TETRA TECH

November 14, 2013

Mr. Heath Smith
EPA On-Scene Coordinator
U.S. Environmental Protection Agency, Region 7
310 Saline Street
Fredericktown, Missouri 63645

Subject: **Quality Assurance Project Plan**
Removal Action
Ellisville Site – Strecker Forest Sub-site, Wildwood, Missouri
EPA CERCLIS ID No.: MOD980633010
U.S. EPA Region 7 START 4, Contract No. EP-S7-13-06, Task Order 0048
Task Monitor: Heath Smith, On-Scene Coordinator

Dear Mr. Smith:

Tetra Tech, Inc. is submitting the attached Quality Assurance Project Plan for a Removal Action at the Ellisville Site – Strecker Forest Sub-site in Wildwood, Missouri. If you have any questions or comments, please contact the project manager at (314) 395-3157.

Sincerely,

for Dave Kinroth, CHMM
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc: Roy Crossland, START Project Officer (cover letter only)

X9025.14.0048.000

415 Oak Street, Kansas City, MO 64106
Tel 816.412.1741 Fax 816.410.1748 www.tetratech.com

QUALITY ASSURANCE PROJECT PLAN
FOR A REMOVAL ACTION

ELLISVILLE SITE – STRECKER FOREST SUB-SITE
WILDWOOD, MISSOURI
EPA CERCLIS ID No. MOD980633010

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

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
11201 Renner Boulevard
Lenexa, Kansas 66219

November 14, 2013

Prepared By:

Tetra Tech, Inc.
415 Oak Street
Kansas City, Missouri 64106
(816) 412-1741

APPROVED BY:

for David A. Zimmerman — 11-14-13
Dave Kinroth, CHMM, START Project Manager — Date

11-14-13
Ted Faile, PG, CHMM, START Program Manager — Date

Kathleen Homer — 11-14-13
Kathleen Homer, START Quality Assurance Manager — Date

Heath Smith, EPA On-Scene Coordinator — Date

Diane Harris, EPA Quality Assurance Manager — Date

CONTENTS

Section **Page**

1.0 PROJECT MANAGEMENT 1

1.1 DISTRIBUTION LIST 1
1.2 PROJECT, TASK ORGANIZATION, AND SCOPE OF WORK 1
1.3 PROBLEM DEFINITION, BACKGROUND, AND SITE DESCRIPTION 2
1.4 SITE GEOLOGY 4
1.5 PROJECT AND TASK DESCRIPTION 4
1.6 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA 5
1.7 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATION 6
1.8 DOCUMENTATION AND RECORDS 6

2.0 MEASUREMENT AND DATA ACQUISITION 7

2.1 SAMPLING PROCESS DESIGN 7

2.1.1 Site Perimeter Air Monitoring During Excavation Activities 8
2.1.2 Post-excavation Soil Sampling 8
2.1.3 Soil Disposal Profile Sampling 10
2.1.4 Backfill Soil Sampling 11

2.2 SAMPLING METHODS REQUIREMENTS 12
2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS 13
2.4 ANALYTICAL METHODS REQUIREMENTS 13
2.5 QUALITY CONTROL REQUIREMENTS 14
2.6 INSTRUMENT, EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS 14
2.7 INSTRUMENT CALIBRATION AND FREQUENCY 14
2.8 INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES 15
2.9 DATA ACQUISITION REQUIREMENTS 15
2.10 DATA MANAGEMENT 15

3.0 ASSESSMENT AND OVERSIGHT 15

3.1 ASSESSMENTS AND RESPONSE ACTIONS 15
3.2 REPORTS TO MANAGEMENT 15

4.0 DATA VALIDATION AND USABILITY 16

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS 16
4.2 VALIDATION AND VERIFICATION METHODS 16
4.3 RECONCILIATION WITH USER REQUIREMENTS 16

5.0 REFERENCES 17

CONTENTS (Continued)

APPENDICES

Appendix

A FIGURES

TABLES

Table **Page**

1 SUMMARY OF PRE-EXCAVATION DIOXIN TEQ CONCENTRATIONS 3

2 SPECIFIC DATA REPORTING UNITS 6

3 SOIL REMOVAL ACTION LEVELS 9

4 ANTICIPATED SAMPLE SUMMARY 12

5 SUMMARY OF SAMPLING METHODS 12

6 ANALYTICAL METHODS 14

1.0 PROJECT MANAGEMENT

1.1 DISTRIBUTION LIST

Region 7 EPA	Heath Smith, Project Manager Diane Harris, Quality Assurance Manager
Region 7 START	Dave Kinroth, Project Manager Ted Faile, Program Manager Kathleen Homer, Quality Assurance Manager

1.2 PROJECT, TASK ORGANIZATION, AND SCOPE OF WORK

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 provide support for a Removal Action (RA) at the Ellisville Site – Strecker Forest Sub-site in Wildwood, Missouri. The RA will involve excavation and disposal of soil from three areas of the site (totaling approximately 0.25 acre) where dioxin toxic equivalent (TEQ) concentrations exceeding the removal action level (RAL) of 820 parts per trillion (ppt) for surface soil were discovered during sampling from September 2011 through August 2013.

Dave Kinroth will serve as the START Project Manager. He will be responsible for ensuring that sampling of environmental media proceeds as described in this Quality Assurance Project Plan (QAPP), and for providing periodic updates to the client concerning the status of the project, as needed. Heath Smith will be the EPA Project Manager for this activity. START prepared the QAPP for EPA approval prior to initiation of the RA.

A Tetra Tech START field sampling team composed of one to two people will (1) conduct site perimeter air monitoring during excavation activities on site, (2) perform post-excavation soil sampling to ensure achievement of the RAL, (3) collect samples of excavated soil for disposal profiling analyses as required by the selected disposal facility, (4) conduct sampling to ensure that soils used for backfill purposes meet the requirements established in the site's Action Memorandum (AM), (5) manage samples and procure analytical services, and (6) maintain documentation of site activities. The Tetra Tech START quality assurance (QA) manager will provide technical assistance, as needed, to ensure that necessary QA issues are adequately addressed.

START will adhere to this QAPP as much as possible, but may alter proposed activities in the field if warranted by site-specific conditions and unforeseen hindrances that prevent implementation of any aspect of this QAPP in a feasible manner. Such deviations will be recorded in the site logbook, as

necessary. This QAPP will be available to the field team at all times during the RA to serve as a key reference for the proposed activities described herein.

1.3 PROBLEM DEFINITION, BACKGROUND, AND SITE DESCRIPTION

This QAPP was prepared by Tetra Tech START to address concerns that could impact human health and the environment at the Ellisville Site – Strecker Forest Sub-site (hereafter referred to as Strecker Forest) in Wildwood, Missouri, where soil contaminated with dioxin TEQ compounds (particularly 2,3,7,8-tetrachlorodibenzo-p-dioxin or 2,3,7,8-TCDD) has been identified during previous sampling activities.

Strecker Forest 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 W.J. Byrne Builders, Inc., of Glencoe, Missouri, with intent to develop the proposed Strecker Forest subdivision. Geographic coordinates of the site are 38.597578 degrees north latitude and 90.605617 degrees west longitude.

The climate in St. Louis County, Missouri, is characterized by warm, humid summers and cool to cold winters. The average daily temperature in January is 27.5 degrees Fahrenheit (ºF), and during July is 78.1ºF. The mean annual precipitation is approximately 38 inches (HAMweather 2013).

The site is mostly undeveloped, except for foundations remaining from recently demolished structures (a garage and two abandoned homes) on the former Dozier and Primm properties. The northern two-thirds of Strecker Forest 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 with a residence, horse arena, and stables are present. Other features identified from previous investigations of the Strecker Forest property include a “Western Pond Area” in the southwestern portion of the site, a “Solid Waste Disposal Area” in a drainage ravine in the central portion of the site, an “Alleged Former Haul Road” that parallels the drainage ravine, and an “Eastern Disturbed Area (EDA)” and “National Priorities List (NPL) Area” that are both in the northeastern portion of the site. The EDA and the NPL Area are directly adjacent to the Bliss portion of the historic Ellisville Superfund site, sometimes referred to as the Bliss-Ellisville site. EPA implemented an RA at the Bliss-Ellisville site 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 (Tetra Tech EM Inc. 2012). Because of its proximity to the Ellisville Superfund site, the Strecker Forest property has come under scrutiny related to environmental health concerns associated with the proposed

residential development of the property, leading to a number of environmental site investigations by various entities dating back to year 2000.

The EDA and NPL Area are the subject areas for this RA, where soils contaminated with dioxin TEQ compounds (primarily 2,3,7,8-TCDD) above the 820 ppt RAL were identified during recent sampling efforts by EPA Region 7 and START from September 2011 through August 2013. Table 1 summarizes dioxin TEQ concentrations exceeding the 820 ppt RAL for surface soil samples. An action level of 2,460 ppt has been proposed for soils 12 inches to 4 feet below ground surface (bgs)—the planned maximum excavation depth—or to bedrock (whichever is encountered first).

TABLE 1

SUMMARY OF PRE-EXCAVATION DIOXIN TEQ CONCENTRATIONS (>820 PPT – EDA AND NPL AREA) STRECKER FOREST SITE – WILDWOOD, MISSOURI

Sample Number	Date Collected	Excavation Area/Sample Location	Dioxin TEQ (ppt)
5651-23	1-24-12	EA 3 /SU 34D (surface)	5,822
5618-18	12-1-11	EA 3 /SU 35A (surface)	3,974
5618-22	12-1-11	EA 3 /SU 36A (surface)	4,026
5651-28	1-23-12	EA 3 /SU 41A (surface)	2,699
5651-32	1-23-12	EA 3 /SU 42A (surface)	1,156
5651-35	1-23-12	EA 2 /SU 42D (surface)	1,261
5651-39	1-24-12	EA 3 /SU 43D (surface)	2,313
5527-42	9-14-11	EA 3 /SB-14 (0-2 feet bgs)	18,234
5651-46	1-23-12	EA 3 /SB-37 (1-2 feet bgs)	26,684
5527-57	9-14-11	EA 1/SB-20 (0-2 feet bgs)	1,733
SFRSE-19	7-16-13	EA 1/SB-56 (0-1 feet bgs)	2,491
SFRSE-20	7-16-13	EA 1/SB-56 (1-2 feet bgs)	9,744
SFRSE-37	8-9-13	EA 1/SB-56 (2-3 feet bgs)	20,375
SFRSE-38	8-9-13	EA 1/SB-58 (0-1 feet bgs)	25,409
SFRSE-39	8-9-13	EA 1/SB-58 (0-2 feet bgs)	3,154
SFRSE-40	8-9-13	EA 1/SB-59 (0-1 feet bgs)	1,904

Notes:

bgs Below ground surface
EA Excavation area
EDA Eastern Disturbed Area
NPL National Priorities List
ppt Parts per trillion
SB Soil boring
SU Sampling unit
TEQ Toxic equivalent

Based on the documented dioxin contamination, EPA recommended keeping this area of the site undisturbed by human activity (i.e., planned residential development activities), pending final decisions regarding disposition of the contaminated soils. An AM approved in September 2012 prescribed construction of a perimeter fence to encircle all or most of this contaminated area. The fence installation was completed on October 30, 2012 (Tetra Tech 2013).

Additional sampling in and near these contaminated areas of the site occurred during July and August 2013 to further define the extent and estimated volume of dioxin-contaminated soil. Figure 2 in Appendix A shows three defined areas planned for excavation (Excavation Areas [EA]). EPA subsequently approved a second AM for the site in September 2013 that prescribed excavation of contaminated soils. An estimated 700 cubic yards of dioxin-contaminated soil will be excavated and removed from the site for off-site disposal at a Resource Conservation and Recovery Act (RCRA)-permitted hazardous waste management facility.

1.4 SITE GEOLOGY

The Strecker Forest site is situated on hill slopes and in a small tributary valley of Caulks Creek near its headwaters. The narrow, steep-sloped valley walls that surround the valley bottoms are forested, though the property is surrounded by suburban housing developments. Surficial materials on the hill slopes and ridge tops in the area are composed of cherty, clay-rich residual materials derived from weathering of carbonate bedrock.

The valley floor is filled with silty clay surface soils overlying cherty gravel alluvial materials. Bedrock in the area is the Mississippian-age Burlington-Keokuk Formation—a gray, cherty limestone that typically displays an irregular weathered surface with cutters and pinnacles. Shallow karst development is also typical of this formation. These surficial materials and bedrock are generally characterized as having moderate to high permeability. Water tracing by the Missouri Department of Natural Resources (MDNR) has shown that Caulks Creek and its tributaries are losing streams that recharge Lewis Spring about 2 miles northwest of the Bliss property (MDNR 2010).

1.5 PROJECT AND TASK DESCRIPTION

This QAPP will address the following activities:

- Providing site perimeter air monitoring for potential emission of fugitive dust and volatile organic compounds (VOC) during excavation activities.

- Conducting post-excavation soil sampling for dioxin TEQ compounds to determine whether RALs have been achieved.
- Collecting soil samples for disposal profiling analyses as required by the selected disposal facility.
- Verifying that soils used for backfill purposes meet requirements established in the site's AM.
- Managing samples and procuring analytical services.
- Conducting site documentation.

The following is a preliminary schedule of activities for the planned RA:

- October 2013 – Conduct site walk and document pre-excavation conditions.
- Late fall/winter 2013/2014 or early spring 2014 – Begin excavation on site.
- Spring 2014 – Finish backfilling soil and site restoration in excavated areas, and take down site perimeter fencing.

Aspects of the project are described in the following sections of this QAPP.

1.6 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The QA objective for this project is to provide valid data of known and documented quality. Specific data quality objectives are discussed in terms of accuracy, precision, completeness, representativeness, and comparability.

For this project, accuracy is defined as the ratio, expressed as a percentage, of a measured value to a true or reference value. The analytical component of accuracy will be expressed as percent recovery, based on the analysis of laboratory-prepared spike samples and performance evaluation audit samples. Analytical precision for this project is defined as a measure of agreement among individual measurements of laboratory-prepared duplicate samples. Up to five field duplicate samples will be collected to determine total method precision. Data completeness will be expressed as the percentage of data generated that are considered valid. A completeness goal of 100 percent will be applied to this project; however, if that goal is not met, site decisions may still be made based on the remaining data. No critical samples have been identified for the project.

Representativeness of collected samples is facilitated by establishing and following criteria and procedures identified in this QAPP. Data comparability is achieved by requiring that all data generated

for the project be reported in common units. Table 2 lists the various types of data that will be generated and specific reporting units.

TABLE 2

SPECIFIC DATA REPORTING UNITS
STRECKER FOREST SITE – WILDWOOD, MISSOURI

Parameter	Unit
Dust concentration in air via DataRAM 4000	Micrograms per cubic meter (µg/m^3)
VOC concentration in air via MultiRAE Plus or equivalent PID	Parts per million (ppm)
Dioxin TEQ compounds in soil via laboratory Method 1613B	Picograms per gram or parts per trillion (ppt)
Other analytical parameters (VOCs, SVOCs, RCRA metals, PCBs, TOX, etc.) in soil via standard laboratory analytical methods	Micrograms per kilogram or parts per billion (ppb)
Time	Military time (00:01 - 24:00)

Notes:

PCB Polychlorinated biphenyl
PID Photoionization detector
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
TEQ Toxic equivalent
TOX Total organic halides
VOC Volatile organic compound

1.7 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATION

All site personnel will be required to have completed a basic 40-hour health and safety (Hazardous Waste Operations and Emergency Response) training course and annual refreshers. Familiarity with operating a DataRAM 4000 dust/particulate monitor and MultiRAE Plus or equivalent photoionization detector (PID) also will be necessary for Tetra Tech START field personnel.

1.8 DOCUMENTATION AND RECORDS

Tetra Tech START personnel will maintain a field logbook to record all pertinent activities associated with the RA. Appropriate documentation pertaining to photographs taken by Tetra Tech START also will be recorded in the field logbook. Video documentation will occur prior to any excavation and after backfilling is complete, as well as at haul roads to be constructed on site during this RA. Information pertaining to all samples collected for laboratory analysis during this event (such as sampling dates and times, locations, and so on) will be recorded on sample field sheets generated by START. Labels will also be generated and affixed to the sample containers, identifying sample numbers, dates collected, and

requested analyses. Each sample will have a unique identification number generated by START. The sample label will be affixed to the sample container and will show the following information in indelible ink:

- Excavation Area (EA) ID
- Sampling cell number
- Depth (bgs)
- Method of collection.

The method of collection will be indicated as follows:

- FCS – Excavation floor composite sample
- SCS – Excavation sidewalls composite sample.

Each sample will be recorded on a chain-of-custody (COC) record. The COC record will include the project name and number, names of the field sampling personnel, sample numbers, dates and times the samples were collected, whether the samples were composites or grabs, sample locations, numbers of containers per sample, constituents to be analyzed, and comments. Each COC record will also document the dates, times, and signatures of the people relinquishing and receiving custody of the samples. All samples will be stored in a secure location at the site while awaiting shipment. Samples will be delivered by field personnel to the closest shipping location for overnight delivery to the laboratory, except for samples collected on Saturday—those will be shipped the following Monday.

A health and safety plan (HASP) prepared by Tetra Tech START prior to field activities will address site-specific hazards. The HASP will be reviewed and signed by all field personnel prior to field work, indicating that they understand the plan and its requirements. Copies of the plan will be available to all personnel throughout sampling activities.

2.0 MEASUREMENT AND DATA ACQUISITION

The following sections address aspects of sampling and analysis.

2.1 SAMPLING PROCESS DESIGN

The sampling design proposed in the following subsections has been selected to evaluate whether any harmful concentrations of airborne contaminants are released as a result of removal activities, determine whether RALs in soil have been achieved, determine appropriate disposal options for excavated soils, and verify that backfill soils meet guidelines for clean backfill soil as established in the site's AM.

2.1.1 Site Perimeter Air Monitoring During Excavation Activities

Continuous real-time air monitoring for particulate matter less than 10 microns (PM-10) and VOCs will occur daily at locations upwind and downwind from the area(s) of excavation. This will be accomplished using a DataRAM 4000 Particulate Monitor or similar equipment for PM-10 particulate monitoring, and a MultiRAE PID or equivalent for monitoring VOCs. Both instruments will have data-logging capability so the data can be downloaded and printed, as needed, for review and filing. START will operate these instruments in accordance with the manufacturers' operating instruction manuals.

The real-time downwind PM-10 data will be compared to upwind (background) measurements, and also to the National Ambient Air Quality Standard (NAAQS) of 150 micrograms per cubic meter ($\mu g/m^3$) for PM-10 (24-hour average). Any instance of downwind PM-10 concentration exceeding three times (3X) the upwind (background) concentration will be cause to stop excavation activities and evaluate use of institutional controls for dust suppression, such as wetting the excavation area with a water spray or similar measure. Any exceedance of the NAAQS of 150 $\mu g/m^3$ during a daily work shift will be cause for further evaluation of need for additional dust suppression measures during excavation to ensure subsequent release of fugitive dust from the site does not exceed the NAAQS.

Based on soil sampling data from Expanded Site Review (ESR) sampling in 2011-2012, notable airborne VOC concentrations are not anticipated during excavation activities. However, to prepare for unknown subsurface conditions encountered during excavation activities (such as a buried container or area of VOC-contaminated soil), continuous real-time PID monitoring for VOCs will occur. Any VOC readings 3X background or exceeding 5 parts per million (ppm) of unidentified VOCs will be cause to stop excavation activities and evaluate need for additional worker protection and use of institutional controls to ensure no release of harmful concentrations of airborne contaminants from the site.

2.1.2 Post-excavation Soil Sampling

EPA has established soil RALs listed in Table 3. EPA will excavate all defined areas where dioxin TEQ levels have been documented to exceed these soil RALs, as depicted in Appendix A – Figure 2 (EAs). EPA will obtain written consent from the property owners to perform the excavations at the site described herein.

TABLE 3

SOIL REMOVAL ACTION LEVELS
STRECKER FOREST SITE – WILDWOOD, MISSOURI

Depth	Dioxin TEQ Concentration	Action
<1 foot bgs	>820 ppt	Excavation required
1-4 feet bgs	>2,460 ppt	Excavation required

Notes:

bgs Below ground surface
ppt Parts per trillion
TEQ Toxic equivalent

The planned maximum excavation depth in areas of undisturbed, native soils will be 4 feet bgs or to bedrock, whichever is encountered first.

Three EAs have been identified where dioxin concentrations exceed RALs (see Appendix A, Figure 2). Descriptions of those EAs are as follows:

- EA 1 is approximately 15 by 25 feet (375 square feet) and will be excavated as one area or unit. Contamination here has been documented to a depth of 3 feet bgs, with dioxin concentrations ranging from 1,733 to 25,409 ppt.

- EA 2 is approximately 25 by 50 feet (1,250 square feet) and will be excavated as two subunit areas (EA 2-A and EA 2-B), as depicted on Figure 2 in Appendix A. Contamination here has been documented only within the top foot of soil, with dioxin concentrations up to 1,261 ppt.

- Excavation at EA 3 is planned to occur within nine subunit areas (EA 3-A to EA 3-I), each ranging from approximately 25 by 25 feet to 25 by 50 feet (i.e., 625 to 1,250 square feet), as indicated on Figure 2 in Appendix A. Contamination here has been documented to 2 feet bgs, with dioxin concentrations ranging from 1,156 to 26,684 ppt.

Initial removal activities within each EA unit/subunit will involve excavation of approximately 12 to 36 inches of soil, depending on the previous sample results for each EA (see Table 1). This will be conducted with excavating machinery, such as skid loaders, dozers, excavators, backhoes, and hand tools. Upon completion of excavation of the first layer or "lift" of contaminated soil, EPA and START will visually observe the EA floor and sidewalls. If excavation evidently has reached undisturbed, native soil with no apparent appearance of staining or intermingled debris, START will conduct post-excavation soil sampling. Otherwise, EPA may direct further excavation until undisturbed material is reached in both the excavation floor and sidewall areas.

Post-excavation soil sampling of the floor areas will proceed according to a composite sampling protocol, with nine increments evenly spaced over the EA floor. The samples will be collected using new

dedicated stainless steel tablespoons and aluminum pie pans. The soil will be thoroughly disaggregated and homogenized before placement of approximately 20 grams (weighed on an electronic tabletop scale) into a 4-ounce amber glass jar. The samples will be shipped daily for overnight delivery to a START-contracted laboratory for dioxin analysis via Method 1613B. The requested analytical turnaround time (TAT) will be 72 hours. If any dioxin TEQ result exceeds the appropriate RAL (see Table 3), another lift of soil will be excavated, and the process will continue until the RAL is achieved or maximum excavation depth is reached.

The excavation sidewalls will be sampled using a modification of the incremental composite sampling (ICS) protocol (EPA 2011). From each sidewall of the EA, a nine-increment sample will be collected in the manner previously described for the excavation floors. Equal sub-portions of the two to four sidewall samples will then be combined and homogenized to create an overall "top tier" sample to be submitted for laboratory analysis. Portions of the individual sidewall composite samples will also be submitted to the laboratory, with instructions to analyze these only if the top tier sidewall sample from that EA exceeds the RAL. This protocol will allow EPA to determine need for further excavation of each EA laterally while reducing the overall number of required samples—minimizing analytical expenses and overall project costs.

2.1.3 Soil Disposal Profile Sampling

Soils excavated from the EAs will be placed in roll-off boxes or temporary storage bins constructed on site. Sampling of the excavated soil will occur to satisfy the analytical requirements of the selected RCRA-permitted hazardous waste management facility. These composite samples will each consist of nine to 12 increments collected from the entirety of soil in a roll-off box/container, in a manner consistent with EPA Region 7 Standard Operating Procedure (SOP) 4231.2017 for waste pile sampling.

A clean soil coring tool will be used to ensure sample material is obtained throughout the entire depth of each pile. The coring tool will be decontaminated with an Alconox® solution wash and deionized water triple rinse after collection of each sample. The sample material will be placed in dedicated aluminum roasting pans and thoroughly disaggregated and homogenized before placement of approximately 20 grams (weighed on an electronic tabletop scale) into a 4-ounce amber glass jar for dioxin analysis via Method 1613B. In addition, a 32-ounce glass jar will be filled with composited sample material for the remaining disposal profiling analyses required by the selected disposal facility.

Although specific disposal profiling analytical requirements may vary somewhat among waste management facilities (and states), below is a listing of analyses often requested for disposal profiling of waste:

- pH
- Paint Filter Test for Free Liquids
- Reactive Cyanide
- Reactive Sulfide
- Total Phenolics
- Flash Point (open cup)
- Polychlorinated Biphenyls (PCB) (if suspect or unknown)
- F-Code Solvent Scan (if suspect or unknown)
- Total Organic Halides (TOX) Scan
- Full Toxicity Characteristic Leaching Procedure (TCLP) Analysis, including TCLP VOCs and Semivolatile Organic Compounds (SVOC), TCLP Pesticides and Herbicides, and TCLP Metals.

Analytical requirements for disposal profile samples collected during this project will be determined by the facility under consideration for disposal services by EPA and the Emergency and Rapid Response Services (ERRS) contactor.

2.1.4 Backfill Soil Sampling

After removal of soils from the affected areas and attainment of RALs, the excavated soils will be replaced with clean backfill. Clean backfill will consist of soils with dioxin TEQ compounds below 50.5 ppt and with concentrations of other hazardous substances, pollutants, or contaminants below residential soil screening levels, as determined by EPA. In addition to dioxin TEQ analysis, these samples will be analyzed for VOCs, SVOCs, PCBs, and RCRA metals (at a minimum). Samples collected from potential backfill source areas will be composite samples of nine to 12 increments, depending on the size of the source area or soil stockpile.

A summary of anticipated samples to be collected during this project is in Table 4. The actual number of samples will depend on the amount of soil excavated during the RA.

TABLE 4

ANTICIPATED SAMPLE SUMMARY
STRECKER FOREST SITE – WILDWOOD, MISSOURI

Matrix	Estimated Number of Samples	Laboratory Analyses
Soil (excavation floor surfaces)	12-15	Dioxin TEQ compounds via Method 1613B
Soil (excavation sidewall surfaces)	12-15	Dioxin TEQ compounds via Method 1613B
Soil (disposal profiling for excavated material)	3-5	Dioxin TEQ compounds via Method 1613B, plus other analytical parameters required by selected disposal facility
Soil (backfill)	2-3	Dioxin TEQ compounds via Method 1613B, VOCs, SVOCs, PCBs, and RCRA metals

Notes:

See Section 2.4 for details pertaining to laboratory analyses.

PCB Polychlorinated biphenyl
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
TEQ Toxic equivalent
VOC Volatile organic compound

2.2 SAMPLING METHODS REQUIREMENTS

Table 5 references EPA Region 7 SOPs that will be followed during sample collection. SOPs for sampling surface soils in excavated areas, stockpiled excavated soils, and proposed backfill source areas are included in the table.

TABLE 5

SUMMARY OF SAMPLING METHODS
STRECKER FOREST SITE – WILDWOOD, MISSOURI

Matrix	Sample Description	EPA Region 7 SOP Numbers
Soil	Post-excavation floors and sidewalls	4231.2012
Soil	Excavated soil stockpiles	4231.2012, 4231.2017
Soil	Backfill source areas	4231.2012, 4231.2017

Notes:

EPA U.S. Environmental Protection Agency
SOP Standard Operating Procedure

Tetra Tech START will address disposal of investigation-derived waste (IDW) and procedures for equipment and personal decontamination in a separate, site-specific HASP. Most IDW will consist of

disposable sampling supplies (gloves, paper towels, etc.) to be disposed of off site as uncontaminated debris.

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Sample containers, preservatives, and holding times will comply with procedures defined in Region 7 EPA SOP 2420.06. COC procedures will be maintained as directed by Region 7 EPA SOP 2420.04. Samples will be accepted by the contract lab according to the lab's established procedures and in accordance with the guidelines of EPA Region 7 SOP 2420.01.

Soil samples will be placed in coolers containing packing material and enough ice to ensure that the temperature of the samples does not exceed 4 degrees Celsius (°C). Tetra Tech START will complete necessary paperwork for all samples, including COC records, which will accompany the coolers until delivery to the laboratory. If shipment of samples by commercial service is required, each cooler lid will be securely taped shut, and two custody seals will be signed, dated, and placed across the lid opening. Samples will be submitted to the laboratory in a time-efficient manner to ensure that applicable holding times are not exceeded.

2.4 ANALYTICAL METHODS REQUIREMENTS

Samples will be analyzed at a subcontracted laboratory, according to the EPA methods listed in Table 6. Detection limits typically reported by those methods are expected to be adequate for this activity. The requested analyses have been selected based on past sampling data and historical information regarding the site. Rapid TAT (72 hours) for laboratory analysis of all samples will be requested unless otherwise directed by the EPA On-Scene Coordinator (OSC).

TABLE 6

ANALYTICAL METHODS
STRECKER FOREST SITE – WILDWOOD, MISSOURI

Analytical Parameter	EPA Method
Soil	
Dioxin TEQ compounds (including 2,3,7,8-TCDD)	1613B
VOCs	8260B
SVOCs	8270C
PCBs	8082A
RCRA metals	6010
Other analytical parameters for disposal profiling	To be determined

Notes:

EPA U.S. Environmental Protection Agency
PCB Polychlorinated biphenyl
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
TCDD Tetrachlorodibenzo-p-dioxin
TEQ Toxic equivalent
VOC Volatile organic compound

2.5 QUALITY CONTROL REQUIREMENTS

For this investigation, a maximum of five soil field duplicates will be collected to evaluate total method precision. Analytical error (precision and accuracy) will be assessed by analysis of laboratory-prepared duplicates and spike samples. These criteria, along with other laboratory QC elements, will be assessed in accordance with the laboratory's established procedures.

2.6 INSTRUMENT, EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Tetra Tech START personnel will test, inspect, and maintain all sampling equipment and supplies, along with field screening instrumentation, prior to deployment for field activities. Testing, inspection, and maintenance of analytical instrumentation will proceed in accordance with the laboratory's established procedures and manufacturers' recommendations.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

Calibration of the field screening and laboratory analytical instrumentation will conform to the referenced SOPs and manufacturers' recommendations. Daily calibration checks of the DataRAM 4000 and MultiRAE PID will be noted in the field logbook.

2.8 INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

All sample containers will meet EPA criteria for cleaning procedures required for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Sample Containers*. Certificates of cleanliness will be maintained in the project file.

2.9 DATA ACQUISITION REQUIREMENTS

Tetra Tech START has compiled previous data and information pertaining to the site (including other analytical data, reports, photographs, and maps referenced in this QAPP) from various sources. Some of those data have not been verified; however, that unverified information will not be used for decision-making purposes without verification of its authenticity.

2.10 DATA MANAGEMENT

All laboratory data acquired during this activity will be managed in accordance with the laboratory's established procedures. The laboratory will provide electronic copies of all analytical data packages. The TAT for the Level II data packages will be 72 hours after receipt of the samples.

3.0 ASSESSMENT AND OVERSIGHT

The following sections address aspects of assessment, oversight, and reporting.

3.1 ASSESSMENTS AND RESPONSE ACTIONS

Assessment and response actions pertaining to analytical phases of the project will accord with the laboratory's established procedures. Corrective action will be taken at the discretion of the EPA Project Manager whenever problems appear that could adversely affect data quality or resulting decisions affecting future response actions pertaining to the site.

3.2 REPORTS TO MANAGEMENT

Tetra Tech START will prepare a formal report within 60 days of completion of the field activities, describing sampling techniques, locations, problems encountered (with resolutions to those problems); interpretation of analytical results following completion of the field activities described herein; and validation of data generated by START-contracted laboratories. The laboratory data from soil samples

will be compared to all applicable or relevant and appropriate requirements, including RALs established for the site, to determine whether further response is warranted.

4.0 DATA VALIDATION AND USABILITY

The following sections address aspects of data review, validation, verification, and usability.

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

START-contracted laboratories are expected to conduct all sample analyses for this project. The analytical data packages will be validated internally by the contracted laboratory in accordance with the laboratory's established SOPs and with guidelines of EPA Region 7 Laboratory SOPs 2410.10, 2430.06, and 2430.12. A Tetra Tech or EPA chemist will conduct an external verification and validation of the laboratory data package using a method consistent with a Stage 2B validation, as described in the EPA Contract Laboratory Program (CLP) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA 2009). A Stage 2B validation includes verification and validation based on a completeness and compliance check of sample receipt conditions and sample-related and instrument-related QC results. The EPA Project Manager will be responsible for overall validation and final approval of the data, in accordance with the projected use of the results.

4.2 VALIDATION AND VERIFICATION METHODS

The data will be validated in accordance with the laboratory's established procedures. Laboratory personnel will perform QC spot checks, as needed. The EPA Project Manager will inspect the data to provide a final review. The EPA Project Manager will also compare sample descriptions with field sheets for consistency, and will ensure that any anomalies in the data are documented appropriately.

4.3 RECONCILIATION WITH USER REQUIREMENTS

If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded, and re-sampling or re-analysis may be required.

5.0 REFERENCES

HAMweather. 2013. *Weather Summary for St. Louis County, Missouri*. October 2013. On-line address: http://www.rssweather.com/climate/Missouri/St.%20Louis/

Missouri Department of Natural Resources (MDNR). 2010. Monitoring Well Installation Report, Bliss-Ellisville Site Shallow Groundwater Investigation, St. Louis County. April.

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.

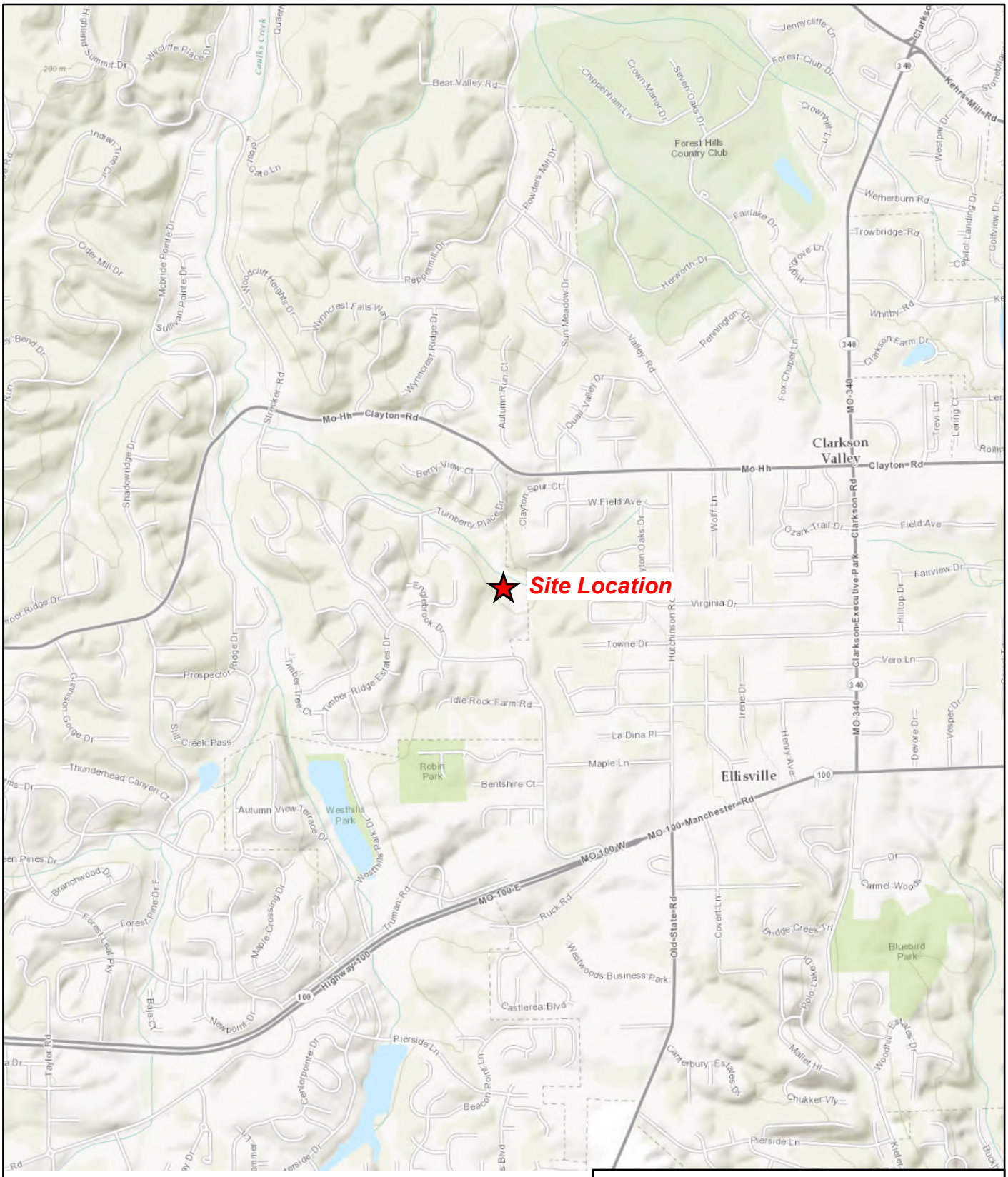
Tetra Tech, Inc. (Tetra Tech). 2013. Preliminary Removal Action Report – Proposed Strecker Forest Development Site, Wildwood, Missouri. START Contract EP-S7-06-01, Task Order No. 0293.001. June 21.

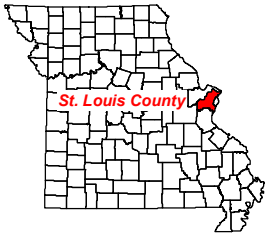
U.S. Environmental Protection Agency (EPA). 2009. EPA Contract Laboratory Program (CLP), Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. January Guidance Document EPA-540-R-08-005. On-line address: http://www.epa.gov/superfund/programs/clp/guidance.htm#external

EPA. 2011. *User Guide – Uniform Federal Policy Quality Assurance Project Plan Template for Soils Assessment of Dioxin Sites*. September. On-line address: http://www.epa.gov/superfund/health/contaminants/dioxin/pdfs/Dioxin%20%20QAPP%20UserGuide.pdf

APPENDIX A

FIGURES





N

1,000 0 1,000

Feet

Source: ESRI Basemap, Topographic, 2013

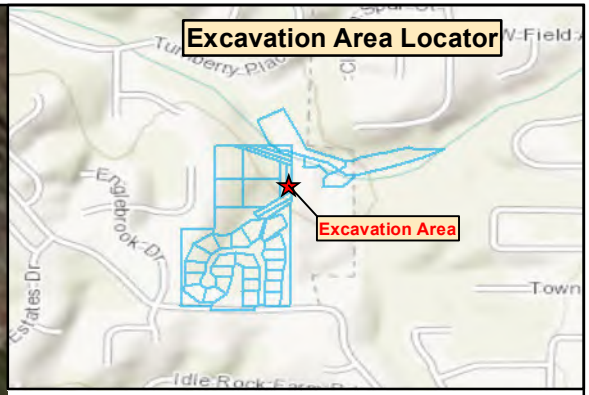
Strecker Forest Removal Action
Wildwood, Missouri

Figure 1
Site Location Map

TETRA TECH

Date: 10/31/13 Drawn By: Colin Willits Project No: 103X9025140048.000

C:\G\9025\0014\Strecker\Projects\mxd\Figure1_QAPP.mxd



Legend
- Site fence
- Decision unit boundary
- Excavation area
- Excavation subarea

N

35 0 35

Feet

Source: ESRI Basemap, Imagery, 2013;
ESRI Basemap, Topographic, 2013

Strecker Forest Removal Action
Wildwood, Missouri

Figure 2

Planned Excavation Areas

TETRA TECH

Date: 11/6/2013 Drawn By: Colin Willits Project No: 103X9025140048.000

C:\G9025\0014\Strecker\Projects\mxd\Figure2_QAPP.mxd