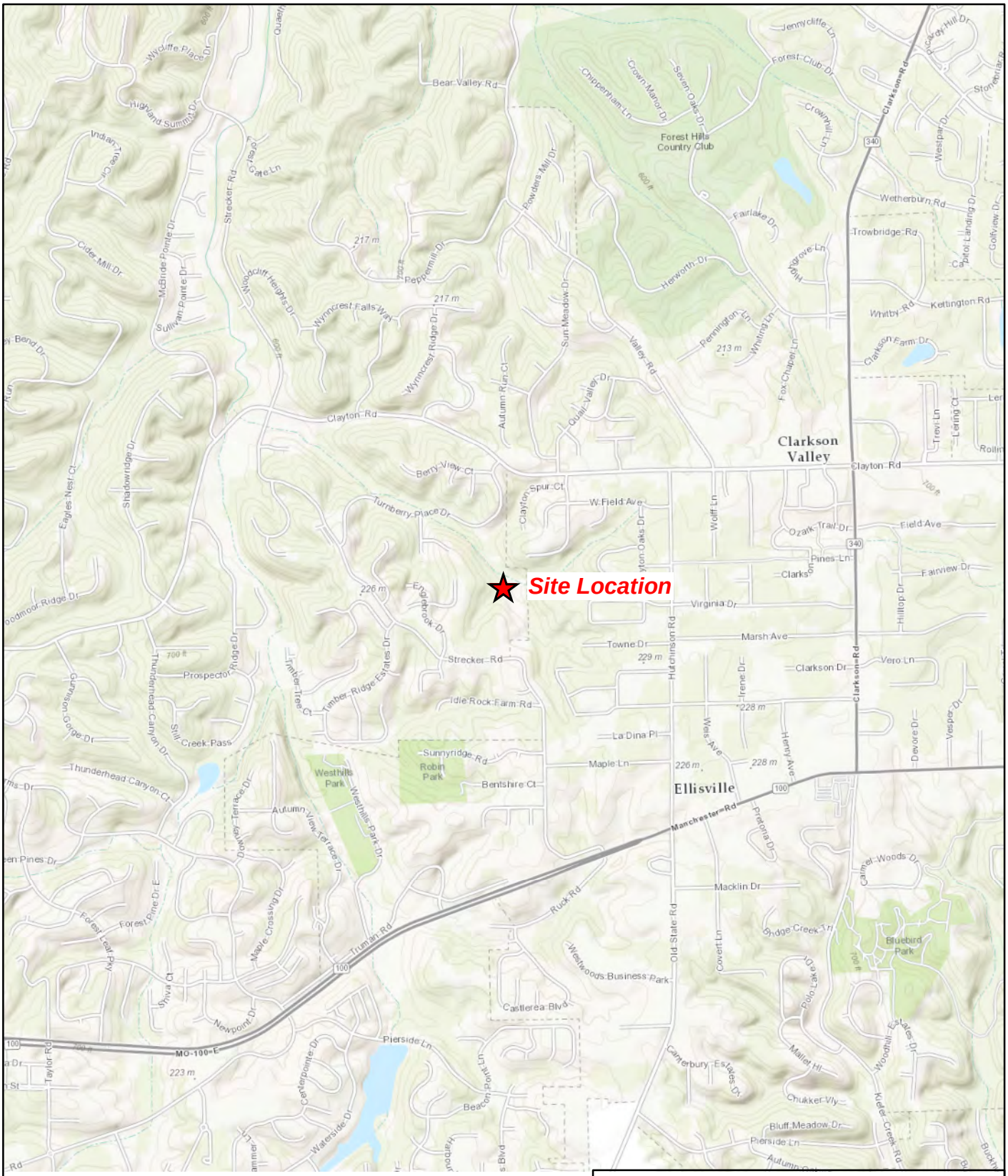
Tetra Tech EM Inc. 2012. *Site Reassessment Report for an Expanded Site Review, Proposed Strecker Forest Development Site, Wildwood, Missouri.* Superfund Technical Assessment and Response Team (START) Contract EP-S7-06-01, Task Order No. 0002.058. June 13.

Tetra Tech, Inc. (Tetra Tech). 2014. *Removal Site Evaluation Report, Bliss-Ellisville Site – Strecker Forest Subsite, Wildwood, Missouri*. Superfund Technical Assessment and Response Team (START) Contract EP-S7-06-01, Task Order No. 0014. April 24.

U.S. Environmental Protection Agency (EPA). 2013. Action Memorandum for a Removal Action at the Ellisville Site, Wildwood, Missouri. September 26.

APPENDIX A

FIGURES



N

1,000 0 1,000

Feet

Source: ESRI Basemap, Topographic, 2013

Ellisville Site
Wildwood, Missouri

Figure 1
Site Location Map

TETRA TECH

Date: 10/29/2014 Drawn By: Gustavo Orozco Project No: 103X9025140048.000

X:\GIS\9025\0048\Projects\mxd\Figure1.mxd

Sampling Unit Pre-Excavation Results

SOIL BORING RESULTS

Soil Boring (SB)	38	50	51	37	14	58	47	49	39	52	53	57	20	54	55	56	59	60
0-12 in. TEQ	96	7	171	26,684	18,274	25,409	122	21,311	125	273	19.5	138	1,733	314	317	2,491	1,904	35
12 to 24 in. TEQ		1	4.2			3,154	1.8	547		27	2.6	856		85	862	9,744	NS	NS
24 to 36 in. TEQ	1.1	NS	NS	143	NS	NS	NS	NS	21	NS	NS	NS	NS	NS	NS	NS	NS	NS
36 to 48 in. TEQ		NS	NS		NS	NS	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS

Excavation Area Post-Excavation Results

DESCRIPTION	EXCAVATION AREA (EA) 3					EA 2	EA 1
CELL	H/I	G	F	D/E	A/B/C	NA	NA
Floor, Post-Excavation TEQ	13.1	6.89	1,508	752.9	69.8	597.3	182.36
Excavation Depth	12 inches	24 inches	24 inches	3 to 4 feet	6 to 7 feet	12 inches	4 to 8 feet

Legend

- Soil boring - below action level
- Soil boring - above action level
- Decision / sampling unit boundary
- Excavation area
- Excavation sub-area

Pre-excavation sample results:

- 50 - 820 ppt
- > 820 ppt

NA Not applicable
NS Not sampled
ppt Parts per trillion
TEQ Toxic equivalence (dioxin) in ppt

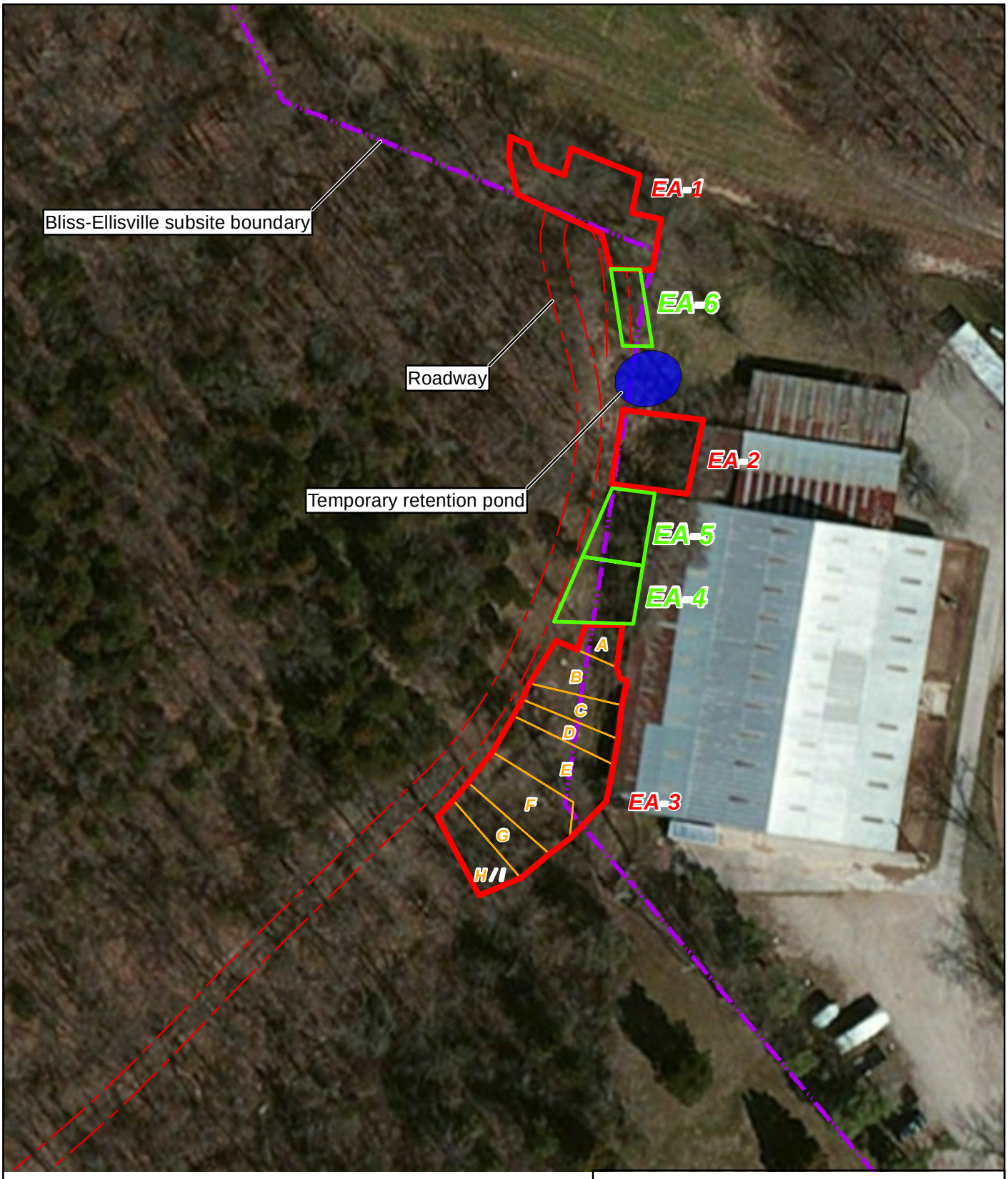
Source: EPA Region 7, Strecker Forest GIS Data, 2012 - 2013; ESRI Basemap, Imagery, 2013; ESRI Basemap, National Geographic, 2013; ESRI Basemap, Topographic, 2013.

Ellisville Site
Wildwood, Missouri

Figure 2
Removal Activity Map

N W E S

Date: 11/20/2014 Drawn By: Colin Willits Path: X:\G\9025\0048\Projects\mxd\Figure2.mxd



Legend

- Exploratory area
- Excavation area
- Excavation sub-area

N

35 0 35

Feet

Source: EPA Region 7, Strecker Forest GIS Data, 2012 -2013; ESRI Basemap, Imagery, 2013

Ellisville Site
Wildwood, Missouri

Figure 3
Exploratory Sampling Locations

TETRA TECH

Date: 11/4/2014 Drawn By: Gustavo Orozco Project No: 103X9025140048.000

X:\GIS\9025\0048\Projects\mxd\Figure3.mxd

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows the site entrance driveway and upper support zone prior to brush clearing in preparation for removal activities.	1
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/24/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows the site entrance driveway and upper support zone area after brush clearing in preparation for removal activities.	2
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/25/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northwest	DESCRIPTION	This photograph shows Emergency and Rapid Response Services (ERRS) personnel grinding tree stumps in the upper support zone area in preparation for removal activities.	3
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/25/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: North	DESCRIPTION	This photograph shows gabian stone being delivered to prepare site access roads and support zones for the removal action.	4
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/26/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: North	DESCRIPTION	This photograph shows ERRS personnel laying base fabric in the area where gabian stone would be placed for a roadbed .	5
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/26/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: South	DESCRIPTION	This photograph shows gabian stone on the haul road at the site.	6
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/28/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: North	DESCRIPTION	This photograph shows the lower support zone and haul road (near completion) to be used for the removal action.	7
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/28/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: East/Northeast	DESCRIPTION	This photograph shows ERRS personnel beginning excavation of dioxin-contaminated soil at the south end of Excavation Area (EA) 3.	8
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/7/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: East	DESCRIPTION	This photograph shows ERRS loading dioxin-contaminated soil into a roll-off box for transport to a disposal facility.	9
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/7/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Southeast	DESCRIPTION	This photograph shows an air monitoring station operated by Superfund Technical Assessment and Response Team (START) personnel during soil excavation activities.	10
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/7/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Southeast	DESCRIPTION	This photograph shows the south end of EA 3 as soil excavation was nearing completion.	11
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/8/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: East	DESCRIPTION	This photograph shows a roll-off box with excavated dioxin-contaminated soil being moved for temporary staging on site.	12
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/7/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northwest	DESCRIPTION	This photograph shows a roll-off box with excavated dioxin-contaminated soil being removed for transport to an off-site disposal facility.	13
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/22/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows an overview of EA 3 with excavation in progress.	14
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/23/14
	PHOTOGRAPHER	Dave Kinroth	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows excavation at EA 2.	15
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/25/14
	PHOTOGRAPHER	Rick Claytor	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: East	DESCRIPTION	This photograph shows dark-stained soil encountered during excavation at EA 3 (cells D and E).	16
	CLIENT	Environmental Protection Agency - Region 7	DATE 4/30/14
	PHOTOGRAPHER	Rick Claytor	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: East	DESCRIPTION	This photograph shows sampling of stained soil at EA 3.	17
	CLIENT	Environmental Protection Agency - Region 7	DATE 5/6/14
	PHOTOGRAPHER	Dave Kinroth	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Southeast	DESCRIPTION	This photograph shows the southeast portion of EA 1 after excavation to approximately 8 feet below ground surface (bgs) had been completed.	18
	CLIENT	Environmental Protection Agency - Region 7	DATE 6/24/14
	PHOTOGRAPHER	Rick Claytor	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows ERRS excavating a vein of dark-stained soil at EA 3.	19
	CLIENT	Environmental Protection Agency - Region 7	DATE 6/28/14
	PHOTOGRAPHER	Rick Claytor	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northwest	DESCRIPTION	This photograph shows preparation for backfilling at EA 1, along the tributary to Caulks Creek on the north perimeter of the site.	20
	CLIENT	Environmental Protection Agency - Region 7	DATE 7/10/14
	PHOTOGRAPHER	Rick Claytor	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Southeast	DESCRIPTION	This photograph shows EA 3 after excavation had been completed, and the area had been backfilled with clean topsoil.	21
	CLIENT	Environmental Protection Agency - Region 7	DATE 7/14/14
	PHOTOGRAPHER	Rick Claytor	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Southeast	DESCRIPTION	This photograph shows EA 2 after excavation had been completed, and the area had been backfilled with clean topsoil.	22
	CLIENT	Environmental Protection Agency - Region 7	DATE 5/5/14
	PHOTOGRAPHER	Rick Claytor	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: South	DESCRIPTION	This photograph shows EA 1 after excavation had been completed, the area had been backfilled with clean topsoil, and rip-rap had been placed along the creek bank.	23
	CLIENT	Environmental Protection Agency - Region 7	DATE 7/30/14
	PHOTOGRAPHER	Rick Claytor	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows ERRS applying straw at EA 3 after the area had been backfilled with clean topsoil and seeded.	24
	CLIENT	Environmental Protection Agency - Region 7	DATE 8/1/14
	PHOTOGRAPHER	Rick Claytor	

Ellisville Site Removal Action
Wildwood, Missouri

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: North	DESCRIPTION	This photograph shows EA 1 after excavation had been completed, and seed and straw had been applied to clean topsoil backfill.	25
	CLIENT	Environmental Protection Agency - Region 7	DATE 8/1/14
	PHOTOGRAPHER	Rick Claytor	

TETRA TECH PROJECT NO. X9025.14.0048.000 DIRECTION: South	DESCRIPTION	This photograph shows gabian stone taken from the site haul road to line drainage pathways for erosion control at EA 3.	26
	CLIENT	Environmental Protection Agency - Region 7	DATE 8/1/14
	PHOTOGRAPHER	Rick Claytor	

APPENDIX C
FIELD SHEETS (CD)

APPENDIX D
CHAIN-OF-CUSTODY RECORDS AND LABORATORY DATA (CD)

APPENDIX E
KM TEQ VALUES (CD)

APPENDIX F
AIR MONITORING RECORDS (CD)