

Addendum No. 2 to Remedial Action Optimization Work Plan, Former Tronox Facility, Springfield, Missouri, RCRA Permit Number MOD007129406

PREPARED FOR: Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

PREPARED BY: Environmental Works Inc.

DATE: December 30, 2016

1.0 Introduction and Purpose

This Addendum No. 2 to Remedial Action Optimization Work Plan (RAO Work Plan Addendum 2 or Addendum 2) was prepared by Environmental Works, Inc. (EWI) on behalf of the Greenfield Environmental Multistate Trust LLC, not individually, but solely in its representative capacity as Trustee for the Multistate Environmental Response Trust (the Multistate Trust) for the former Tronox Facility, Springfield, Missouri (the Facility or Site), Resource Conservation and Recovery Act (RCRA) Post Closure Care Permit #MOD007129406.

The purpose of this technical memorandum is to present the follow-on activities associated with the soil vapor (SV) sampling program as discussed with the Missouri Department of Natural Resources (MoDNR) on December 22, 2016.

2.0 Expanded Soil Vapor Sampling Program

Addendum 2 expands the SV sampling program to locations on the Facility and along High Street near SMW-80 and immediately north of the property owned by Greene County as shown on Figure 1.0. These additional data are needed to more completely evaluate the SV results from the residential area north of High Street between N. Fulbright and N. Clifton Avenues.

The following sections present the rationale for each of the proposed SV locations included in this expanded SV sampling program.

High Street

SV sampling points will be installed at four locations in right-of-way on the south side of High Street.

- One location adjacent to SMW-80: SMW-80 has significantly elevated concentrations of Site-related chemicals of potential concern (COPCs) in groundwater compared to SMW-14 and SMW-15 which are located on the Facility west of SMW-80. SMW-80 also contains creosote. The highest concentrations of naphthalene and benzene detected at SMW-80 are 11,000 micrograms per liter (ug/L) and 10 ug/L, respectively.
- Three locations between SMW-80 and N. Clifton Avenue: These locations will be used to assess the potential impacts from the Greene County stormwater discharge. A stormwater detention basin utilizing best management practices (BMPs) and adjacent asphalt parking lot first appeared in April 2003 as observed on Google earth aerial photographs. On a March 2015 Google Earth photograph, a pile of dark material (possibly dirt, asphalt, or snow scraped from

the property) was observed at the entrance to the stormwater detention basin. SV samples will be collected from each of the locations proposed below:

- One on the east side of the culvert serving as the stormwater exit from the Greene County stormwater detention basin.
- One on the west side of the access road to Greene County at the northeast corner of the asphalt parking lot.
- One near the northeast corner of Greene County property, where a culvert for stormwater detention exits the property.

Facility

SV sampling points will be installed at six locations on the Facility to assess SV concentrations near known source areas or areas with elevated groundwater concentrations of benzene and naphthalene.

- Two locations in the northeast Facility area where the Clifton Drainage begins:
 - At SMW-14: historical benzene concentrations range from 1.1 to 2.0 ug/L, and naphthalene concentrations range up to 3,200 ug/L.
 - At SMW-15: historical benzene concentrations up to 7 ug/L, and naphthalene concentrations range up to 170 ug/L.
 - Maximum historical dissolved phase COPCs from SMW-14 and 15 were input to the U.S. Environmental Protection Agency's (EPA) Vapor Intrusion Screening Level (VISL) calculator (EPA, 2016), which estimated exceedance of indoor air vapor intrusion screening levels for benzene, ethylbenzene, naphthalene, and benzo(a)anthracene (full reporting is provided in the *Remedial Action Optimization Phase 1 Technical Memorandum, Former Tronox Wood Treating Facility, Springfield, Missouri*, dated October 24, 2016 [EWI, 2016]).
 - Comparing on-site to off-site monitoring well groundwater VISL screening results, where exceedances of indoor air screening levels occurred, the off-site groundwater consistently had higher calculated exceedances.
- Two locations in the east central Facility at the east property line with Greene County:
 - At TarGOST boring TG-47: measured creosote presence at the bedrock interface at a depth of 13-14 feet below land surface (ft bls).
 - At SMW-17: historical benzene concentrations range from 1 to 3.1 ug/L, and naphthalene concentrations range from 0.4 to 3,300 ug/L.
- Two locations in the south Facility bordering the pre-RCRA cell area where TarGOST investigations indicated a large area of creosote present:
 - At PW-20: historical benzene concentrations range from 4.6 to 9.8 ug/L, and naphthalene concentrations range from 5,400 to 6,700 ug/L, within the TarGOST creosote area.
 - At SMW-22R: historical benzene concentrations range from 9 to 23 ug/L, and naphthalene concentrations range from 4,600 to 6,500 ug/L, just outside the TarGOST creosote area.

Table 1.0 presents a summary of the historical BTEX, N groundwater concentrations for onsite and offsite wells. Table 2.0 presents a summary of the BTEX, N groundwater concentrations for the new wells installed as part of the RAO Work Plan field activities.

SV points will be installed and sampled in accordance with the procedures presented in the MoDNR-approved RAO Work Plan Addendum dated December 16, 2016. Samples will be collected using individually certified 1-liter Summa® canisters and will be submitted to Eurofins Lancaster laboratory for analysis using EPA Method TO-15 (full scan).

3.0 Schedule

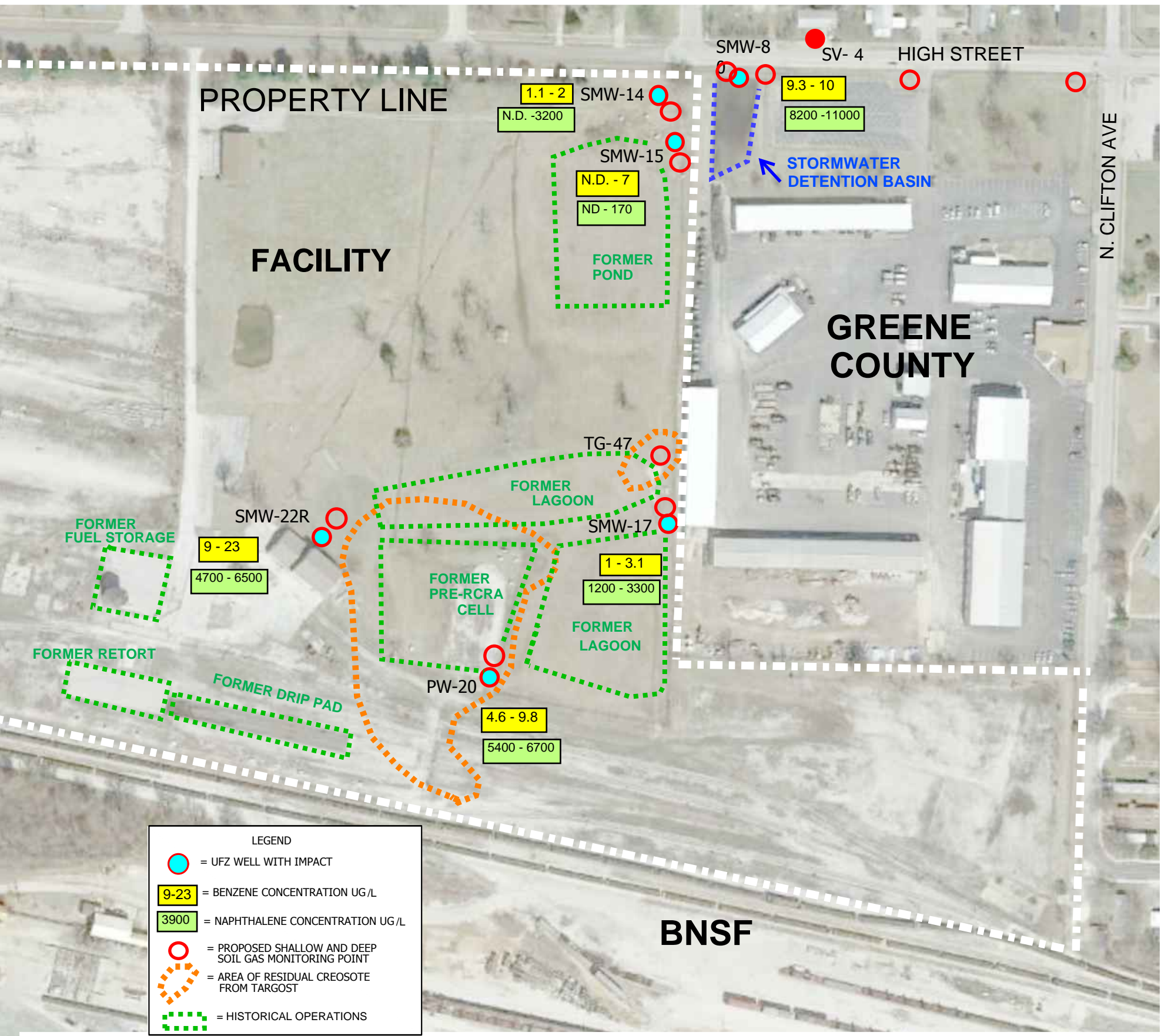
The table below summarizes the anticipated schedule. This is subject to weather and laboratory delays. The results from this additional SV sampling will be used to evaluate other potential sources of contamination and will be incorporated into the Vapor Intrusion Work Plan.

Activity	Starting Date	Completion Date
Shallow and Deep Soil Gas Collection	Week of January 9, 2017	Week of January 9, 2017
Receipt and Evaluation of Analytical Reports	Week of January 16, 2017	Week of January 16, 2017







4.0 References

EPA, 2016. Vapor Intrusion Screening Levels (VISLs). Version 3.5.1. May 2016 RSLs.
<https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls>

EWI, 2016. Remedial Action Optimization Phase 1 Technical Memorandum, Former Tronox Wood Treating Facility, Springfield, Missouri, October 24, 2016.



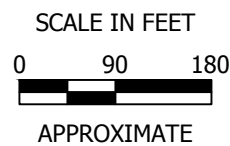
LEGEND

-  = UFZ WELL WITH IMPACT
-  9-23 = BENZENE CONCENTRATION UG/L
-  3900 = NAPHTHALENE CONCENTRATION UG/L
-  = PROPOSED SHALLOW AND DEEP SOIL GAS MONITORING POINT
-  = AREA OF RESIDUAL CREOSOTE FROM TARGOST
-  = HISTORICAL OPERATIONS



CHECKED BY:
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Dec. 30, 2016



PREPARED FOR:



Greenfield Environmental Multistate Trust, LLC,
Trustee of the Multistate Environmental
Response Trust

PREPARED BY:



ENVIRONMENTAL WORKS

PROPOSED SOIL GAS MONITORING POINTS - ONSITE & HIGH ST

SPRINGFIELD SITE GREENFIELD MULTISTATE TRUST
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
1.0

PRELIMINARY DRAFT 12/30/16

TABLE 1.0 ON-SITE AND OFF-SITE UPPER FLOW ZONE ANALYTICAL DATA HISTORICAL RANGES - 2014-2016
Former Tronox Facility, Springfield, Missouri

ON-SITE WELLS		Benzene (ug/L)	Ethylbenzene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	Naphthalene (ug/L)
Well	Location					
SMW-11B	Facility Northeast	<0.2	<0.2 - 0.8	<0.2 - 1.5	<0.2 - 1.1	<0.1 - 69
PW-01	Facility Northeast	<0.2	<0.2	<0.2	<0.2	<0.1 - 8
SMW-03	Facility Northeast	DNAPL and <0.2	DNAPL and 0.8	DNAPL and 0.8	DNAPL and 2.7	DNAPL and 25
SMW-13	Facility Northeast	<0.2	<0.2	<0.2	<0.2	<0.1 - 6
SMW-14	Facility Northeast	1.1 - 2	5.8 - 7.5	0.5 - 0.9	8.5 - 17	<0.1 - 3,200
SMW-15	Facility Northeast	<0.2 - 5.6	<0.2 - 9.7	<0.2 - 2.4	<0.2 - 14	<0.01 - 170
SMW-16	Facility Northeast	<0.2	<0.2	<0.2	<0.2	<0.1 - 0.8
SMW-17	Facility Southeast	1 - 2.3	7 - 13	1 - 3.7	10 - 39	1,200 - 3,300
SMW-18	Facility Southeast	<0.2	<0.2	<0.2	<0.2	0.2 - 0.3
PW-20	Facility South-Center	6.3 - 9.8	46 - 62	15 - 16	130 - 140	5,400 - 6,700
SMW-22R	Facility Southwest	9 - 23	21 - 25	7.2 - 25	58 - 110	4,700 - 6,500
SMW-30	Facility South	<0.2	<0.2 - 1.8	<0.2 - 0.8	<0.2 - 3.9	<0.1 - 140
OFF-SITE WELLS						
WL-MW-11	N. Woodlawn Spring	<0.2	<0.2	<0.2	<0.2	<0.1 - 5
WL-MW-2	Kearney St, N	<0.2	<0.2	<0.2	<0.2	<0.1
WL_MW-3	Kearney St, N	DNAPL	DNAPL	DNAPL	DNAPL	DNAPL
WL_MW-4	Kearney St, N	<0.2	<0.2	<0.2	<0.2	<0.1
SMW-73	Kearney St, S	<0.2	<0.2	<0.2	<0.2	<0.1 - 24
SMW-72	Kearney St, S	<0.2	4	0.2	0.8	1
RW-21	Kearney St, S	DNAPL	DNAPL	DNAPL	DNAPL	DNAPL
SMW-71	NE Clifton Drainage	<0.2 - 0.2	<0.2 - 0.3	<0.2 - 0.3	<0.2 - 1.2	0.1 - 37
SMW-74	Clifton Ave, N	<0.2	<0.2	<0.2	<0.2	<0.1 - 8
SMW-75	Clifton Ave, S	<0.2,	<0.2	<0.2	<0.2	<0.1
SMW-62	South BNSF	<0.2	<0.2	<0.2	<0.2	0.4 - 2
SMW-64	South BNSF	0.3 - 1.1	1.2 - 6.1	<0.2 - 0.3	2.2 - 6.4	45 - 230

TABLE 2.0 ON-SITE AND OFF-SITE UPPER FLOW ZONE ANALYTICAL DATA - 2016 NEW WELLS
Former Tronox Facility, Springfield, Missouri

ON-SITE WELLS		Benzene (ug/L)	Ethylbenzene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	Naphthalene (ug/L)
Well	Location					
BMW-13	Facility Center	1.9	1.0	2.9	3.3	58
BMW-12	Facility Southwest	DNAPL	DNAPL	DNAPL	DNAPL	DNAPL
SMW-76	Facility Southwest	DNAPL and <0.2	DNAPL and 1.7	DNAPL and <0.2	DNAPL and 3.8	DNAPL and 67
OFF-SITE WELLS						
SMW-85	N. Clifton Drainage	<0.2	<0.2	<0.2	<0.2	<1.0
SMW-84	N. Clifton Drainage	DNAPL and 0.5	DNAPL and 20	DNAPL and 5	DNAPL and 82	DNAPL and 5,000
SMW-82	N. Clifton Ave, center	DNAPL and <1.0	DNAPL and 13	DNAPL and 2.6	DNAPL and 38	DNAPL and 3,900
SMW-81	W. Truman St	<0.2	0.7	<0.2	2.7	4
SMW-86	W. Margret St, east	Results Pending				
SMW-87	W. Margret St, west	DNAPL - Results Pending				
SMW-80	High St, near Facility	DNAPL, 9.3 - 10	DNAPL, 92 - 94	DNAPL, 45 - 47	DNAPL, 300 - 310	DNAPL, 8,200 - 11,000
SMW-77	Greene County, east	0.3	<0.2	0.4	<0.2	0.14
SMW-78	Greene County, east	0.6	<0.2	1	0.8	0.54
SMW-83	Drury Ave, southwest	<0.2	<0.2	<0.2	<0.2	<0.1

NOTE: New wells with DNAPL were carefully sampled, avoiding DNAPL, to provide initial groundwater quality data