HRS DOCUMENTATION RECORD-- COVER SHEET

Name of Site: SHAFFER EQUIPMENT/ARBUCKLE CREEK AREA

EPA ID No.: WVD988768909

Date Prepared: September 2018

Contact Person(s):

Lorie Baker
U.S. Environmental Protection Agency
Philadelphia, Pennsylvania
(215) 814-3355
Baker.Lorie@epa.gov

Pathways, Components, or Threats Not Scored

Ground Water:
The Ground Water Migration Pathway was not scored because its inclusion would not significantly affect the site score. In June 2017, groundwater samples were collected from the four monitoring wells located on the Shaffer Equipment Co. property (References [Refs.] 12, p. 51; 30, pp. 12, 13; 52, pp. 1-3). Polychlorinated biphenyls (PCBs) were detected in one sample above the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) for drinking water (Refs. 2, p. 3; 52, p. 2). However, Minden is supplied drinking water from the West Virginia American Water Company whose source water is a surface water intake on the New River (Refs. 56, p. 1; 57, p. 16).

Soil Exposure Pathway and Subsurface Intrusion Pathway – Soil Exposure Component Nearby Population Threat:
The Nearby Population Threat of the Soil Exposure and Subsurface Intrusion Pathway – Soil Exposure Component was not scored because its inclusion would not significantly affect the site score.

Soil Exposure Pathway and Subsurface Intrusion Pathway – Subsurface Intrusion Component:
The Subsurface Intrusion Component of the Soil Exposure and Subsurface Intrusion Pathway was not scored because PCBs are the contaminant of concern at the Shaffer Equipment /Arbuckle Creek Area site; therefore, the subsurface intrusion component is not a concern at the site.

Air Migration Pathway:
The Air Migration Pathway was not scored because there is no documented observed release to the atmosphere, and scoring the potential to release to air would not significantly affect the site score.

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HRS DOCUMENTATION RECORD

Name of Site:	Shaffer Equipment/Arbuckle Creek Area
Date Prepared:	September 2018
EPA ID No.:	WVD988768909
EPA Region:	3
Street Address of Site*:	WV Route 17 (a.k.a. Minden Road)
City, State, and Zip Code:	Minden, Fayette County, West Virginia 25879
General Location in the State:	Southcentral
Topographic Map:	Oak Hill, West Virginia
Latitude*:	37.97651° North Longitude*: -81.1265° West

Latitude/Longitude Reference Point: The latitude and longitude is the location of sample SEC-SS-SE-02, a sample used to characterize Source 1, which was collected at the edge of the capped area on the Shaffer Equipment Company property, in December 2017 (Figure 3; Refs. 3; 26, p. 7; 27, p. 32; 66, p. 15; 84, pp. 1, 2).

*The street address, coordinates, and contaminant locations presented in this Hazard Ranking System (HRS) documentation record identify the general area where the site is located. They represent one or more locations the U.S. Environmental Protection Agency (EPA) considers part of the site based on the screening information EPA used to evaluate the site for inclusion on the National Priorities List (NPL). EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as an area where a hazardous substance has been "deposited, stored, disposed, or placed, or has otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed regarding where the contamination has come to be located.

<u>Scores</u>

Ground Water Pathway[1]	Not Scored
Surface Water Pathway	100.00
Soil Exposure and Subsurface Intrusion Pathway	14.76
Air Pathway	Not Scored
HRS SITE SCORE	50.54

1 “Ground water” and “groundwater” are synonymous; the spelling is different due to “ground water” being codified as part of the HRS, while “groundwater” is the modern spelling.

WORKSHEET FOR COMPUTING HRS SITE SCORE
Shaffer Equipment/Arbuckle Creek Area

	$\underline{S}$	$\underline{S^2}$
1. Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	NS	NS
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100	10,000
2b. Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	NS	NS
2c. Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100	10,000
3a. Soil Exposure Component Score (S_{se}) (from Table 5-1, line 22)	14.76	217.8576
3b. Subsurface Intrusion Component Score (S_{ssi}) (from Table 5-11, line 12)	NS	NS
3c. Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi}) (from Table 5-11, line 13)	14.76	217.8576
4. Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS	NS
5. Total of $S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2$	-	10,217.8576
6. **HRS Site Score** Divide the value on line 5 by 4 and take the square root	50.54	

Note:

NS= Not Scored

HRS TABLE 4-1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Shaffer Equipment/Arbuckle Creek Area

Factor Categories & Factors **DRINKING WATER THREAT**	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release by Overland Flow		
2a. Containment	10	not scored
2b. Runoff	25	
2c. Distance to Surface Water	25	
2d. Potential to Release by Overland Flow (lines 2a [2b + 2c])	500	
3. Potential to Release by Flood		
3a. Containment (Flood)	10	not scored
3b. Flood Frequency	50	
3c. Potential to Release by Flood (lines 3a x 3b)	500	
4. Potential to Release (lines 2d + 3c)	500	
5. Likelihood of Release (higher of lines 1 and 4)	550	550
Waste Characteristics		
6. Toxicity/Persistence	*	
7. Hazardous Waste Quantity	*	
8. Waste Characteristics	100	not scored
Targets		
9. Nearest Intake	50	Not scored
10. Population		
10a. Level I Concentrations	**	
10b. Level II Concentrations	**	
10c. Potential Contamination	**	
10d. Population (lines 10a + 10b + 10c)	**	
11. Resources	5	
12. Targets (lines 9 + 10d + 11)	**	
13. **DRINKING WATER THREAT SCORE** ([lines 5 x 8 x 12]/82,500)	100	Not scored

* Maximum value applies to waste characteristics category.
** Maximum value not applicable

HRS TABLE 4-1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Shaffer Equipment/Arbuckle Creek Area

Factor Categories & Factors **HUMAN FOOD CHAIN THREAT**	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+08
16. Hazardous Waste Quantity	*	100
17. Waste Characteristics	1,000	320
Targets		
18. Food Chain Individual	50	20
19. Population		
19a. Level I Concentrations	**	0
19b. Level II Concentrations	**	0
19c. Potential Human Food Chain Contamination	**	0.0000003
19d. Population (lines 19a + 19b + 19c)	**	0.0000003
20. Targets (lines 18 + 19d)	**	20.0000003
21. **HUMAN FOOD CHAIN THREAT SCORE** ([lines 14 x 17 x 20]/82,500)	100	42.66

* Maximum value applies to waste characteristics category.
** Maximum value not applicable

HRS TABLE 4-1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Shaffer Equipment/Arbuckle Creek Area

Factor Categories & Factors **ENVIRONMENTAL THREAT**	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	*	5.00E+08
24. Hazardous Waste Quantity	*	100
25. Waste Characteristics	1,000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0
26b. Level II Concentrations	**	200
26c. Potential Contamination	**	not scored
26d. Sensitive Environments (lines 26a + 26b + 26c)	**	200
27. Targets (line 26d)	**	200
28. **ENVIRONMENTAL THREAT SCORE** ([lines 22 x 25 x 27]/82,500)	60	60
29. WATERSHED SCORE (lines 13 + 21 + 28)	100	100
30. SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE (S_{of})	100	100.00
SURFACE WATER MIGRATION PATHWAY SCORE (S_{sw})	100	100.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable

HRS TABLE 5-1
SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY – SOIL EXPOSURE COMPONENT
Shaffer Equipment/Arbuckle Creek Area

Factor Categories & Factors **RESIDENT POPULATION THREAT**	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity/Persistence 3. Hazardous Waste Quantity 4. Waste Characteristics	* * 100	10,000 10 18
Targets		
5. Resident Individual 6. Resident Population 6a. Level I Concentrations 6b. Level II Concentrations 6c. Resident Population (lines 6a + 6b) 7. Workers 8. Resources 9. Terrestrial Sensitive Environments 10. Targets (lines 5 + 6c + 7 + 8 + 9)	50 ** ** ** 15 5 **	50 60 13 73 0 0 0 123
11. **RESIDENT POPULATION THREAT SCORE** (lines 1 x 4 x 10)		1,217,700

* Maximum value applies to waste characteristics category.
** Maximum value not applicable

HRS TABLE 5-1
SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY – SOIL EXPOSURE COMPONENT
Shaffer Equipment/Arbuckle Creek Area

NEARBY POPULATION THREAT	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	NS
13. Area of Contamination	100	NS
14. Likelihood of Exposure	500	NS
Waste Characteristics		
15. Toxicity/Persistence 16. Hazardous Waste Quantity 17. Waste Characteristics	* * 100	NS
Targets		
18. Nearby Individual	1	NS
19. Population within 1 mile	**	NS
20. Targets (lines 18 + 19)	**	NS
21. **NEARBY POPULATION THREAT SCORE** (lines 14 x 17 x 20)	**	NS
22. **SOIL EXPOSURE COMPONENT SCORE (S_e)** (lines [11 +21]/82,500)	100	14.76

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Reference
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90.	EPA. EPA Bans PCB Manufacture; Phases Out Uses [EPA press release - April 19, 1979]. Accessed Online on August 11, 2018. https://archive.epa.gov/epa/aboutepa/epa-bans-pcb-manufacture-phases-out-uses.html [3 pages]
91.	Oregon Department of Environmental Quality (DEQ). Fact Sheet: Sources of Polychlorinated Biphenyls. PCB FACT SHEET.CP.8-6-03.DOC. Accessed Online on August 11, 2018. https://www.oregon.gov/deq/FilterDocs/ph-SourcePCBs.pdf [11 pages]
92.	WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: June 2018

Reference
Number Description of the Reference

Logbook Notes. July 18, 2018. [8 pages]

93. WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: June 2018 GPS Data; with Attached Table of GPS Data. July 18, 2018. [2 pages]

94. Burman, Jarmael, EPA, CLP PO/RSCC/DDS. Electronic Mail Correspondence to Justin Bleiler Regarding Case RAS 47707; with attached Unvalidated Sample Summary Report for SDG C0AJ5. August 6, 2018. [18 pages]

95. WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: Wetland Frontage Located Along 15-Mile Surface Water Pathway Target Distance Limit (TDL). August 10, 2018 [3 pages]

96. WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: New River Gorge National River Park Boundary Memo. August 10, 2018 [1 page]

97. WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: Fayette County Tax parcel Database, with attached Parcel Map Information. August 12, 2018, http://maps.agdmaps.com/wv/fayette/ [8 pages]

98. WESTON. Project Note to Shaffer Equipment/Arbuckle Creek Area Site, Subject: Calculation of Distances. August 14, 2018 [1 page]

99. FEMA. Zone A Definition and Description. Accessed on August 28, 2018. https://www.fema.gov/zone [1 page.]

SITE SUMMARY

The site as scored for HRS purposes consists of two sources: contaminated soil source located on the Shaffer Equipment Company (SEC) property and contaminated soil source located on parcels along Arbuckle Creek downstream of the SEC property (see **Section 2.2**) as well as contaminated sediments in Arbuckle Creek (see **Section 4.1.2.1.1**) that stretch between and downstream of the two soil sources. As presented in the Source Characterization section, these sources have been documented to contain PCBs. A release of PCBs from sources to a Level II wetland, as well as additional Level II sensitive environments, and the presence of Level I and Level II Resident Population associated with the soil exposure component of the Soil Exposure and Subsurface Intrusion Pathway have been documented (see **Sections 4.1.4.3 and 5.1.1)**. Additionally, the presence of fishery (i.e. New River) located along the 15-mile Target Distance Limit (TDL) is subject to Potential Contamination (see **Section 4.1.3.3).**

The Shaffer Equipment/Arbuckle Creek Area site is located in Minden, Fayette County, West Virginia (**Figure 1**; Ref. 4, p. 1). The town of Minden, West Virginia, encompasses approximately 0.49 square miles situated in a valley between two ridges and has a population of approximately 242 people (Refs. 4, p. 1; 5, p. 1). Historically, the town was founded in the 1800s as a mining town (Ref. 6, p. 9). The SEC built and serviced electrical substations for the local coal mining industry from approximately 1970 to 1985 (Refs. 6, p. 5; 7, p. 8). The substations incorporated various types of transformers, capacitors, switches, and related voltage regulation and distribution devices that utilized cooling oil that contained PCBs (Refs. 6, p. 5; 7, p. 8). SEC stored nonessential, damaged or outdated transformers and capacitors on the approximate 1-acre property (Ref. 7, p. 8). The former SEC is situated on the southern bank of Arbuckle Creek within the creek's floodplain on the western end of the town of Minden (**Figures 1 and 3**; Refs. 8; 11, p. 10). Arbuckle Creek flows eastward through the center of Minden (Ref. 6, p. 21). Residential, commercial, vacant, and undeveloped properties border the creek on both the north and south banks, primarily within the creek's designated floodplain (**Figures 1, 3, 4, 5, and 6;** Refs. 8; 40).

Historically, it has been reported that Arbuckle Creek floods on average about 7 times a year, and in recent years the creek has been known to flood approximately 4 to 5 times a year (Refs. 7, p. 102; 14, p. 1). Additionally, historic flood events occurred in the eastern portion of West Virginia in 1985, as well as specifically in Minden, WV in July 2001, June 2016, and June 2017 (Refs. 15, pp. 20-37; 16, pp. 1-16; 17, pp. 1-11; 18, pp. 1, 2; 19, pp. 1-4; 20, pp. 1-4; 21, pp. 1-5; 22, pp. 1-5). In the summer of 1984, prior to the discovery of PCB contamination on the Shaffer property, in efforts to control the periodic flooding of Arbuckle Creek, the creek was dredged and the sediments were placed on residential properties as fill and in abandoned mine piles (Refs. 6, p. 9; 23, p. 9).

In September 1984, West Virginia Department of Natural Resources (DNR) conducted an inspection of the SEC property located at the western end of the town of Minden, bordering Arbuckle Creek to the south (**Figures 2 and 3**; Refs. 7, p. 8; 9, p. 1). During the initial inspection in September 1984 and a subsequent visit in October 1984, WVDNR and EPA observed hundreds of transformers and capacitors across the property and noted most of the capacitors were resting on their side, several of which had broken insulators with surrounding heavy oil spillage evident (Refs. 7, p. 218; 9, p. 1; 10, pp. 1-3). A four-point composite soil sample in the transformer area, a grab soil sample from the main transformer area, a grab soil sample from a drainage ditch leading towards Arbuckle Creek, and surface and subsurface soil samples from the capacitor spillage area were collected, as well as two sediment samples from Arbuckle Creek (Refs. 7, pp. 218 and 219; 10, pp. 1-7, 10, 11). Analytical data indicated the presence of PCBs at concentrations of 8,200 parts per million (ppm) (0.82%) in the composite sample, 33 ppm in the main transformer area soil sample, 260 ppm in the soil sample collected from the drainage ditch, 260,000 ppm (26%) in the surface soil sample collected from the capacitor spillage area, and 40,000 ppm (4 %) in the subsurface soil sample collected from the capacitor spillage area and 4 ppm and 3 ppm in the sediment samples collected from Arbuckle Creek (Refs. 7, pp. 218, 219; 10, pp. 5, 6, 10, and 11).

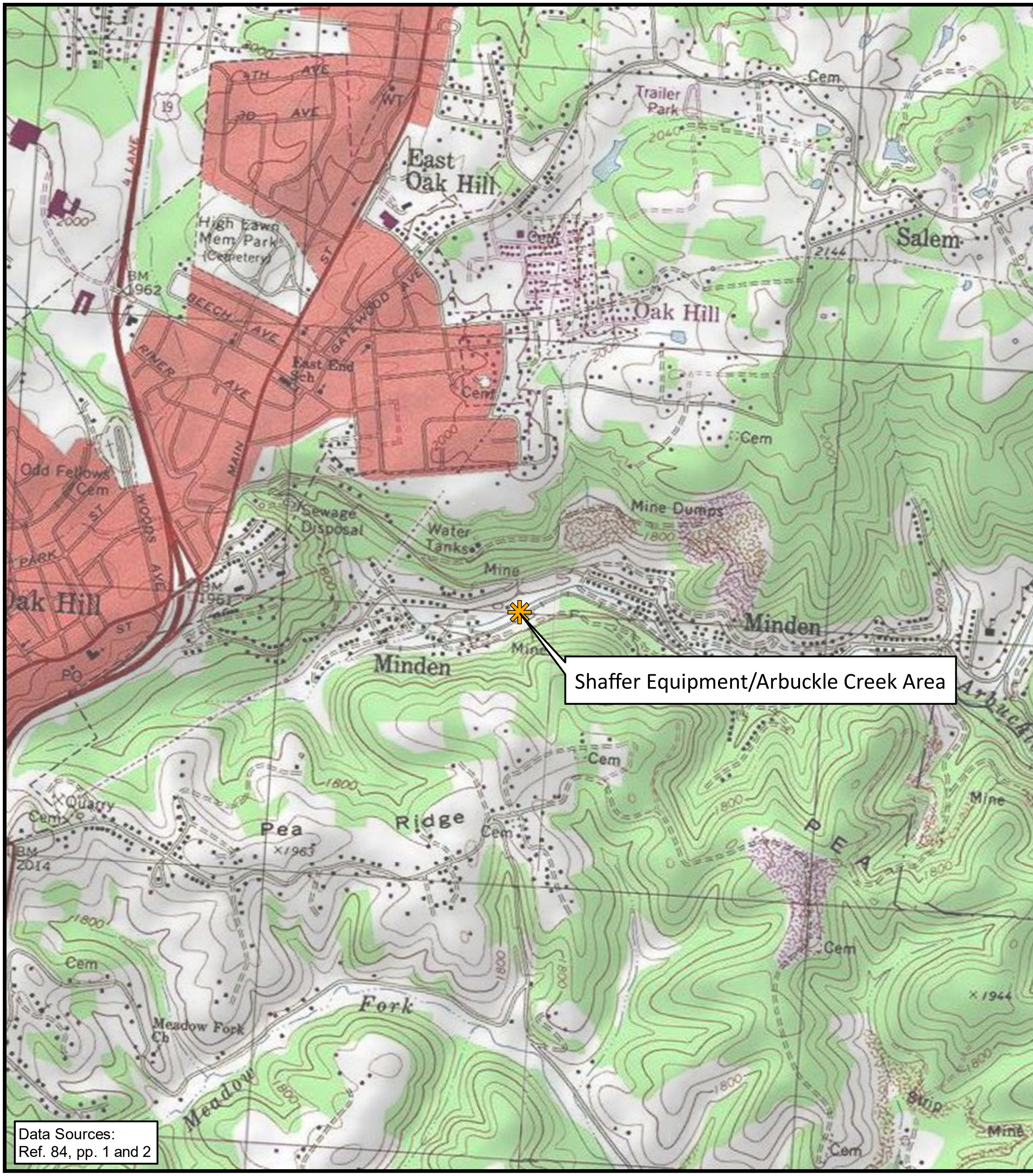
Subsequently, EPA conducted several investigations and removal actions at the SEC property. From December 1984 to December 1987, EPA conducted a removal action at the SEC property, which consisted of the removal and offsite disposal of 4,735 tons of soil from an approximate 1-acre area that contained PCBs at concentrations greater than 50 ppm and the removal and offsite disposal of capacitors, transformers, and numerous drums of transformer fluid (Ref. 7, pp. 4 and 74). Six inches of surface soil was removed from an area of the western end of the property along Arbuckle Creek (Area I) and post-excavation sample analysis indicated PCB concentrations <50 ppm. An area just west of the former building along Arbuckle Creek (Area II) was excavated 2 feet and the post-excavation samples indicated PCB concentrations <50 ppm (Refs. 12, p. 8; 11, p. 21). The excavated contaminated soils were staged in a clay-lined holding cell located in the flood plain of Arbuckle Creek on the SEC property until November 1987 when offsite disposal was completed (Ref. 7, pp. 102 and 415). On several occasions it was noted that the cover over the soil was partially off, ripped, deteriorated and exposed to the elements (Ref. 7, pp. 355, 359, 369). Additional soil and sediment samples collected in January 1985 indicated soil at residential property approximately 1 mile downstream of the Shaffer property contained PCBs as high as 15 ppm and in Arbuckle Creek as high as 73 ppm 300 feet downstream (Ref. 7, p. 237).

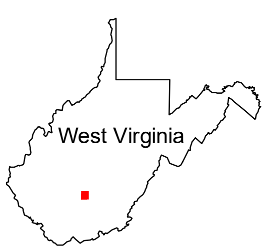
In March 1990, EPA conducted additional sampling on the SEC property, nearby residential properties, and from Arbuckle Creek (Ref. 11, pp. 13, 15-19, and 21). Analytical data indicated PCBs on the SEC property as high 660,000 micrograms per kilograms (µg/kg) in a sample collected from an on-property drainage ditch to Arbuckle Creek (SD-8), 240,000 µg/kg in surface soil (S-1), 110,000 µg/kg in subsurface soil (S-7), as high as 2,100 µg/kg on residential property (S-102), and as high as 5,200 µg/kg in Arbuckle Creek sediment (SD-5) (Ref. 11, pp. 15-17, 19, 21, 34, 36, 38, 40, and 43). Additional samples were collected from the SEC property in June 1990 with the highest concentrations of PCBs detected at 40,302.8 ppm (Ref. 12, p. 8). In November 1990, EPA conducted a second removal action at the SEC property that consisted of the excavation and off-property disposal soil from six areas at the property at depths ranging from 1 inch to 4 feet below ground surface (bgs) (Refs. 12, pp. 8, 9; 13, p. 19). Post-excavation samples collected from three areas were determined to be clean (Ref. 12, p. 8). Post-excavation samples collected from a fourth area showed results of 772 ppm and less than 50 ppm (Ref. 12, p. 8). The remaining two areas indicated PCB concentrations of 2,030 ppm and 10,500 ppm (Ref. 12, p. 9). Additional soil was excavated from these areas (Ref. 12, p. 9). The excavated areas were backfilled with soil from a borrow area south of the SEC facility (Ref. 12, p. 9). The backfilled area was resampled and PCB concentrations ranged from 0.1 to 1000 ppm (Ref. 12, p. 9).

Following the two soil excavation and off-property disposal removal actions conducted between 1984 and 1987 and in 1990, in 1993 EPA collected 125 soil samples from the SEC property, eight soil samples from residential properties, 11 samples from a drainage ditch on the SEC property, and 24 sediment samples from Arbuckle Creek (Ref. 13, pp. 23-34, 36, 37, 39-50). Eleven samples indicated PCB concentrations greater than 50 ppm, 11 samples indicated PCB concentrations between 10 ppm and 50 ppm, and 91 samples indicated PCB concentrations less than 10 ppm (Ref. 13, pp. 13, 39-50). Twenty subsurface soil samples were collected from the SEC property and field-tested for PCBs (Ref. 13, p. 14). Two of the samples indicated PCB concentrations greater than 50 ppm and the remaining 18 indicated PCB concentrations less than 10 ppm (Ref. 13, pp. 14, 39-41, 43-48).

From October 2001 through December 2001, the U.S. Army Corps of Engineers conducted a third removal action at the SEC property that involved the installation of an impervious barrier/cap over a portion of the remaining contaminated soil on the SEC property that consisted of a compacted clay layer and a 40-millimeter thick, high-density polyethylene impervious cap/barrier placed over the compacted clay and installing metal sheet pilings along the bank of Arbuckle Creek (Ref. 12, pp. 10, 12, 15, 16, 50-54). Excavated and capped areas at the SEC property are shown on **Figures 2 and 3**.

EPA has investigated additional locations in Minden, WV as possible sources for PCBs detected in Arbuckle Creek and in soil on residential properties. One location, known as Britt Bath House investigated in 1991 indicated limited PCB soil contamination and is discussed in further detail in the **Attribution Section** of this HRS documentation record (Ref. 53, pp. 63). Two other locations investigated in 1991 did not contain PCBs in the collected samples and thus are not discussed further in this HRS documentation record (Refs. 54, pp. 8, 31, 32, 56, and 58, 60; Ref. 55, pp. 5, 28-30, 54-56, 142, 148, 160, 168, 176, 184, 192, 200, 211, 219). Residents have indicated to EPA that there are numerous locations throughout the town where PCB oil was allegedly dumped as well as numerous locations where the potentially PCB-contaminated sediments from Arbuckle Creek were placed. EPA and WVDEP are coordinating with the local community to identify and evaluate these locations (Refs. 23, p. 9; 88, pp. 6, 9, 10, 22-24, 27).





USGS 7.5 Minute Quadrangle
Oakhill, West Virginia, 1976. Revised 1978
Thurmond, West Virginia, 1976. Revised 1977

N

Coordinate System:
WGS84 UTM Zone 17N Feet

0 1,000 2,000
Feet

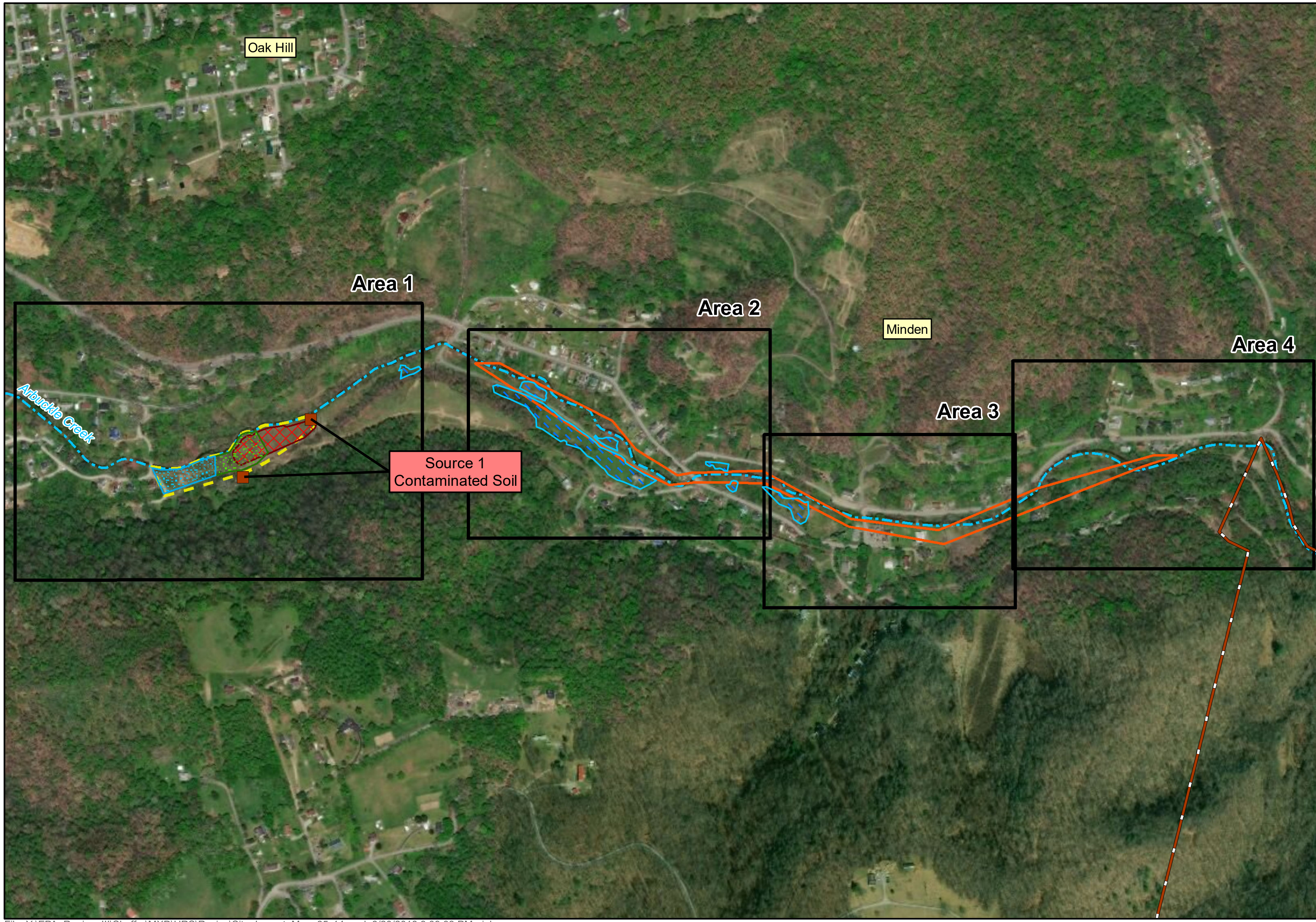
Shaffer Equipment/Arbuckle Creek Area
Minden, Fayette County, West Virginia

Figure 1
Site Location Map

TDD#: W503-17-12-001
Contract: EP-S3-15-02
Prepared: 8/9/2018

WESTON SOLUTIONS

File: Y:\EPA_Region_III\Shaffer\MXD\HRS\Resize\Site_Loc_Map.mxd, 8/9/2018 4:01:54 PM, ricksc



Legend

- Approximate Shaffer Equipment Company Boundary
- Sampling Areas
- Capped Area Boundary
- Excavation (6 inch)
- Excavation (2 ft)
- New River Gorge National River Park Boundary
- Source 2/AOC A
- Delineated Wetland Boundaries
- Arbuckle Creek

Data Sources:
Refs. 11, p. 10; 12, pp. 51-53; 32, pp. 1, 2; 67, p. 13; 84, pp. 1, 2; 85, pp. 1, 2; 96
Section 2.2.2 of this HRS documentation record

Background: ESRI, Mapping Service
The source of this map image is Esri, used by the EPA with Esri's permission

Coordinate System:
WGS84 UTM Zone 17N Feet

N

0 170 340 680
Feet

Shaffer Equipment/Arbuckle Creek Area
Minden, Fayette County, West Virginia

Figure 2
Site Layout Map

TDD#: W503-17-12-001
Contract: EP-S3-15-02
Prepared: 8/20/2018

WESTON SOLUTIONS

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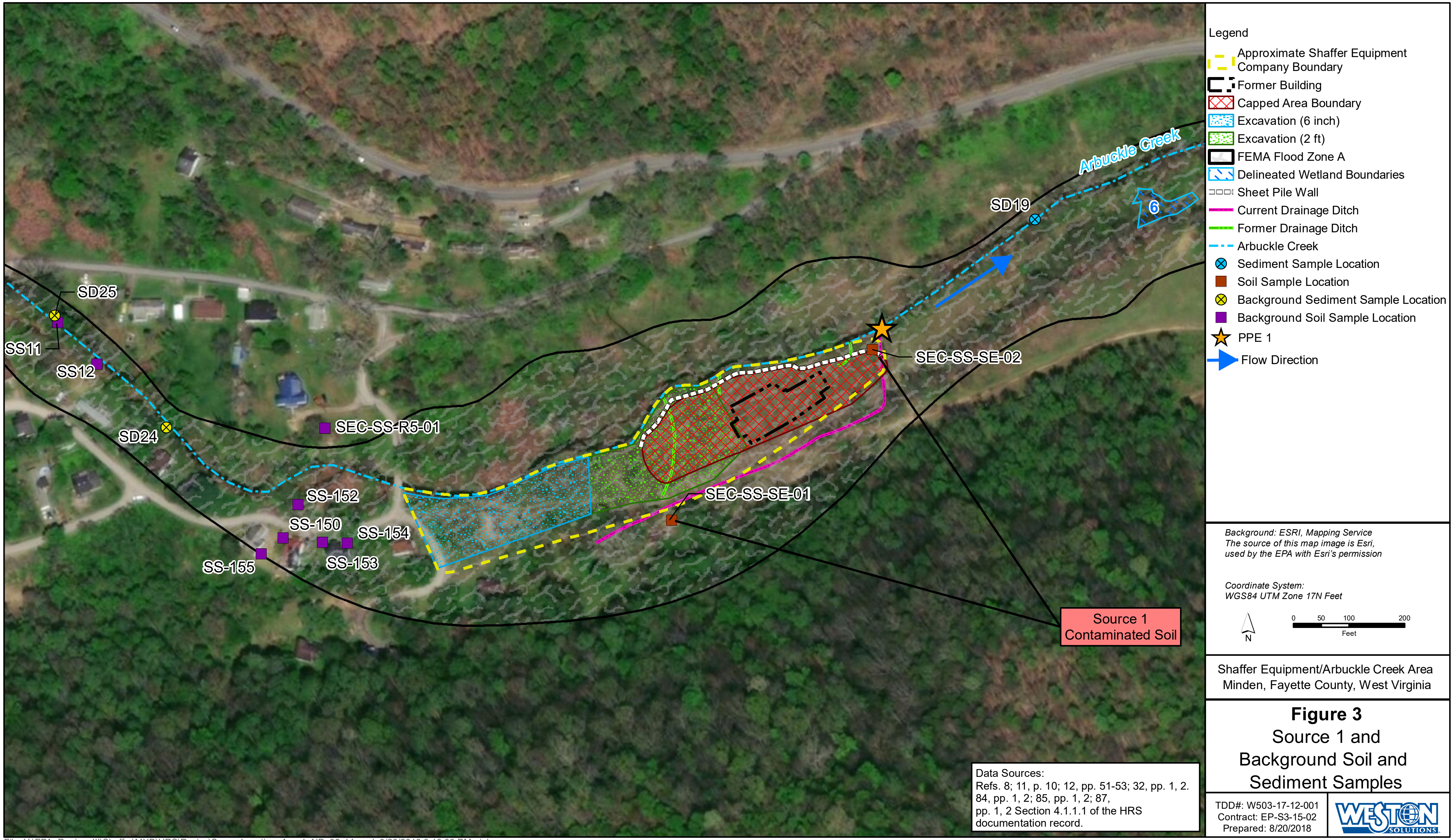

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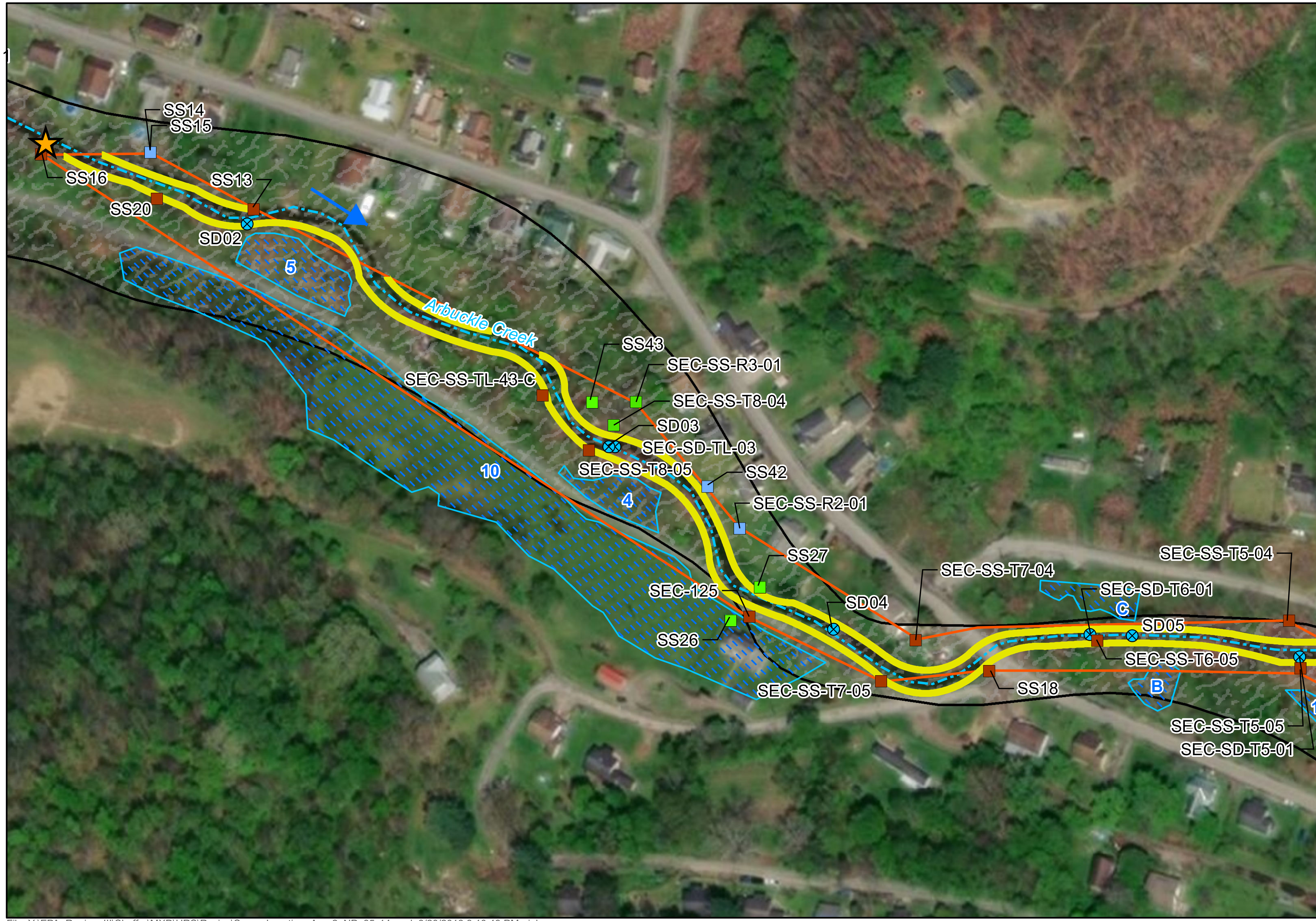


Data Sources:
Refs. 8; 32, pp. 1, 2; 84, pp. 1, 2; 85, pp. 1, 2
Section 2.2.2 of this HRS documentation record.
Section 4.1.1.1 of the HRS documentation record.
Section 5.1.1.3.2 of the HRS documentation record.

Background: ESRI, Mapping Service
The source of this map image is Esri, used by the EPA with Esri's permission

Coordinate System:
WGS84 UTM Zone 17N Feet

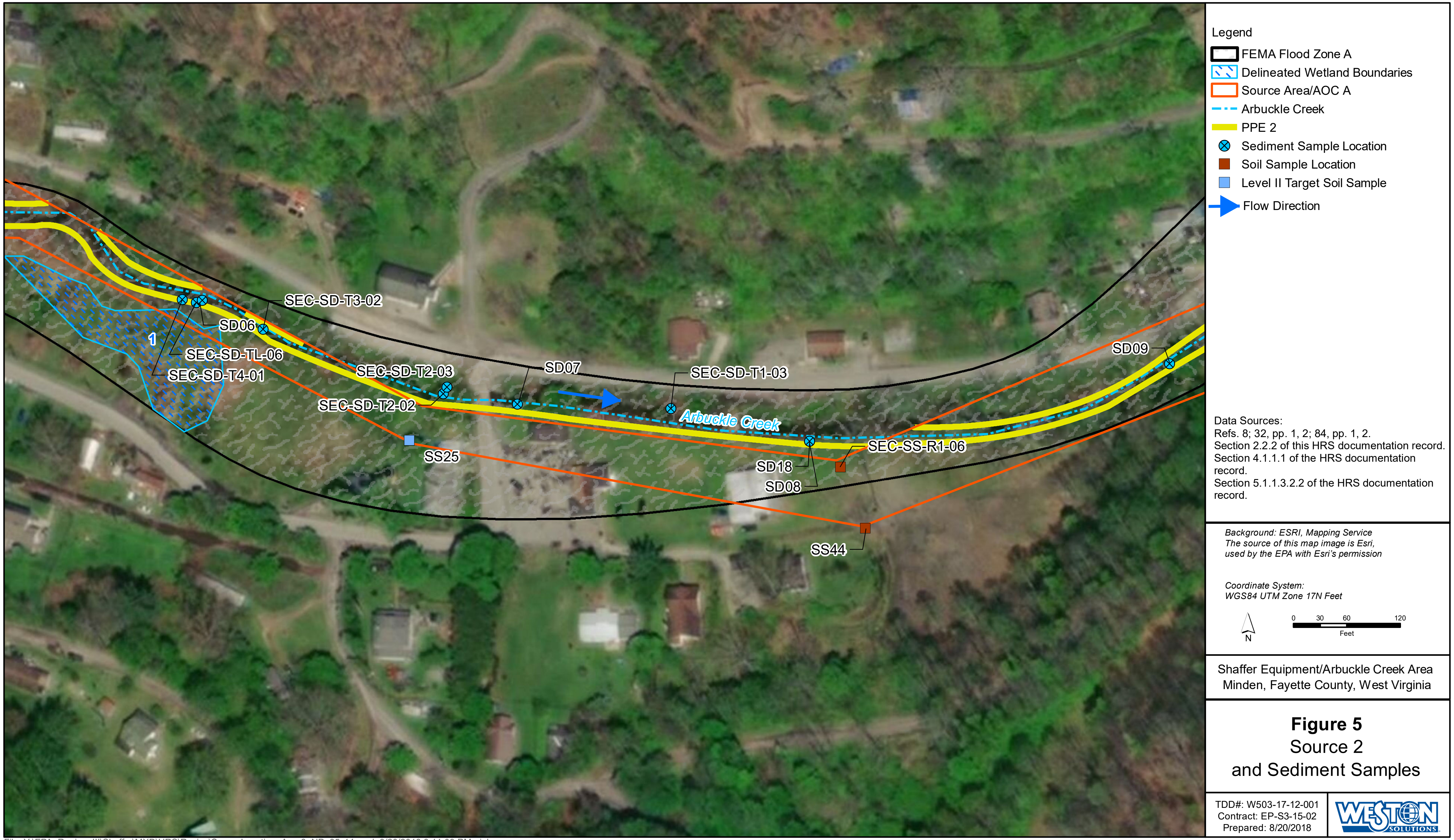
Shaffer Equipment/Arbuckle Creek Area
Minden, Fayette County, West Virginia

Figure 4
Source 2
and Sediment Samples

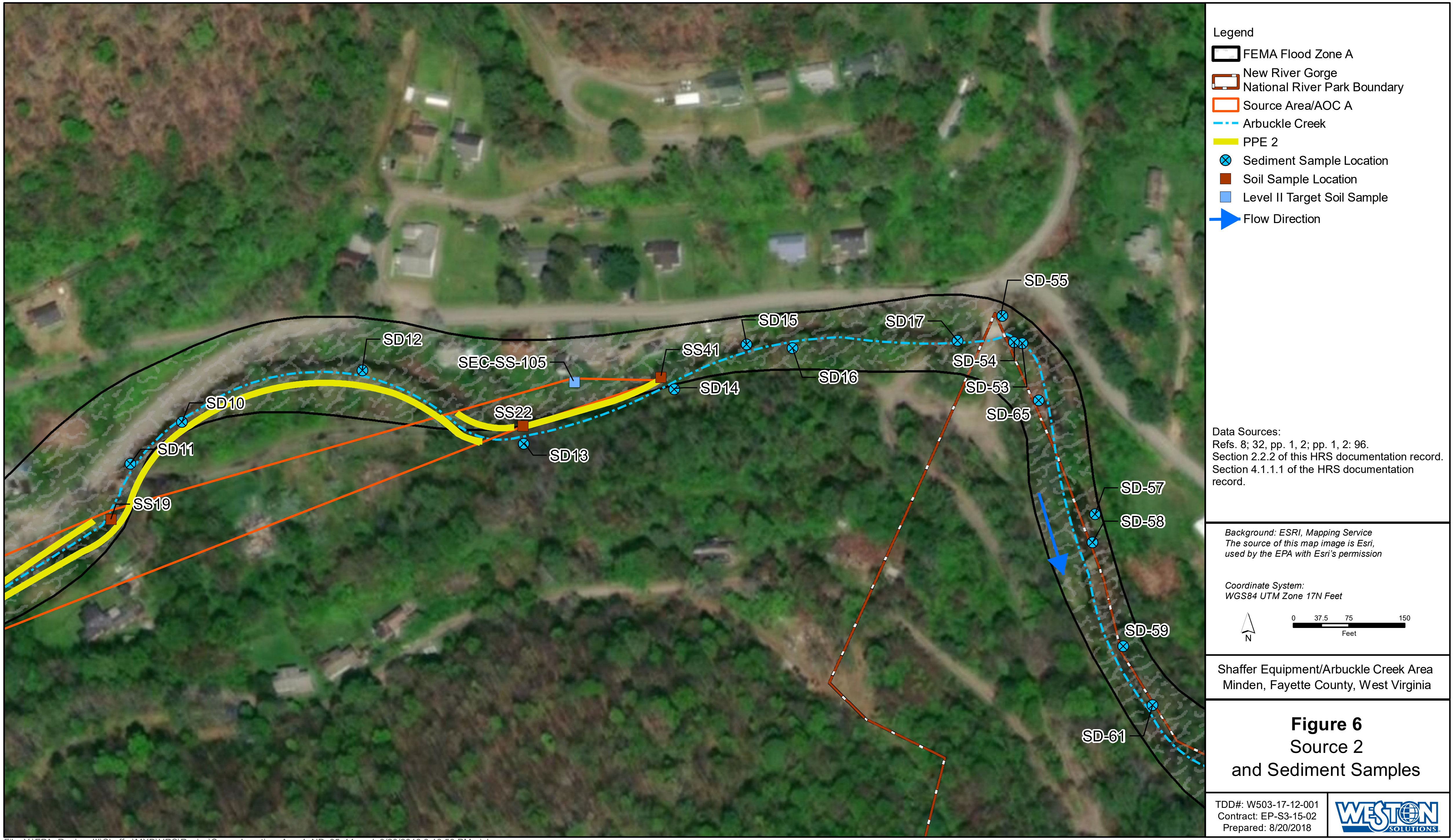
TDD#: W503-17-12-001
Contract: EP-S3-15-02
Prepared: 8/20/2018

WESTON SOLUTIONS

File: Y:\EPA_Region_III\Shaffer\MXD\HRS\Resize\Samp_Location_Area2_NP_85x14.mxd, 8/20/2018 3:10:49 PM, ricksc



File: Y:\EPA_Region_III\Shaffer\MXD\HRS\Resize\Samp_Location_Area3_NP_85x14.mxd, 8/20/2018 3:11:09 PM, ricksc



File: Y:\EPA_Region_III\Shaffer\MXD\HRS\Resize\Samp_Location_Area4_NP_85x14.mxd, 8/20/2018 3:16:58 PM, ricksc

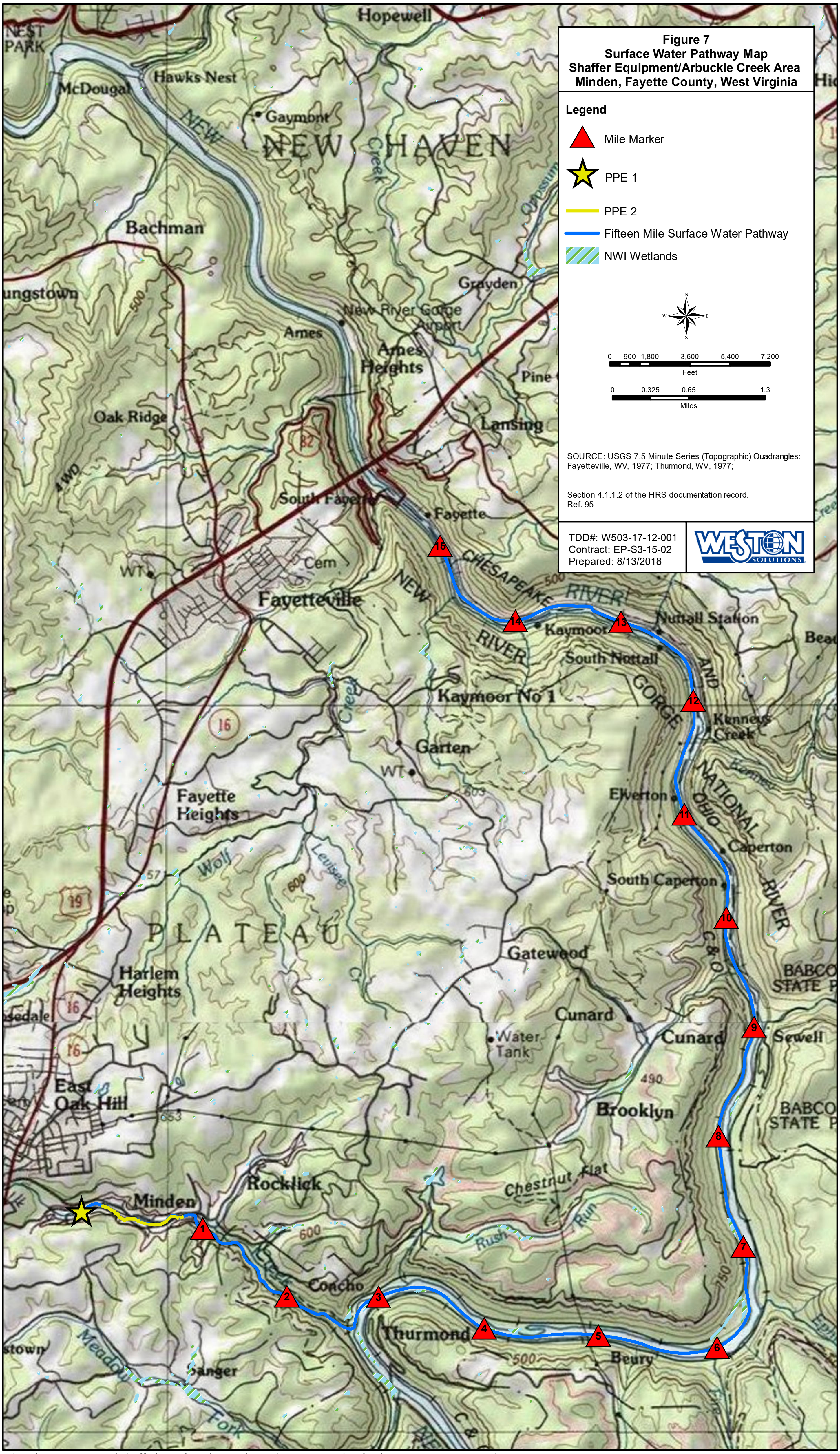


Figure 7
Surface Water Pathway Map
Shaffer Equipment/Arbuckle Creek Area
Minden, Fayette County, West Virginia
Legend
Mile Marker
PPE 1
PPE 2
Fifteen Mile Surface Water Pathway
NWI Wetlands
N
S
E
W
0 900 1,800 3,600 5,400 7,200
Feet
0 0.325 0.65 1.3
Miles
SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangles: Fayetteville, WV, 1977; Thurmond, WV, 1977;
Section 4.1.1.2 of the HRS documentation record.
Ref. 95
TDD#: W503-17-12-001
Contract: EP-S3-15-02
Prepared: 8/13/2018
WESTON SOLUTIONS
Hopewell
Hawks Nest
McDougal
Gaymont
NEW HAVEN
NEW
Bachman
Grayden
New River Gorge Airport
Ames
Ames Heights
Lansing
Oak Ridge
South Fayette
Fayette
Fayetteville
CHESAPEAKE
RIVER
Kaymoor
Nuttall Station
South Nuttall
Kaymoor No 1
Garten
Kenneys Creek
Elverton
Caperton
South Caperton
Fayette Heights
PLATEAU
Harlem Heights
Gatewood
Cunard
Sewell
Water Tank
Brooklyn
East Oak Hill
Rocklick
Minden
Chestnut Flat
Concho
Thurmond
Beury
Sanger
Meadow Fork
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1

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 1

Name of source: Shaffer Contaminated Soil

Source Type: Contaminated Soil

Location of the source, with reference to a map of the site.

Source No. 1 is located on the SEC property, as shown on **Figure 3.** Source No. 1, contaminated soil, consists of an area of PCB-contaminated soil of an undetermined extent on the SEC property that has resulted from the migration, deposition, or spillage of hazardous substances associated with the handling, storage, maintenance, and management practices involving hundreds of PCB-containing transformers and capacitors (Refs. 7, pp. 8, 18, 32, 218, 219, and 231; 9, p. 1; 10, pp. 1-3; 11, pp. 7, 9, 10, 23, 24).

As discussed in the Site Summary Section, EPA has conducted numerous investigations and removal actions at the SEC property since 1984, including the removal and offsite disposal of PCB-contaminated soil. During the initial removal from 1984-1987, soils containing PCBs at concentrations less than 50 ppm were left in place and backfilled (Ref. 7, p. 259). Additionally, post-excavation and post-backfill samples collected following the second removal in 1990 indicated PCB concentrations as high as 1,000 ppm in the backfilled area (Ref. 12, p. 9). Fifty ppm (1 ppm = 1 mg/kg) in soil for PCBs exceeds the HRS soil exposure component benchmarks as well as the RSLs for residential and industrial soil (Refs. 2, p. 3; 24, p. 10).

Source 1 is characterized by two soil samples collected in December 2017 from the SEC property; SEC-SS-SE-01 was collected from beyond the excavated and backfilled area adjacent to a demolished building reportedly used for storage in the southwest corner of the former SEC property and SEC-SS-SE-02 was collected from a drainage channel beneath a broken section of the capped wall in the northeast corner of the former SEC property (**Figure 3**; Refs. 26, p. 7; 27, pp. 31-32; 66, p. 15; 84, p. 2).

As evidenced by the historical sampling following the removal actions as well as the analytical data collected as part of this HRS investigation that show the presence of PCBs in soil on the SEC property at concentrations significantly above background (see **Section 2.2.2**), all site-related waste has not been removed.

2.2.2 Hazardous Substances Associated with Source

Though not required by the HRS, to document the presence of PCBs in the source at significant concentrations, the analytical results of the soil/source samples collected in December 2017 were compared to background soil samples collected in June 2017, December 2017, and March 2018 from properties located upstream from the SEC property at locations not expected to have been impacted by surface water runoff or flooding from the source (Refs. 26, p. 7; 27, p. 30, 31, 32; 30. p. 18; 31, p. 41; 32, pp. 1, 2; 44, p. 35; 47, pp. 5, 6, and 7; 64, p. 21; 84, pp. 1, 2; 85, pp. 1, 2; 1, Section 2.2.2). All soil samples from the June 2017, December 2017, and March 2018 sampling events were submitted to and analyzed by an EPA Contract Laboratory Program (CLP) laboratory for PCBs in accordance with CLP Statement of Work (SOW) SOM02.4, and the analytical data were validated by EPA Region 3 Environmental Services Assistance Team (ESAT) according to the National Functional Guidelines for Organic Superfund Methods Data Review and applicable USEPA Region 3 modifications (Refs. 26, p. 7; 28, pp. 1, 2, 23; 30. p. 18; 31, pp. 1, 3, 4, and 41; 44, pp. 1, 2, and 35; 47, pp. 5, 6, and 7; 64, pp. 1, 2, and 21). The background soil samples and source soil samples are all grab samples consisting of similar matrices comprised of silt, silty-sand, and silty-clay with comparable percent solids ranging from 65.2% to 79.6% (Refs. 26, p. 7; 27, pp. 30, 31, 32; 30, p. 18; 31, pp. 18, 19, 41; 28, pp. 13, 14, 23; 44, pp. 30, 35; 47, pp. 5, 6, 7; 64, pp. 10, 12, 13, 14, 15, 21). The background soil and source soil samples collected in June and December 2017 and March 2018 were documented as having been collected between 0 to 6 inches bgs (0 to 0.5 feet bgs) (Refs. 26, p. 14; 27, pp. 30, 31, 32; 47, p. 8; 35, p. 3; 48, pp. 10, 11).

The following table summarizes analytical results of background soil samples. If a background concentration was reported at an estimated concentration below the adjusted EPA Contract Laboratory Program Contract Required Quantitation Limit (CRQL), the higher of the adjusted CRQL, or three times the estimated concentration was used to determine elevation over background (Ref. 1, Table 2-3). The highest of the background concentrations or the highest adjusted CRQL is used for comparison against all the soil/source data. PCB concentrations at or above the highest adjusted CRQL, 48 µg/kg, are elevated above background. The background soil samples are shown on **Figure 3**.

Table 1
Source No. 1 –Background Soil Samples

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AD8	SS11	6/15/17	PCB – Aroclor 1260	11J[1]	44	30, p. 18; 31, pp. 1-5, 18, 41, 101; 35, pp. 1 and 3
C0AD9	SS12	6/15/17	PCB – Aroclor 1260	15J[1]	43	30, p. 18; 31, pp. 1-5, 19, 41, 106; 35, pp. 1 and 3
C0AG6	SEC-SS-R5-01	12/13/17	PCB – Aroclor 1260	41U	41	26, p. 7; 27, p. 30; 38, pp. 1 and 11; 44, pp. 1-4, 30, 35, 145
C0AE6	SS-150	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 5-6; 48, pp. 1 and 10; 64, pp. 1-4, 10, 21, 56
C0AE8	SS-152	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 12, 21, 64
C0AE9	SS-153	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 13, 21, 67
C0AF0	SS-154	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 14, 21, 70
C0AF1	SS-155	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 7; 48, pp. 1 and 11; 64, pp. 1-4, 15, 21, 73

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Refs. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL: EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
µg/kg = micrograms per kilogram
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (Ref. 31, p. 4). Samples reporting concentrations of target analytes less than CRQLs are estimated and have been qualified J (Refs. 31, pp. 1-5; 49, pp. 246, 247).

U= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit
[1] Qualified background data were used in accordance with EPA Fact Sheet *Using Qualified Data to Document an Observed Release and Observed Contamination*, which states "The adjustment factors apply only to "J" qualified data above the CRQL"; therefore, the qualified data was not adjusted (Ref. 37, pp. 4). Although the fact sheet was not intended for application to source data, it has been applied in this situation to demonstrate the relative increase in contamination in the samples over background levels.

The following table summarizes analytical results of Source 1 soil samples. Source 1 soil sample locations are on **Figures 3**.

Table 2
Source No. 1 –Soil Samples

CLP Sample ID	Field Sampling ID	Date	Hazardous Substance	Concentration (μg/kg)	Adjusted CRQL (μg/kg)	References
C0AG7	SEC-SS-SE-01	12/13/17	PCB – Aroclor 1260	54,000	25,000	26, p. 7; 27, p. 31; 28, pp. 1-4, 13, 23, 80; 38, pp. 1 and 3
C0AG8	SEC-SS-SE-02	12/13/17	PCB – Aroclor 1260	270	43	26, p. 7; 27, p. 32; 28, p. 1-4, 14, 23, 83; 38, pp. 1 and 3

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Refs. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL = EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
SEC = Shaffer Equipment Company
μg/kg = micrograms per kilogram

2.2.3 Hazardous Substances Available to a Pathway

Source 1, which includes two samples that document concentrations of PCBs above background level as noted in Section 2.2.2, is located within Arbuckle Creek's floodplain (**Figure 3**). Additionally, source sample SEC-SS-SE-02 was collected from a drainage channel beneath a broken section of the capped wall in the northeast corner of the former SEC property that leads into Arbuckle Creek (**Figure 3**; Refs. 26, p. 7; 27, p. 32; 66, p. 15). Chemical analysis of sediment samples collected from Arbuckle Creek downstream of the source document a release of attributable hazardous substances to the surface water migration pathway (**see Section 4.1.2.1.1**).

As part of the 1984-1987 removal actions, EPA constructed a 3-foot high berm along Arbuckle Creek and the SEC property in September 1985 (Ref. 7, p. 42, 74). However, it was noted in the 2003 Final Removal Action report that extensive flooding had significantly eroded the bank of Arbuckle Creek and affected the berms constructed during the previous removal actions (Ref. 12, pp. 5, 319-328). During the removal actions conducted between October and December 2001, a metal sheet pile wall was constructed along the northern perimeter of the cap along a portion of Arbuckle Creek, as shown on **Figure 3** (Ref. 12, pp. 12, 15, 16, 52, and 53). The metal sheet piling extends between approximately 1 and 3 feet above the elevation of the cap (Ref. 12, pp. 52, 53, 381). Additionally, a riprap drainage ditch was constructed along the southern, western and eastern boundaries of the cap to divert surface water away from the capped area (Ref. 12, pp. 10-12, 53). The cap was inspected in April and May 2002 with a final inspection conducted in December 2002 by USEPA, WVDEP and USACE; however, there is no documentation that any further inspection or maintenance was conducted by the property owner, WVDEP, or EPA (Refs. 12, p. 16; 39, pp. 1-2).

In June 2016, a 1-in-1,000-year flood occurred in Fayette County, WV, with approximately 8 to 10 inches (200-250 millimeter) of rain falling between 7 am and 8 pm (13 hours), Fayette County was declared a federal major disaster (Refs. 18, pp. 1-2; 19, p. 1). In June 2017, severe flooding occurred in Minden, WV, with roadways closed due to Arbuckle Creek flooding the streets (Refs. 20, p. 2; 21, pp. 1-3; 22, pp. 1-5).

As noted above, no maintained engineered cover or functioning and maintained run-on control system and runoff management system is documented for soil sample/source sample SEC-SS-SE-02 and the complete absence of a maintained engineered cover or functioning and maintained run-on control system and runoff management system is documented for soil sample/source sample SEC-SS-SE-01 used to characterize Source 1 and the lack of a designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood. As documented in **Section 4.1.2.1.1**, source-related contaminants are present in Arbuckle Creek. Based on lack of overland flow/flood containment features, the containment factor for the surface water migration pathway is assigned a value of 10 (Ref. 1, Table 4-2 and Table 4-8).

Containment Description	Containment Factor	References
Release via overland migration: lack of a maintained engineered cover, and any complete run-on and runoff control management systems	10	1, Table 4-2
Release flood: lack of a designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood	10	1, Table 4-8

2.4.2.1 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The hazardous constituent quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (e.g., manifests, Potentially Responsible Party (PRP) records, State records, permits, waste concentration data, etc.) available to adequately calculate the total mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source No. 1 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, Hazardous Wastestream Quantity (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

The hazardous wastestream quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the mass of the hazardous wastestreams plus the mass of any additional CERCLA pollutants and contaminants in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (e.g., manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) available to adequately calculate the total mass or partial mass of the wastestream plus the mass of all CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, insufficient information is available to evaluate the associated releases from the source to calculate or extrapolate the hazardous wastestream quantity for Source No. 1 with reasonable confidence. Scoring proceeds to the evaluation of Tier C, Volume [Ref. 1, Section 2.4.2.1.2].

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3 Volume

The information available on the depth of Source No. 1 is not sufficiently specific to support an exact volume of the contaminated soil with reasonable confidence; therefore, it is not possible to assign a volume (Tier C) for Source 1 (Ref. 1, Section 2.4.2.1.3). Source 1 has been assigned a value of 0 for the volume measure (Ref. 1, Section 2.4.2.1.3). As a result, the evaluation of HWQ proceeds to the evaluation of Tier D, area (Ref. 1, Section 2.4.2.1.3).

Volume (V) Value: 0

2.4.2.1.4 Area

As presented in **Section 2.2.2** of this HRS documentation record, contaminated soil has been documented at the site; however, a definitive area of contamination has not been determined (**Figure 3**). An area of contaminated soil cannot be quantified based on the soil sampling locations from the December 2017 sampling event. Because the information available is insufficient to estimate the area and measure with reasonable confidence [as required in Section 2.4.2.1.4 of Reference 1], a value of greater than zero (>0) is established as the source hazardous waste quantity (HWQ) value for Tier D – area. The source type is "Contaminated Soil," so the area value is divided by 34,000 to obtain the assigned value of >0, as shown below (Ref. 1, Section 2.4.2.1.4, Table 2-5).

Area of source in square feet (ft^2) = >0
Area (A) Assigned Value: >0/34,000 = >0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The highest assigned source hazardous waste quantity value for Source No. 1 was assigned based on D – Area [Ref. 1, Table 2-5].

Source Hazardous Waste Quantity Value: >0

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 2

Name and description of the source: Downstream Contaminated Soil

Source Type: Contaminated Soil

Location of the source, with reference to a map of the site:

Source No. 2, contaminated soil, is located on portions of numerous parcels within and adjacent to the floodplain of Arbuckle Creek (**see Figures 4, 5, and 6**) downstream of the SEC property. Source No. 2 is likely primarily a product of the PCB-contaminated sediments within Arbuckle Creek being deposited onto the properties as a result of the periodic and historic flooding of Arbuckle Creek (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-15; 17, pp. 1-11; 21, pp. 1-3; and 22, pp. 1-5). The separate areas of contaminated soil, as documented by the analytical results presented in **Table 4** of this HRS documentation record, are aggregated into a single source for this HRS scoring for the following reasons: the same source type (i.e., contaminated soil), affects similar targets (i.e., sensitive environments, **see Section 4.1.4.3** and resident population, **see Section 5.1.1.3**), the same contaminant of concern (i.e., PCBs), is deposited in a similar manner (i.e., deposition by flooding).

Historically, soil samples collected from residential properties located along Arbuckle Creek up to 1 mile downstream of the SEC property have contained concentrations of PCBs up to 15 ppm (Ref. 7, p. 237). Analytical data of soil samples from March 1985 showed PCBs up to 7 ppm in a residential yard approximately 0.6 mile from the SEC property and up to 7 ppm in a sediment sample collected from Arbuckle Creek approximately 0.6 mile downstream from the SEC property (Ref. 7, p. 258). Additional soil sampling conducted on several occasions throughout the 1990s at the SEC property and sediment sampling of Arbuckle Creek continued to show the presence of PCBs (Refs. 11, pp. 15-17, 19, 21, 34, 36, 38, 40, and 43; 12, p. 8; 13, pp. 13, 14, 23-34, 36, 37, 39-50).

Arbuckle Creek is prone to annual periodic flooding and occasional significant flooding (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-15; 17, pp. 1-11; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5). Prior to the initial Removal Action, EPA noted that recent past floods had fully engulfed the Shaffer property and there was evidence of stream scouring and flood damage on the property (Ref. 7, p. 102). Prior to the third removal action, which consisted of capping a portion of the contaminated soil, a major flood event occurred in July 2001. Photographs taken of the SEC property in August, September, and October 2001 following the flood, document widespread damage and drainage channels across the property (Ref. 12, pp. 13-16, 318-325). Additionally, it was noted that the extensive flooding significantly eroded the bank of Arbuckle Creek and affected the berm constructed during the removal activities in 1987 (Ref. 12, p. 5). The 2001 Flood event engulfed the entire town of Minden depositing large amounts of sediment on residential property (Refs. 16, pp. 1-5; 17, 1-11). Two additional major flood events occurred in June 2016 and June 2017 that engulfed the entire town of Minden (Refs. 18, pp. 1-3; 19, p. 1; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5). In June 2016, a 1-in-1,000-year flood occurred in Fayette County, WV, with approximately 8 to 10 inches (200-250 millimeter) of rain falling between 7 am and 8 pm (13 hours) and in June 2017, severe flooding occurred in Minden, WV, with roadways closed due to Arbuckle Creek flooding the streets (Refs. 19, p. 1; 20, p. 2; 21, pp. 1-3; 22, pp. 1-5). Six additional flood events (i.e., 19 feet and above) have been recorded at the New River gauging station at Thurmond, located near the confluence of Arbuckle Creek (Ref. 42, p. 1). At 19 feet, flooding of low areas starts along the New River and up Dunloup Creek and Arbuckle Creek with portions of county routes 2, 25 and 17 starting to flood. At 20 feet, major flooding of low areas has occurred along the New River and up Dunloup Creek and Arbuckle Creek with portions of county routes 2, 25 and 17 flooded (Ref. 42, p. 2).

Source 2 is characterized by soil samples collected from parcels within and adjacent to the creek's floodplain in June 2017, December 2017, and March 2018 (**Figures 4, 5, and 6;** Refs. 26, pp. 2, 4, 5, 8, and 10; 27, pp. 27, 34, 38, 41, 44, 49, 51, 55, 56; 28, pp. 22, 23; 30, pp. 14, 15, 17, 18; 31, pp. 39, 40; 43, pp. 37, 38, 39, 40; 44, pp. 34, 35; 45, pp. 32, 33, 34; 46, pp. 31, 32; 51, p. 16). The samples collected in June 2017 were collected 8 to 10 days following a major flood event in the Town of Minden (Refs. 20, p. 2; 21, pp. 1-3; 22, pp. 1-5; 30, pp. 14, 15, 17, and 18).

2.2.2 Hazardous Substances Associated with Source

Though not required by the HRS, to document the presence of PCBs in the source at significant concentrations, the analytical results of the soil/source samples collected in June 2017, December 2017, and March 2018 were compared to soil samples collected in June 2017, December 2017, and March 2018 from properties located upstream from the SEC property at locations not expected to have been impacted by surface water runoff or flooding from the source (Refs. 26, p. 7; 27, p. 30; 30. p. 18; 31, p. 41; 32, p. 1, 2; 44, p. 35; 47, pp. 5-7; 64, pp. 21; 84, pp. 1, 2; and 85, pp. 1, 2).

The soil samples from the June 2017, December 2017, and March 2018 sampling events were submitted to and analyzed by an EPA Contract Laboratory Program (CLP) laboratory for Aroclors (i.e., PCBs) in accordance with CLP Statement of Work (SOW) SOM02.4, and the analytical data were validated by EPA Region 3 Environmental Services Assistance Team (ESAT) according to the National Functional Guidelines for Organic Superfund Methods Data Review and applicable USEPA Region 3 modifications (Refs. 26, pp. 3, 5, 6, 7, 8, 10; 28, pp. 1, 2; 30, pp. 17, 18; 31, pp. 1, 3; 43, pp. 1, 3; 44, pp. 1, 2; 45, pp, 1, 3; 46, pp. 1, 2; 47, pp. 6, and 7; 51, pp. 1, 3; 64. pp. 1, 2). The background soil samples and source soil samples are all grab samples consisting of similar matrices comprised of top soil/organics, silt, silty-sand, and silty-clay with comparable percent solids ranging from 68.9% to 79.6% for background samples and 63.5% to 84.9% for source/soil samples with two exceptions; sample SS-22 had a percent solid of 44.3% and sample SS-26 had a percent solid of 48.6% (Refs. 26, pp. 3, 5, 6, 7, 8, and 10; 27, pp. 27, 28, 30, 34, 38, 41, 44, 49, 51, 55, 56; 28, pp. 11, 22; 30, pp. 17, 18; 31, pp. 18, 19, 39; 43, pp. 10, 11, 12, 13, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 37, 38, 39; 44, pp. 15, 22, 23, 26, 30, 34, 35; 45, pp. 8, 13, 16, 20, 26, 28, 32, 33, 34; 46, pp. 12, 28, 32; 47, pp. 5, 6, 7; 51, pp. 8, 16; 64, pp. 10, 12, 13, 14, 15, 21). The background soil and source soil samples collected in June and December 2017 and March 2018 were documented as having been collected between 0 to 6 inches bgs (0 to 0.5 feet bgs) (Refs. 26, p. 14; 27, pp. 27, 30, 34, 38, 41, 44, 49, 51, 55, and 56; 47, p. 8; 35, pp. 3, 12, 13, 14, 15, and 16; 48, pp. 3, 10, 11). The December 2017 and March 2018 soil samples were collected using a dedicated polyethylene scoop and homogenizing the soil in a disposable aluminum pan (Refs. 26, p. 14; 47, p. 8).

The following tables summarize analytical results of background soil samples. If a background concentration was reported at an estimated concentration below the adjusted CRQL, the higher of the adjusted CRQL, or three times the estimated concentration was used to determine elevation over background (Ref. 1, Table 2-3). The highest of the background concentrations or the highest adjusted CRQL is used for comparison against all the soil/source data. The background concentration used for comparison is 48 µg/kg. PCB concentrations at or above 48 µg/kg, the highest adjusted CRQL, are elevated above background. Background sample locations are on **Figure 3**.

Table 3 Source No. 2 –Background Soil Samples						
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AD8	SS11	6/15/17	PCB – Aroclor 1260	11J[1]	44	30, p. 18; 31, pp. 1-5, 18, 41, 101; 35, pp. 1 and 3
C0AD9	SS12	6/15/17	PCB – Aroclor 1260	15J[1]	43	30, p. 18; 31, pp. 1-5, 19, 41, 106; 35, pp. 1 and 3
C0AG6	SEC-SS-R5-01	12/13/17	PCB – Aroclor 1260	41U	41	26, p. 7; 27, p. 30; 38, pp. 1 and 11; 44, pp. 1-4, 30, 35, 145
C0AE6	SS-150	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 5-6; 48, pp. 1 and 10; 64, 1-4, pp. 10, 21, 56
C0AE8	SS-152	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 12, 21, 64
C0AE9	SS-153	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 13, 21, 67
C0AF0	SS-154	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 14, 21, 70
C0AF1	SS-155	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 7; 48, pp. 1 and 11; 64, pp. 1-4, 15, 21, 73

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Refs. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL = EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
µg/kg = micrograms per kilogram
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (Ref. 31, p. 4). Samples reporting concentrations of target analytes less than (CRQLs) are estimated and have been qualified J; no bias is associated (Ref. 31, pp. 1-5; 49, pp. 246, 247).
U= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit (Refs. 44, p. 4; 64, p. 4)
[1] Qualified background data were used in accordance with EPA Fact Sheet *Using Qualified Data to Document an Observed Release and Observed Contamination,* which states "The adjustment factors apply only to "J" qualified data above the CRQL"; therefore, the qualified data was not adjusted (Ref. 37, pp. 4). Although the fact sheet was not intended for application to source data, it has been applied in this situation to demonstrate the relative increase in contamination in the samples over background levels.

The following table summarizes analytical results of Source 2 soil samples. Source 2 soil sample locations are on **Figures 4, 5, and 6**.

Table 4 Source No. 2 – Soil Samples						
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AE0	SS13	6/15/17	PCB – Aroclor 1260	450	49	30, p. 18; 35, pp. 1 and 12; 43, pp. 1-5, 10, 37, 71
C0AE1* (C0AE2)	SS14 (SS15)	6/15/17	PCB – Aroclor 1260	91 (90)	50 (50)	30, p. 18; 35, pp. 1 and 12; 43, pp. 1-5, 11, 38, 76 (30, p. 18; 35, pp. 1 and 12; 43, pp. 1-5, 12, 38, 81)
C0AE3	SS16	6/15/17	PCB – Aroclor 1260	260	42	30, p. 18; 35, pp. 1 and 12; 43, pp. 1-5, 13, 38, 86
C0AE5	SS18	6/15/17	PCB – Aroclor 1260	340	39	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-5, 17, 38, 96

Table 4 Source No. 2 – Soil Samples						
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AE6	SS19	6/15/17	PCB – Aroclor 1260	210	46	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-5, 18, 38, 101
C0AE7	SS20	6/15/17	PCB – Aroclor 1260	160	40	30, p. 18; 35; pp. 1 and 13; 43, pp. 1-5, 19, 38, 106
C0AE9	SS22	6/15/17	PCB – Aroclor 1260	200	74	30, p. 18; 35, pp. 1, 13; 43, pp. 1-5, 21, 39, 116
C0AF2	SS25	6/15/17	PCB – Aroclor 1260	100	50	30, p. 18; 35, pp. 1, 14; 43, pp. 1-5, 24, 39, 132
C0AF3	SS26	6/15/17	PCB – Aroclor 1260	660	67	30, p. 17; 35 pp. 1 and 14; 43, pp. 1-5, 25, 39, 137
C0AF4	SS27	6/15/17	PCB – Aroclor 1260	350	47	30, p. 17; 35, pp. 1 and 14; 43, pp. 1-5, 26, 39, 142
C0AM0	SS41	6/14/17	PCB – Aroclor 1260	130	47	30, p. 15; 35, pp. 1, 14; 43, pp. 1-5, 27, 39, 147
C0AM7	SS42	6/15/17	PCB – Aroclor 1260	230	41	30, p. 17; 35, pp. 1 and 14; 43, pp. 1-5, 28, 40, 152
C0AM8	SS43	6/15/17	PCB – Aroclor 1260	1,300	49	30, p. 17; 35, pp. 1 and 15; 43, pp. 1-5, 29, 40, 157
C0AN1	SS44	6/15/17	PCB – Aroclor 1260	1200	89	30, p. 18; 51, pp. 1-5, 8, 16, and 46; 35, pp. 1 and 16
C0AG4	SEC-SS-TL-43C	12/13/17	PCB – Aroclor 1260	58	47	26, p. 6; 27, p. 27; 38, pp. 1, 11; 44, pp. 1-4, 26, 35, 139
C0AG0	SEC-SS-R3-01	12/13/17	PCB – Aroclor 1260	310	49	26, p. 6; 38, pp. 1, 10; 44, pp. 1-4, 23, 35, 124
C0AC6	SEC-SS-R1-06	12/12/17	PCB – Aroclor 1260	64	49	26, p. 3; 27, p. 56; 38, pp. 1 and 9; 44, pp. 1-4, 15, 34, and, 88
C0AF6	SEC-SS-T8-04	12/13/17	PCB – Aroclor 1260	220	44	26, p. 6; 27, p. 55; 28, pp. 1-4, 11, 22, 63; 38, pp. 1, 2
C0AF2	SEC-SS-T8-05/ SEC-SD-T8-05**	12/13/17	PCB – Aroclor 1260	410	41	26, p. 6; 27, p. 51; 38, pp. 1, 15; 45, pp. 1-5, 28, 34, 146
C0AF9	SEC-SS-R2-01	12/13/17	PCB – Aroclor 1260	140	46	26, p. 6; 38, pp. 1, 10; 44, pp. 1-4, 22, 35, 118
C0AE4	SEC-SS-T7-04	12/13/17	PCB – Aroclor 1260	60	43	26, p. 5; 27, p. 44; 38, pp. 1, 14; 45, pp. 1-5, 20, 33, 119
C0AE9	SEC-SS-T7-05	12/13/17	PCB – Aroclor 1260	59	39	26, p. 5; 27, p. 49; 38, pp. 1, 15; 45, pp. 1-5, 26, 33, 137
C0AE0	SEC-SS-T6-05	12/13/17	PCB – Aroclor 1260	140	46	26, p. 5; 27, p. 41; 38, pp. 1; 13; 45, pp. 1-5, 16, 33, 104
C0AD2	SEC-SS-T5-04	12/13/17	PCB – Aroclor 1260	200	42	26, p. 5; 27, p. 34; 38, pp. 1, 12; 45, pp. 1-5, 8, 32, 63
C0AD7	SEC-SS-T5-05	12/13/17	PCB – Aroclor 1260	290	41	26, p. 5; 27, p. 38; 38, pp. 1, 13; 45, pp. 1-5, 13, 32, 92
C0AA5	SEC-SS-105	3/20/18	PCB – Aroclor 1260	67J[1]	47	26, p. 8; 46, pp. 1-4, 12, 32 70; 48, pp. 1 and 3

Table 4
Source No. 2 – Soil Samples

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AC5	SEC-SS-125	3/20/18	PCB – Aroclor 1260	58	52	26, p. 10; 46, pp. 1-4, 28, 31, 123; 48, pp. 1 and 5

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Ref. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL = EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
SEC = Shaffer Equipment Company
µg/kg = micrograms per kilogram
( ) = Data and information within parentheses indicates data and information for the field duplicate sample pair
J[1] = The percent recoveries for the following surrogate were outside of the lower control limits. Detected concentrations in these samples are estimated and have been qualified (Refs. 46, pp. 3, 12, 50, 152). In accordance with the EPA National Functional Guidelines for Organic Superfund Methods Data Review, low surrogate recoveries between 10% ≤ %R < 30% should be qualified J- indicating a low bias (Ref. 49, pp. 233-235). In accordance with the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination*, the qualified concentration was not adjusted (Ref. 37, pp. 7 and 8).
*Reference 35, p. 12 lists the same sample identifier, SS15, for both CLP sample numbers C0AE1 and C0AE2. As shown on Reference 43, p. 38, CLP sample number C0AE1 is associated with SS14. As noted in Reference 30, p. 18, samples SS14 and SS15 are a duplicate pair.
** References 38, p. 15 and 45, pp. 28 and 34 incorrectly identify the sample identifier as SEC-SD-T8-05. The correct sample identifier for this sample is recorded in References 26, p. 6 and 27, p. 51 as SEC-SS-T8-05.

2.2.3 Hazardous Substances Available to a Pathway

Source 2 includes the soil/source samples that document PCB contamination significantly over background within and adjacent to Arbuckle Creek's floodplain on numerous parcels as noted in Section 2.2.2 (**Figures 4, 5, and 6**). Chemical analysis of sediment samples collected from Arbuckle Creek adjacent to and downstream of the source document a release of attributable hazardous substances to the surface water migration pathway (**see Section 4.1.2.1.1**).

As noted previously, Arbuckle Creek is prone to annual periodic flooding and occasional significant flooding (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-15; 17, pp. 1-11; 21, pp. 1-3; and 22, pp. 1-5).

No maintained engineered cover or functioning and maintained run-on control system and runoff management system or designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood is documented for Source No. 2 (Ref. 1, Table 4-2 and Table 4-8).

Containment Description	Containment Factor	References
Release via overland migration: lack of a maintained engineered cover, and any complete run-on and runoff control management systems	10	1, Table 4-2
Release flood: lack of a designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood	10	1, Table 4-8

2.4.2.1 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The hazardous constituent quantity for Source No. 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (e.g., manifests, PRP records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source No. 2 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, Hazardous Wastestream Quantity (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

The hazardous wastestream quantity for Source No. 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (e.g., manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) available to adequately calculate the total or partial mass of the wastestream plus the mass of all CERCLA pollutants and contaminants in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous wastestream quantity for Source No. 2 with reasonable confidence. Scoring proceeds to the evaluation of Tier C, Volume [Ref. 1, Section 2.4.2.1.2].

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3 Volume

The information available on the depth of Source No. 2 is not sufficiently specific to estimate a volume of the contaminated soil with reasonable confidence; therefore, it is not possible to assign a volume (Tier C) for Source 3 (Ref. 1, Section 2.4.2.1.3). Source 2 has been assigned a value of 0 for the volume measure (Ref. 1, Section 2.4.2.1.3). As a result the evaluation of hazardous waste quantity proceeds to the evaluation of Tier D, area (Ref. 1, Section 2.4.2.1.3).

Volume (V) Value: 0

2.4.2.1.4 Area

The area of Source No. 2 is not adequately determined. Source No. 2 is composed of contaminated soil on numerous residential and non-residential (vacant lots and commercial) properties that contain concentrations of PCBs that are equal to or greater than three times background levels (**Table 4 and Figures 4, 5, 6**). The approximate area of soil contamination, excluding impervious surfaces, was not estimated because of the large number of properties and area that comprise the source. Additionally, soil sample collection was focused towards occupied residential properties. Contamination is inferred between sampling locations because the primary mechanism by which the hazardous substances was deposited involves widespread dispersion of contaminants (i.e., depositional flooding of contaminated sediments within Arbuckle Creek). Because the information available is insufficient to estimate the area and measure with reasonable confidence [as required in Section 2.4.2.1.4 of Reference 1], a value of greater than zero (>0) is established as the source hazardous waste quantity (HWQ) value for Tier D – area. The source type is "Contaminated Soil," so the area value is divided by 34,000 to obtain the assigned value of >0, as shown below (Ref. 1, Section 2.4.2.1.4, Table 2-5).

Area of source in ft^2 = >0
Area (A) Assigned Value: >0/34,000 = >0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The highest assigned source HWQ value for Source No. 2 was assigned based on D – Area [Ref. 1, Table 2-5].

Source Hazardous Waste Quantity Value: >0

Table 5
Summary of Source Descriptions

Source No.	Source HWQ Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway			
			Ground Water (GW) (Ref. 1, Table 3-2)	Surface Water (SW) Overland/flood (Ref. 1, Table 4-2)	Air	
					Gas	Particulate
					Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	>0	N	NS	10	NS	NS
2	>0	N	NS	10	NS	NS

HWQ = Hazardous Waste Quantity
NS = Not Scored

Total Source Hazardous Waste Quantity Value: >0

Other Possible Sources Not Scored

Other possible sources include the hundreds of transformers and capacitors in deteriorating condition formerly scattered around the SEC property on the ground surface (Ref. 7, p. 218; 9, p. 1; 10, p. 3) and several locations throughout the Town of Minden previously assessed by EPA, such as additional areas of concern brought to EPA's attention by local residents. EPA is collaborating with WVDEP to collect samples and evaluate these other possible source areas.

Former Transformer and Capacitors

During the initial inspection of the former SEC property, hundreds of transformers and capacitors in deteriorating condition were observed to be scattered around the SEC property on the ground surface (Refs. 7, p. 218; 9, p. 1; 10, p. 3). Many of the transformers and capacitors were observed to be broken, cracked, or lying on their side and leaking fluid onto the soil (Refs. 7, p. 218; 10. p. 3). Two of the transformers were labeled as containing PCBs; however, many other transformers, capacitors, and drums were indicated to contain Chloroextol ™ and Pyranol™, which are PCB-containing fluids (Refs. 7, pp. 32, 218, 231; 10, p. 3; 65, p. 2). Soil beneath transformers at one location was saturated with oil to a depth of at least 12 inches bgs (Ref. 7, p. 218). Preliminary results of two samples collected at this location contained PCBs at concentrations of 260,000 ppm at the surface and 40,000 ppm at 12 inches bgs (Ref. 7, p. 219). Rusty and leaking transformers were also observed inside the building located on the SEC property (Ref. 7, p. 231). It was noted that the floor drains in the building discharged directly into Arbuckle Creek (Ref. 7, p. 231). The transformers and capacitors containing PCB fluids were removed from the SEC property during the 1984-1987 removal action conducted by EPA (Ref. 7, p. 4). However, prior to the removal, the leaking transformers on the ground surface and in the building were likely sources of contamination to Arbuckle Creek.

4.0 SURFACE WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

The hazardous substance migration path includes both the overland and in-water segments that hazardous substances would take as they migrate away from sources at the site (Ref. 1, Section 4.1.1.1). Overland and in-water segments for Sources 1 and 2 are described below. The surface water pathway is shown on **Figures 3, 4, 5, 6, and 7**. Arbuckle Creek and the New River make up the surface water pathway along the TDL (**Figures 2 and 7**). Sources 1 and 2 are located within Arbuckle Creek's floodplain, which is a Federal Emergency Management Agency (FEMA)-designated Zone A Flood Hazard Area indicating the area is subject to inundation by the 1-percent-annual-chance flood event (**Figures 3, 4, 5, and 6;** Refs. 8 and 99). Historically, it has been reported that Arbuckle Creek floods on average about 7 times a year, and in recent years the creek has been known to flood approximately 4 to 5 times a year (Ref. 7, p. 102; 14, p. 1). Additionally, historic flood events occurred in the eastern portion of West Virginia in 1985, as well as specifically in Minden, WV in July 2001, June 2016, and June 2017 (Refs. 15, pp. 20-37; 16, pp. 1-16; 17, pp. 1-11; 18, pp. 1, 2; 19, pp. 1-4; 20, pp. 1-4; 21, pp. 1-5; 22, pp. 1-5).

On July 8, 2001, Arbuckle Creek in Minden, WV, experienced an historic flood event that fully engulfed the town in several feet of water (Refs. 16, pp. 1-16; 17, pp. 1-11). In June 2016, a 1-in-1,000-year flood occurred in Fayette County, WV, with approximately 8 to 10 inches (200-250 millimeter) of rain falling between 7 am and 8 pm (13 hours) (Ref. 19, p. 1). In June 2017, severe flooding occurred in Minden, WV, with roadways closed due to Arbuckle Creek flooding the streets (Ref. 20, p. 2; 21, pp. 1-3; 22, pp. 1-5). Six additional flood events (i.e., 19 feet and above) have been recorded at the New River gauging station at Thurmond, located near the confluence of Arbuckle Creek (Ref. 42, p. 1). At 19 feet, flooding of low areas starts along the New River and up Dunloup Creek and Arbuckle Creek with portions of county routes 2, 25 and 17 starting to flood. At 20 feet, major flooding of low areas has occurred along the New River and up Dunloup Creek and Arbuckle Creek with portions of county routes 2, 25 and 17 flooded (Refs. 4; 5, p. 2; 42, p. 2).

Source 1, contaminated soil, consists of two soil samples, SEC-SS-SE-01 and SEC-SS-SE-02, which show significant concentrations of PCBs above background (**see Table 2 in Section 2.2.1**). Overland flow from sample point SEC-SS-SE-01 would be approximately 22 feet to the northeast into the drainage ditch constructed in 2001 as part of the EPA Removal Action to divert surface water runoff around the capped area and then another 512 feet to the drainage ditch discharge into Arbuckle Creek at probable point of entry (PPE) PPE1 (**Figure 3**; Refs. 12, p. 12, 16, 53; 98). Overland flow from sample point SEC-SS-SE-02 would be approximately 12 feet to the northeast into the same drainage ditch that receives overland flow from SEC-SS-SE-01, then another 41 feet to the ditch discharge point into Arbuckle Creek (PPE1) (**Figure 3**; Ref. 12, p. 53; 98). PPE 1 represents the location where overland flow for Source 1, contaminated soil, discharges to Arbuckle Creek on the former SEC via a drainage ditch constructed as part of the 2001 EPA removal Action as shown on **Figure 3** (Ref. 12, pp. 10, 15, 53).

Source 2, contaminated soil, surface soil/source samples were collected from properties along both the north and south side of Arbuckle Creek within the creek's floodplain [**Figures 4, 5, and 6**]. Source No. 2 is likely primarily a product of the documented PCB-contaminated sediments within Arbuckle Creek being deposited onto the properties along the creek as a result of the periodic and historic flooding of Arbuckle Creek (**Section 4.1.2.1;** Refs. 7, pp. 102, 219; 11, p. 43; 14, p. 1; 15, pp. 20-37; 16, pp. 1-16; 17, pp. 1-11; 18, pp. 1, 2; 19, pp. 1-4; 20, pp. 1-4; 21, pp. 1-5; 22, pp. 1-5). The separate areas of contaminated soil, as documented by the analytical results presented in **Table 4 Section 2.2.1** of this HRS documentation record, are aggregated into a single source for this HRS scoring package for the following reasons: the same source type (i.e. contaminated soil), affect similar targets (i.e. sensitive environments, **see Section 4.1.4.3** and resident population, **see Section 5.1.1.3**), same contaminant of concern (i.e., PCBs), deposited in a similar manner (i.e., deposition by flooding). As shown on **Figures 3, 4, 5, and 6**, Source 2 abuts Arbuckle Creek along the majority of the entire length of the source. Overland flow from Source 2 is sheet flow directly into Arbuckle Creek as well as direct release from the source into the creek by means of flooding; therefore, PPE 2 is the contact boundary between Source 2 and the creek along both sides of the banks, where applicable. The area on both sides of the creek, which contain Source 2, gently slopes toward the creek (**Figure 1**; Ref. 67, p. 13). As shown on **Figure 4**, the most upstream point for PPE 2 associated with Source 2 is at the westernmost end of Source 2.

4.1.1.2 Target Distance Limit

Arbuckle Creek flows from west to east through the town of Minden (Ref. 6, p. 21). The most upstream PPE for the overland/flood component for the site is PPE 1 into Arbuckle Creek at the northeastern edge of the SEC property where the drainage channel from Source 1 discharges surface water runoff into the creek (**Figure 3**). The farthest downstream PPE is PPE 2, which is the contact boundary between Source 2 and the creek along both sides of the banks, where applicable. From PPE1, Arbuckle Creek flows approximately 2.52 miles before its confluence with the New River (**Figure 7**; Ref. 98). Based on sampling outlined in **Section 4.1.2.1.1** of this evaluation, the farthest downstream sediment sample collected from Arbuckle Creek documenting an observed release of hazardous substances attributable to the site is sediment sample SD-61, documenting a zone of actual contamination of approximately 1 mile; from PPE 1 to SD-61 (**Figures 3, 4, 5, 6, and 7**; Ref. 98). Because observed contamination is not documented more than 15 miles downstream of PPE 1, the TDL extends 15 miles downstream of the most downstream PPE, PPE 2, for the site (Ref. 1, Section 4.1.1.2). The total TDL for the site, as measured from PPE 1 to 15 miles downstream from the most downstream point of PPE-2, is 15.95 miles and terminates in the New River (**Figure 7; Ref. 98**).

Table 6
15-Mile Target Distance Limit

Surface Water Body	Descriptor[a]	Distance Measured from PPE 1 (miles)	Flow Characteristics (cfs)[b]	Reference(s)
Arbuckle Creek	Minimal	0	8.9	Figures 3, 4, 5, 6, and 7; Refs. 1, Table 4-13; 58, pp. 1, 11, 12
New River	Large River	2.52	18,300	Figures 3, 4, 5, 6, and 7; Refs. 1, Table 4-13; 59, p. 2; 98

[a] Minimal stream: <10 cfs. Small to moderate stream: 10–100 cfs. Moderate to large stream: >100–1,000 cfs. Large stream to river: >1,000–10,000 cfs. Large river: >10,000–100,000 cfs. [Ref. 1, Table 4-13]
[b] Cubic feet per second

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Direct Observation

During the 1984 Removal Actions, it was observed that the floor drains within the building located on the SEC property discharged directly to Arbuckle Creek. Capacitors in the building were observed to be rusted and leaking fluid onto the floor (Ref. 7, p. 231). These rusted and leaking capacitors were identified as containing Chloroextol ™ and Pyranol™, which are PCB-containing fluids (Refs. 7, pp. 32, 218, 231; 10, p. 3; 65, p. 2).

Arbuckle Creek is prone to annual periodic flooding and occasional significant flooding (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-15; 17, pp. 1-11; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5). As presented in **Section 2.2.2**, both Source 1 and 2 have flood containment factor values greater than 10. Prior to the initial Removal Action, EPA noted that recent past floods had fully engulfed the Shaffer property and there was evidence of stream scouring and flood damage on the property (Ref. 7, p. 102). As noted in the **Site Summary Section** and **Section 2.2.2, Source 1**, PCB-contaminated soil has remained on the Shaffer property following numerous removal actions. Prior to the third removal action, which consisted of capping a portion of the contaminated soil, a major flood event occurred in July 2001. Photographs taken of the SEC property in August, September and October 2001 following the flood, document widespread damage and drainage channels across the property (Ref. 12, pp. 10, 318-325). Additionally, it was noted that the extensive flooding significantly eroded the bank of Arbuckle Creek and affected the berm constructed during the removal activities in 1987 (Ref. 12, p. 5). Flood waters would therefore have come into direct contact with PCB-contaminated soils at the Shaffer property. The 2001 Flood event engulfed the entire town of Minden depositing large amounts of sediment on residential property (Refs. 16, pp. 1-5; 17, 1-11). Two additional major flood events occurred in June 2016 and June 2017 that engulfed the entire town of Minden (Refs. 18, pp. 1-3; 19, p. 1; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5).

Chemical Analysis

Sediment samples were collected from Arbuckle Creek in June and December 2017 and in March, May 2018 (Refs. 26, pp. 2-6, 10 and 13; 27, pp. 1-3, 6-8, 16-19, 23, 24, 35-37, 39, 40, 43, 45-48, 50, 52-54; 30, pp. 15-17; 45, pp. 32 and 34; 47, pp. 1-2; 60, pp. 38-41; 61, p. 16; 62, pp. 31-32; 64, p. 21; 82, p. 26). Sediment samples were submitted to EPA-assigned CLP laboratories and analyzed for Aroclor target analytes in accordance with CLP SOW SOM02.4 (Refs. 45, p. 3; 60, p. 2; 61, p. 2; 62, p. 2; 63, p. 2; 64, p. 2; 82, p. 2). All analytical data were validated by EPA Region 3 ESAT according to the National Functional Guidelines for Organic Superfund Methods Data Review and applicable USEPA Region 3 modifications (Refs. 45, p. 3; 60, p. 2; 61, p. 2; 62, p. 2; 63, p. 2; 64, p. 2; 82, p. 2).

In June 2017, two background sediment samples, SD24 and SD25, were collected from Arbuckle Creek upstream of the former SEC property **(Figure 3**; Refs. 30, p. 17; 32, p. 2; 60, p. 39). The background sediment samples were used to establish background conditions and chemical compositions of the sediment materials upstream of the Shaffer Equipment Co. property. Analytical results of the background sediment samples are presented to establish representative background concentrations for PCBs, which are used to demonstrate that significant concentrations of hazardous substances have been detected in the release sediment samples collected from Arbuckle Creek downstream of the SEC property. The background sediment samples and sediment samples collected to document an observed release are all grab samples consisting of comparable percent solids as shown in **Tables 7 and 8,** with a few exceptions which had percent solids more than 10% difference than the lowest percent solid in background sample SD24 (Refs. 45, pp. 10, 14, 27, 32, and 34; 60, pp. 12, 13, 14, 15, 16, 17, 18, 19, 24, 25, 26, 31, 32, 38, 39, and 40; 61, pp. 6, 7, 8, 9, 10, and 16; 62, pp. 9, 13, 14, 18, 24, 31, 32; 64, pp. 7, 8, and 21; 82 p. 10, 12, 14).

The tables below present the analytical results for the substances that meet observed release criteria in Arbuckle Creek in accordance with the HRS (Ref. 1, Table 2-3). If the background concentration was reported as not detected, the associated adjusted CRQL was used as the background concentration. If the background concentration was detected at a concentration equal to or greater than the adjusted CRQL, the background concentration was multiplied by three to calculate the background concentration. If a background concentration was reported at an estimated concentration below the adjusted CRQL, the higher of the adjusted CRQL or three times the estimated concentration was used as the background concentration (Ref. 1, Table 2-3). The background concentration used for comparison is 39 µg/kg.

PCB concentrations at or above 39 µg/kg, the highest adjusted CRQL, are significant above background.

Table 7
Background Sediment Samples

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	Percent Solids	References
C0AM5	SD24	6/14/2017	PCB-Aroclor 1260	6.4J[1]	48	67.8	30, p. 17; 35, pp. 1 and 10; 60, pp. 1-4, 31, 39, 201
C0AM6	SD25	6/14/2017	PCB-Aroclor 1260	39U	39	83.9	30, p. 17; 35, pp. 1 and 10; 60, pp. 1-4, 32, 39, 206

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Ref. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL: EPA Contract Laboratory Program Contract Required Quantitation Limit
µg/kg = milligrams per kilogram
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (Ref. 60, p. 4). Samples reporting concentrations of target analytes less than (CRQLs) are estimated and have been qualified J (Ref. 60, pp. 3; 49, pp. 246, 247).
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit (Ref. 60, p. 4)
[1] Qualified background data were used in accordance with EPA Fact Sheet *Using Qualified Data to Document an Observed Release and Observed Contamination*, which states "The adjustment factors apply only to "J" qualified data above the CRQL"; therefore, the qualified data was not adjusted (Ref. 37, p. 4).

Table 8
Observed Release Sediment Samples

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	Percent Solids	References
C0AA1	SD02	6/14/2017	PCB-Aroclor 1260	140	49	65.9	30, p. 16; 35, pp. 1 and 6; 60, pp. 1-4, 12, 38, 78
C0AA2	SD03	6/14/2017	PCB-Aroclor 1260	6,200	580	56.4	30, p. 16; 35, pp. 1 and 6; 60, pp. 1-4, 13, 38, 88
C0AA3	SD04	6/14/2017	PCB-Aroclor 1260	350	52	62.7	30, p. 16; 35, pp. 1 and 6; 60, pp. 1-4, 14, 40, 93
C0AA4	SD05	6/14/2017	PCB-Aroclor 1260	230	45	71.7	30, p. 16; 35, pp. 1 and 6; 60, pp. 1-4, 15, 40, 98
C0AA5	SD06	6/14/2017	PCB-Aroclor 1260	50,000C	3,400	48	30, p. 16; 35, pp. 1 and 7; 60, pp. 1-4, 16, 40, 108
C0AA6	SD07	6/14/2017	PCB-Aroclor 1260	85	43	74.4	30, p. 16; 35, pp. 1 and 7; 60, pp. 1-4, 17, 40, 136
C0AA7 (C0AB7)	SD08 (SD18)	6/14/2017	PCB-Aroclor 1260	120 (86)	41 (41)	78.6 (78)	30, p. 16; 35, pp. 1 and 7; 60, pp. 1-4, 18, 41, 141 (30, p. 16; 35, pp. 1 and 11*; 61, pp. 1-3, 10, 16, 58*)
C0AA8	SD09	6/14/2017	PCB-Aroclor 1260	130	50	64.7	30, p. 16; 35, pp. 1 and 7; 60, pp. 1-4, 19, 41, 146;

Table 8
Observed Release Sediment Samples

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	Percent Solids	References
C0AA9	SD10	6/14/2017	PCB-Aroclor 1260	300	54	60.5	30, p. 16; 35, pp. 1 and 11; 61, pp. 1-3, 6, 16, 38;
C0AB1	SD12	6/14/2017	PCB-Aroclor 1260	130	43	76.6	30, p. 16; 35, pp. 1 and 11; 61, pp. 1-3, 7, 16, 43;
C0AB3	SD14	6/14/2017	PCB-Aroclor 1260	340	42	77.8	30, p. 15; 35, pp. 1 and 11; 61, pp. 1-3, 8, 16, 48
C0AB4	SD15	6/14/2017	PCB-Aroclor 1260	61	43	76.4	30, p. 15; 35, pp. 1 and 9; 60, pp. 1-4, 24, 40, 166
C0AB5	SD16	6/14/2017	PCB-Aroclor 1260	70	42	77.7	30 p. 15. 35, pp 1 and 11; 61, pp. 1-3, 9, 16, 53
C0AB6	SD17	6/14/2017	PCB-Aroclor 1260	190	52	62.1	30, p. 15; 35, pp. 1 and 9; 60, pp. 1-4, 25, 40, 171;
C0AB8	SD19	6/14/2017	PCB-Aroclor 1260	50	44	75.3	30, p. 17; 35, pp. 1 and 9; 60, pp. 1-4, 26, 40, 176
C0AA2	SEC-SD-T1-03	12/12/2017	PCB-Aroclor 1260	50	45	72.6	26, p. 2; 27, p. 3; 38, pp. 1 and 4; 62, pp. 1-4, 9, 31, and 71
C0AA6	SEC-SD-T2-02	12/12/2017	PCB-Aroclor 1260	55	41	79.7	26, p. 2; 27, p. 7; 38, pp 1 and 5; 62, pp. 1-4, 13, 31, 94
C0AA7	SEC-SD-T2-03	12/12/17	PCB-Aroclor 1260	160	40	81.6	26, p. 3; 27, p. 8; 38, pp 1 and 5; 62, pp. 1-4, 14, 31, and 97
C0AB1	SEC-SD-T3-02	12/12/2017	PCB-Aroclor 1260	55	40	82.8	26, p. 4; 27, p. 18; 38, pp. 1 and 6; 62, pp. 1-4, 18, 32, 112
C0AB5	SEC-SD-T4-01	12/12/2017	PCB-Aroclor 1260	1800	230	70.7	26, p. 4; 27, p. 23; 38, pp. 1 and 7; 62, pp. 1-4, 24, 32, 130
C0AD4	SEC-SD-T5-01	12/13/17	PCB-Aroclor 1260	440J[1]	46	72.4	26, p. 5; 27, p. 35; 38, pp. 1 and 12; 45, pp. 1-5, 10, 32, 72
C0AD8	SEC-SD-T6-01	12/13/17	PCB-Aroclor 1260	78	43	76.7	26, p. 5; 27, p. 39; 38, pp. 1 and 13; 45, pp. 1-5, 14, 32, 95
C0AF0	SEC-SD-TL-06	12/13/17	PCB-Aroclor 1260	180	40	81.8	26, p. 6; 27, p. 50; 38, pp. 1 and 15; 45, pp. 1-5, 27, 34, 143
C0AD0	SD-53	3/20/2018	PCB-Aroclor 1260	100	43	77.3	47, p. 2; 48, pp. 1 and 10; 64, pp. 1-4, 7, 21, 47
C0AD1	SD-54	3/20/2018	PCB-Aroclor 1260	52	45	73.6	47, p. 2; 48, pp. 1 and 10; 64, pp. 1-4, 8, 21, 50
C0AG9	SD-57	5/15/2018	PCB-Aroclor 1260	45	41	79.5	26, pp. 10 and 13; 82, pp. 1-4, 10, 26, 66; 83, pp. 1, 2
C0AH1	SD-59	5/15/2018	PCB-Aroclor 1260	140	37	89.3	26, pp. 10 and 13; 82, pp. 1-4, 12, 26, 78; 83, pp. 1, 2
C0AH3	SD-61	5/15/2018	PCB-Aroclor 1260	71	53	61.9	26, pp. 10 and 13; 82, pp. 1-4, 14, 26, 90; 83, pp. 1, 3

Table 8 Observed Release Sediment Samples							
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	Percent Solids	References
C0AH7	SD-65	5/15/2018	PCB-Aroclor 1260	70	43	76.2	26, pp. 10 and 13; 82, pp. 1-4, 18, 26, 114; 83, pp. 1, 3

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Ref. 36, pp. 134, 135, 503, 504)
CRQL: EPA Contract Laboratory Program Contract Required Quantitation Limit
µg/kg = milligrams per kilogram
( ) = Data and information within parentheses indicates data and information for the field duplicate sample pair
J[1] = The percent recoveries for the following surrogate were outside of the lower control limits. Detected concentrations in these samples are estimated and have been qualified (Refs. 45, p. 4, 58, 180). In accordance with the EPA National Functional Guidelines for Organic Superfund Methods Data Review, low surrogate recoveries between 10% ≤ %R < 30% should be qualified J- indicating a low bias (Ref. 49, pp. 233-235). In accordance with the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination,* the qualified concentration was not adjusted (Ref. 37, pp. 7 and 8).
C = The target Pesticide or Aroclor analyte identification has been confirmed by Gas Chromatography/Mass Spectrometry (GC/MS). This qualifier may be added to other qualifiers (Ref. 60, pp. 4). No other qualifier was applied to this value; therefore, the result was not adjusted based on the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination*, the qualified concentration was not adjusted (Ref. 37).
* As noted in Reference 30, p. 16, SD08 and SD18 are duplicate pairs. As shown on page 41 of Reference 60, CLP Sample Number C0AB7 was assigned to Sample ID SD18; however, a station location of SD05 is shown. On Page 10 of Reference 61 and on page 11 of Reference 35, the location identifier shown (SD-05) is shown, not the Sample Identifier (SD-18).

Additional Sediment Samples Not Evaluated

Though not included as part of the site score, soil/sediment samples (SS-21, SS-28, SS-29, SS-30, SS-31, SS-BH-01) collected in June 2017 from the delineated Wetland Areas 5 and 10 indicate concentrations of PCBs (**Figure 4;** Ref. 32, p. 3). Soil/sediment samples collected in this area in June 2017 contained concentrations of PCBs as high as 680 μg/kg (Refs. 26, p. 6; 30, p. 14, 17, 18; 28, p. 16; 31, pp. 20, 21, 22, 23, 39, 40; 38, p. 3; 43, pp. 20, 25, 38, 39). These samples were collected prior to the area being delineated as a wetland (Ref. 67).

Attribution

The SEC built and serviced electrical substations for the local coal mining industry from approximately 1970 to 1984. The substations incorporated various types of transformers, capacitors, switches, and related voltage regulation and distribution devices. Oil containing PCBs was used in the electrical transformers (Refs. 90, pp. 1-3; 91, pp. 1-3). SEC stored nonessential, damaged or outdated transformers and capacitors on the approximate 1-acre property (Ref. 7, pp. 4 and 8). During the initial and subsequent investigations conducted by WVDEP and EPA, hundreds of transformers, capacitors, and drums in deteriorating condition were observed scattered around the SEC property on the ground surface (Refs. 7, pp. 218; 9. p. 1; 10, p. 3). Many of the transformers, capacitors, and drums were observed to be broken, cracked, or lying on their side and leaking fluid onto the soil (Refs. 7, p. 218; 10. p. 3). Two of the transformers were labeled as containing PCBs; however, many other transformers, capacitors, and drums were indicated to contain Chloroextol ™ and Pyranol™, PCB containing fluids (Refs. 7, pp. 32, 218, 231; 10, p. 3; 65, p. 2). Soil beneath transformers at one location was saturated with oil to a depth of at least 12 inches bgs (Ref. 7, p. 218). Preliminary results of two samples collected at this location contained PCBs at concentrations of 260,000 ppm at the surface and 40,000 ppm at 12 inches bgs (Ref. 7, p. 219). Rusty and leaking transformers were also observed inside the building located on the SEC property (Ref. 7, p. 231). It was noted that the floor drains in the building discharged directly into Arbuckle Creek (Ref. 7, p. 231).

Removal actions conducted between 1984 and 1987, in 1990, and in 2001 have not completely removed PCB-contaminated soil from the Shaffer property (**Section 2.2.2, Source 1**). A portion of the contaminated soil on the SEC property has been capped; however, the cap has not been maintained and has compromised edges (Refs. 12, p. 16; 39, pp. 1-2; 66, p. 15). Additionally, samples collected from the backfilled area following the 1990 removal action showed the presence of PCBs ranging from 0.1 to 1,000 ppm (Ref. 12. p. 9).

Source 1 consists of PCB contaminated soil located on the SEC property that resulted from the migration, deposition, or spillage of hazardous substances associated with the handling, storage, maintenance, and management practices involving hundreds of PCB-containing transformers and capacitors (**Section 2.2.2, Source 1**). Source 1 is characterized by two soil samples collected in December 2017 from the SEC property; SEC-SS-SE-01 was collected from beyond the excavated and backfilled area adjacent to a demolished building reportedly used for storage in the southwest corner of the former SEC property and SEC-SS-SE-02 was collected from a drainage channel beneath a broken section of the capped wall in the northeast corner of the former SEC property (**Figure 3**; Refs. 26, p. 7; 27, pp. 31-32; 66, p. 15; 84, p. 2). There are no maintained engineering structures to prevent the contaminated soil from flowing off-site via overland flow or flooding (**Section 2.2.3, Source 1**). Overland flow from Source 1 is into a drainage channel constructed in 2001 that discharges into Arbuckle Creek (see **Figure 3**; Ref. 12, pp. 10, 15, 53).

Source 2 consists of PCB contaminated soil located on portions of numerous parcels within and adjacent to the floodplain of Arbuckle Creek that resulted from PCB-contaminated sediments within Arbuckle Creek being deposited onto the properties as a result of the periodic and historic flooding of Arbuckle Creek **(Section 2.2.2, Source 2**). No maintained engineered cover or functioning and maintained run-on control system and runoff management system or designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood is documented for Source No. 2 (**Section 2.2.3, Source 2**). Overland flow from Source 2 is directly into Arbuckle Creek; additionally, as Arbuckle Creek is prone to annual periodic flooding and occasional significant flooding, Source 2 is in direct contact with Arbuckle Creek (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-16; 17, pp. 1-11; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5; **Figures 4, 5, and 6**).

PCBs are not known to be naturally occurring. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs was halted in the United States in 1977 because of evidence they build up in the environment and can cause harmful health effects (Refs. 90, pp. 1-3; 91, pp. 1-11).

Possible other facilities and/or sources of PCB contamination that could potentially contribute to the PCB contamination detected in Arbuckle Creek are the Britt Bath House and the use of PCB-laden oil used to spray the roadways in Minden as a form of dust suppression.

In 1991, EPA assessed the Britt Bath House property located on the western end of the Town of Minden off Old Minden Road on the north side of Arbuckle Creek across from the SEC property (Ref. 53, pp. 1, 10, 12). The Britt

Bath House consists primarily of a large brick building (i.e., bath house) located on approximately 3 acres of land that was used by the coal miners of New River and Pocahontas Coal Company (Ref. 53, pp. 5, 10, 12). Berwind Land Company owned the property until 1980 when it was sold (Ref. 53, p. 13). The purchaser stated that the SEC Company used the brick building for storage of equipment until 1978 or 1979 during the time the property was owned by the Berwind Land Company (Ref. 53, p. 13). The purchaser used the building as a garage to repair trucks and other equipment and infrequently refurbished transformers on the property (Ref. 53, p. 13). During the assessment, an abandoned transformer was observed on the property (Ref. 53, p. 35). EPA collected soil samples from the site, including near the transformer and from observed drainage ditches that discharge to Arbuckle Creek (Ref. 53, pp. 31-33). Two soil samples contained concentrations of PCBs at 2.6 ppm near a 55-gallon drum and 0.3 ppm at the end of a drainage ditch leading from the 55-gallon drum to Arbuckle Creek (Ref. 53, pp. 33 and 63). The remaining samples, including the samples collected near the abandoned transformer, did not contain PCBs (Ref. 53, pp. 33, 61, 63).

A former SEC employee has stated that throughout the 1960s he spread the PCB containing oil from SEC onto the roadways throughout Minden as a means of dust suppression, which was a common practice at that time (Refs. 89, pp. 1-3; 90, p. 2; 91, p. 4). Preliminary analytical results of a sediment sample (SD-71) collected in June 2018 from Arbuckle Creek immediately downstream of a road overpass contained an estimated concentration of 38 µg/kg PCB (Refs. 92, p. 3; 93, p. 2; 94, p. 17). Preliminary analytical results of a second sediment sample (SD-72) collected upstream of the SEC property but downstream of sample SD-71 was nondetect for PCBs (Refs. 92, p. 2; 93, p. 2; 94, p. 8).

Due to the lack of containment features associated with Sources 1 and 2 and the presence of site-attributable contamination (PCBs) in sediment samples which provide evidence that observed release being evaluated for the Shaffer Equipment/ Arbuckle Creek Area site is due, at least in part, to the Shaffer Equipment Company and not another facility or source of PCBs.

<u>Hazardous Substances Released:</u>

PCBs – Aroclor 1260

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Observed Release Factor Value: 550

4.1.2.3 Drinking Water Threat Targets

The Drinking Water Threat was not scored because there are no surface water intakes along the 15-mile TDL. The West Virginia American Water Company New River Water System source water is an intake on the New River located outside the 15-mile TDL (**Figure 7**; Ref. 57, pp. 6 and 16).

4.1.3.2 Human Food Chain Threat - Waste Characteristics

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

Table 10
Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Substance in Observed Release?	Toxicity Factor Value	River Persistence Factor Value	Food Chain Bioaccumulation Value	Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
PCBs	1, 2	Yes	10,000	1	50,000	5×10^8	1a, Section 2.4.1.1; 1 Table 4-16; 2, p. 2

Notes:
PCB = polychlorinated biphenyl

4.1.3.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity Value (HRS Section 2.4.2.1.5)	Is source hazardous constituent quantity data complete? (yes/no)
1	>0	No
2	>0	No

Sum of Values: >0, rounded to 1

A hazardous waste quantity of >0 is estimated for sources at the site. This yields a hazardous waste quantity of 1 based on Table 2-6 of the HRS Final Rule (Ref. 1, Section 2.4.2.2). However, as documented in Section 2.4.2.2 of the HRS Final Rule, if the hazardous constituent quantity is not adequately determined for one or more sources and any target for the migration pathway is subject to Level I or Level II concentrations, a value of 100 can be assigned as the hazardous waste quantity factor value for that pathway. As demonstrated in **Section 4.1.4.3.1.2**, wetlands and other sensitive environments are subject to Level II concentrations in the surface water pathway, and a minimum value of 100 can be assigned for the hazardous waste quantity factor value (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.3.2.3 Waste Characteristics Factor Category Value

PCBs, associated with Sources 1 and 2, which have surface water pathway containment factor values greater than 0 for the watershed, corresponds to a toxicity/persistence factor value of 10,000 and bioaccumulation potential factor value of 50,000.

Toxicity/Persistence Factor Value = 10,000
Hazardous Waste Quantity (HWQ) Factor Value = 100
Bioaccumulation Potential Factor Value (BPFV) = 50,000

(Toxicity/Persistence Factor Value) × (Hazardous Waste Quantity Factor Value) = 10,000 × 100 = 1,000,000
subject to a maximum of 1×10^8

(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value)
× (Bioaccumulation Potential Factor Value) = (1,000,000) × (50,000) =5×10^{10}
Subject to a maximum of 1×10^{12}

The value of 5×10^{10} corresponds to a Waste Characteristics Factor Category Value of 320 (Ref. 1, Table 2-7).

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Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8
Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 320

4.1.3.3 Human Food Chain Threat - Targets

There are Human Food Chain Threat Targets due to the presence of a potentially contaminated fishery located within the surface water pathway, and previous documentation of contaminated sediments (**Section 4.1.2.1.1**). Arbuckle Creek is not a known fishery (Ref. 23, pp. 1, 2, and 4). The creek is known to contain high levels of fecal coliform (Ref. 69, pp. 6 and 10). However, the New River is a popular fishery along its entire length (Ref. 70, p. 2). Fish species present in the river include bass (smallmouth, largemouth, striped, and rock), walleye, muskellunge, crappie, bluegill, carp, flathead, and channel catfish (Ref. 70, pp. 2, 4).

4.1.3.3.1 Food Chain Individual

As noted in **Sections 4.1.2.1.1 and 4.1.3.2.1**, an observed release of hazardous substances associated with Sources 1 and 2 and having a bioaccumulation factor value of 500 or greater has been documented in Arbuckle Creek. As noted in **Section 4.1.3.3**, Arbuckle Creek is not a fishery; however, the New River located within the TDL is a documented fishery (**Figure 7**; Ref. 70, p. 2). No Level I or II fisheries are documented between the PPEs and the most downstream observed release sampling point. Therefore, a value of 20 was assigned as the food chain individual factor value (Ref. 1, Section 4.1.3.3.1).

Food Chain Individual Factor Value: 20

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

Level I concentrations are not established because Actual Contamination of a fishery has not been documented.

Level I Concentrations Human Food Chain Population Value: 0

4.1.3.3.2.2 Level II Concentrations

Level II concentrations are not established because Actual Contamination of a fishery has not been documented.

Level II Concentrations Human Food Chain Population Value: 0

4.1.3.3.2.3 Potential Contamination

As documented in **Section 4.1.3.3**, the New River is fished for consumption within the 15-mile TDL. The fish consumption rate for the downstream fishery is not documented; therefore, the fishery is assigned to the category "Greater than 0 to 100 pounds per year," which corresponds to the assigned Human Food Chain Population Value of 0.03 in Table 4-18 of the HRS [Ref. 1].

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Population Value (P_i)	Dilution Weight (D_i)	P_i x D_i
New River	>0	Large River	18,300	0.03	0.0001	0.000003

Sum of P_i x D_i: 0.000003
(Sum of P_i x D_i)/10: 0.0000003
(Ref. 1, Table 4-13, Table 4-18; 59, p. 2)

Potential Human Food Chain Contamination Factor Value: 0.0000003

4.1.4.2 Environmental Threat - Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

Table 11
Ecosystem Toxicity/Persistence/Bioaccumulation

Hazardous Substance	**Source No.**	**Substance in Observed Release?**	Ecotoxicity Factor Value	River Persistence Factor Value	**Environment Bioaccumulation Value**	**Ecotoxicity/ Persistence/ Bioaccumulation Factor Value**	**Reference**
PCBs	1, 2	Y	10,000	1	50,000	5×10^8	1; Table 4-21; 2, p. 2

Notes:
PCB = polychlorinated biphenyl

4.1.4.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity Value (HRS Section 2.4.2.1.5)	Is source hazardous constituent quantity data complete? (yes/no)
1	>0	No
2	>0	No

Sum of Values: >0, rounded to 1

A hazardous waste quantity of >0 is estimated for sources at the site. This yields a hazardous waste quantity of 1 based on Table 2-6 of the HRS Final Rule (Ref. 1, Section 2.4.2.2). However, as documented in Section 2.4.2.2 of the HRS Final Rule, if the hazardous constituent quantity is not adequately determined for one or more sources and any target for the migration pathway is subject to Level I or Level II concentrations, a value of 100 can be assigned as the hazardous waste quantity factor value for that pathway. As demonstrated in **Section 4.1.4.3.1.2**, wetlands and other sensitive environments are subject to Level II concentrations in the surface water pathway, and a minimum value of 100 can be assigned for the hazardous waste quantity factor value (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.4.2.3 Waste Characteristics Factor Category Value

One hazardous substance, PCBs, associated with Sources 1 and 2, which have a surface water pathway containment factor values greater than 0 for the watershed, correspond to an Ecotoxicity/Persistence Factor Value of 10,000 and Bioaccumulation Potential Factor Value of 50,000.

(Ecotoxicity/Persistence Factor Value) x (Hazardous Waste Quantity Factor Value) = 10,000 x 100 = 1×10^6

(Ecotoxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value)
x (Bioaccumulation Potential Factor Value) = $(1 \times 10^6) \times (50{,}000) = 5 \times 10^{10}$
Subject to a maximum of 1×10^{12}

The product corresponds to a Waste Characteristics Factor Category Value of 320 (Ref. 1 Table 2-7)

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Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 320

4.1.4.3 Environmental Threat - Targets

Arbuckle Creek within the area of actual contamination is evaluated as a habitat for a Federal designated endangered species, the Indiana Bat (*myotis sodalis)* and a Federal designated threatened species, the Northern Long-eared Bat (*myotis septentrionalis*) (Refs. 72, pp. 1 and 4; 75, p. 1; 77, p. 1; 87, pp. 7 and 9). The area of Actual Contamination is located within 5 miles of a known roosting, swarming, and foraging zone of a Priority 3 or 4 winter hibernaculum for the Indiana bat (Refs. 72, pp. 1 and 4; 87, p. 9). The Indiana bats have a home range territory of approximately 255 hectares in the spring to 625 hectares in the fall and can travel up to thousands of kilometers from their winter hibernacula to their summer foraging ground (Refs. 73, pp. 4 and 5; 87, p. 9). In 2003 and 2004, a survey of bat communities within the New River Gorge National River park conducted by the National Park Service (NPS) confirmed the presence of the Indiana bat within the park based on acoustic survey (Ref. 74, pp. 21, 24, 28). The Indiana bat was recorded at 53 of the 453 acoustic survey locations (approximately 11.7% of the total locations) (Ref. 74, p. 28). While the NPS report does not provide the specific locations where the Indiana bat was identified, based on the acoustic survey and the fact that it was conducted solely within the park boundary, the survey provides additional support that the Indiana bat is within current range of the area of actual contamination. The area of actual contamination, which consists of a forested riparian buffer zone, would provide a suitable habitat for the Indiana bat due to the presence of high quality foraging habitat over Arbuckle Creek and good to fair roosting habitat over the stream and adjacent riparian areas (Refs. 73, pp. 1, 5 and 6; 74, pp. 13, 30; 75, pp. 1 and 2; 87, pp. 7, 8, and 9).

Additionally, the Northern Long-eared bat was live captured within the New River Gorge Park as recently as 2017 (Ref. 87, p. 9). The 2003 and 2004 survey of bat communities within the New River Gorge National River live captured 49 Northern Long-eared bats and recorded 107 by acoustical survey (Ref. 74, pp. 24, 25, and 28). The Northern Long-eared bat was the most common bat species found during the survey, which was expected given the habitat association of the species and that which is found at the park (Refs. 74, p. 29; 77, p. 5). The 2003 and 2004 survey of bat communities stated in general that although bat foraging activity occurs over much of the park landscape, riparian areas, such as those found along large portions of the area of actual contamination, are the most critical component of bat foraging habitat (Refs. 74, p. 50; 87, pp. 7, 8 and 9).

West Virginia Department of Natural Resources drafted a State Wildlife Action Plan (SWAP) in 2005 and revised in 2015 in response to a 2001 request by Congress for each state to submit a comprehensive wildlife conservation strategy to U.S. Fish and Wildlife National Advisory Acceptance Team, in order to qualify for state wildlife grant funds (Refs. 78 and 79, p. 1). The objective of the SWAP is to address both species of greatest conservation need as well as the full array of wildlife by focusing on identifying species in need, then on habitats associated with those species and geographic areas of the state with concentrations of species and the habitats that they require. To identify species/habitat associations, known locations of species were matched with data from habitat mapping in the state. High-densities of species and habitat occurrences were used to identify a series of Conservation Focus Areas (CFA's) (Ref. 78, p. 7). Arbuckle Creek within the area of actual contamination is located within the state identified Gorge CFA (Ref. 78, p. 327). The Gorge CFA provides a "particular area, relatively small in size, important to maintenance of unique biotic communities" because the floodplains include some of the most extensive river scour prairies and woodlands in the eastern United States. The area supports many rare plant species including the globally rare Monongahela Barbara's-Buttons (*Marshallia grandiflora*). Upland and riparian habitats in the CFA support a high number of species of greatest conservation need plants (109), and the forest of the CFA is recognized as a globally significant example of the Appalachian cove hardwood/mixed mesophytic forest (Ref. 1, Table 4-23; 78, p. 329).

As depicted on **Figures 3, 4 and 5**, a total of 933 feet of HRS-eligible palustrine emergent wetlands along Arbuckle Creek on both the north and south banks as documented by a wetland delineation conducted in May 2018 (Refs. 67, p. 2, 3, 4, 13, 61-81). Frontage 1 consists of 334 feet of HRS-eligible wetlands located along the southern bank of Arbuckle Creek, Frontage B consists of 79 feet, Frontage C consists of 135 feet, Frontage 4 consists of 175 feet and Frontage 5 consists of 210 feet (Ref. 67, p. 13). Frontages 6 and 10 depicted on the wetland delineation map were not included in this HRS evaluation because frontage 6 is not along the surface water migration pathway, it is located along a drainage channel that flows into Arbuckle Creek, and frontage 10 is an isolated wetland located within the floodplain but not adjacent to or hydraulically connected to Arbuckle Creek.

Most Distant Level I Sample

Level I Concentrations are not established, because benchmarks are not available for sediment, and surface water was not collected.

Most Distant Level II Sample

The most distant Level II observed release attributable to the site and within the TDL extends 5,295 feet (approximately 1 mile) from the most upstream PPE in Arbuckle Creek, PPE1 to the farthest downstream sample location that meets the criteria for an observed release, SEC-SD-61 (**Figures 3, 4, 5, and 6; Section 4.1.2.1.1;** Ref. 98).

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1 Level I Concentrations

Sensitive environments that are determined to be actual contamination targets based on sediment sample analytical results, but for which no ecological-based benchmarks are applicable, are evaluated as subject to actual contamination at Level II (Ref. 1, Section 4.1.4.3.1). Therefore, there are no sensitive environments subject to Level I concentrations and the Level I Concentrations Factor Value is 0 (Ref. 1, Section 4.1.4.3.1).

Level I Concentrations Factor Value: 0

4.1.4.3.1.2 Level II Concentrations

Sensitive environments other than wetlands that have been identified within the zone of actual contamination include habitat known to be used by two Federal designated or proposed endangered or threatened species and particular areas, relatively small in size, important to maintenance of unique biotic communities (**Section 4.1.4.3**).

Table 12
Level II Sensitive Environments

Sensitive Environment	Reference(s)	Sensitive Environment Value (Ref. 1, Table 4-23)
Habitat known to be used by Federal designated or proposed endangered or threatened species (Indiana bat)	72, pp. 1 and 4; 73, pp. 4, 5, 6; 74, pp. 13, 21, 24, 30; 75, pp. 1 and 2	75
Habitat known to be used by Federal designated or proposed endangered or threatened species (Northern Long-eared bat)	72, pp. 1 and 4; 74, pp. 24, 25, 26, 29, and 50; 77, pp. 1, 5	75
Particular areas, relatively small in size, important to maintenance of unique biotic communities (Gorge CFA)	78, p. 7, 327, and 329	25

Sum of Level II Sensitive Environments: 175

Table 13
Level II wetlands

Wetland	Frontage (feet/mi.)	Reference
Wetland 1	334/0.063	67, pp. 4, 13, 61-63
Wetland B	79/0.014	67, pp. 4, 13, 79-81
Wetland C	135/0.025	67, pp. 4, 13, 82-84
Wetland 4	175/0.031	67, pp. 4, 13, 67-69
Wetland 5	210/0.037	67, pp. 4, 13, 70-72

Sum of Level II Wetland Frontages: 0.17 miles
Wetlands Value (Ref. 1, Table 4-24): 25

Sum of Level II Sensitive Environments Value (175) + Wetlands Value (25): 200

4.1.4.3.1.3 Potential Contamination

Since a maximum score of 100.00 was achieved for the surface water migration pathway, the Potential Contamination Factor Value was not scored (NS).

5.0 SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY

5.1 SOIL EXPOSURE COMPONENT

According to the HRS, evaluation of the soil exposure component of the soil exposure and subsurface intrusion pathway is based on areas of observed contamination (Ref. 1a, Section 5.1.0).

5.1.0 GENERAL CONSIDERATIONS

Letter by which this area is to be identified: A

Name of area: Area of Observed Contamination A (AOC A)

Location and description of the area, with reference to a map : The area of observed soil contamination is defined for HRS scoring purposes based on analytical results for soil samples collected in June 2017, December 2017, and March 2018 from parcels within and adjacent to Arbuckle Creek's floodplain (**Figures 4, 5, and 6; Tables 16 and 17;** Refs. 26, p. 7; 27, p. 30; 30. p. 18; 31, p. 41; 32, p. 1, 2; 44, p. 35; 47, pp. 5-7; 64, pp. 21, 84, pp. 1,2; and 85, pp. 1, 2). AOC A is likely primarily a product of the PCB-contaminated sediments within Arbuckle Creek being deposited onto the properties as a result of the periodic and historic flooding of Arbuckle Creek (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-15; 17, pp. 1-11; 21, pp. 1-3; and 22, pp. 1-5). The separate areas of contaminated soil, as documented by the analytical results presented in **Table 17** of this HRS documentation record, are aggregated into a single AOC for this HRS scoring package for the following reasons: the same source type (i.e. contaminated soil), same contaminant of concern (i.e., PCBs), and deposited in a similar manner (i.e. deposition by flooding). The approximate area of soil contamination, excluding impervious surfaces, was not estimated because of the large number of properties and area that comprise the AOC. Additionally, soil sample collection was focused towards occupied residential properties. Contamination can reasonably be inferred between sampling locations within the AOC because the mechanism by which the hazardous substances migrated to the area of observed contamination involves wide dispersion of contaminants (i.e., depositional flooding of contaminated sediments within Arbuckle Creek).

Soil samples that meet observed contamination criteria were used to delineate AOC A, as shown in **Figures 4, 5, and 6** (Ref. 1, Table 2-3). To document the presence of PCBs in AOC A at significant concentrations, the analytical results of the soil samples collected in June 2017, December 2017, and March 2018 were compared to soil samples collected in June 2017, December 2017, and March 2018 from properties located upstream from the SEC property at locations not expected to have been impacted by surface water runoff or flooding from the sources and/or would be only minimally impacted (**Tables 14 and 15**; Refs. 26, p. 7; 27, p. 30; 30, p. 18; 31, p. 41; 32, p. 1, 2; 44, p. 35; 64, pp. 21, 22). The background soil samples and source soil samples are all grab samples consisting of similar matrices comprised of top soil/organics, silt, silty-sand, and silty-clay with comparable percent solids ranging from 68.9% to 79.6% for background samples and 63.5% to 84.9% for source/soil samples with two exceptions; sample SS-22 had a percent solid of 44.3% and sample SS-26 had a percent solid of 48.6% (Refs. 26, pp. 3, 5, 6, 7, 8, and 10; 27, pp. 27, 28, 30, 34, 38, 41, 44, 49, 51, 55, 56; 28, pp. 11, 22; 30, pp. 17, 18; 31, pp. 18, 19, 39; 43, pp. 10, 11, 12, 13, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 37, 38, 39; 44, pp. 15, 22, 23, 26, 30, 34, 35; 45, pp. 8, 13, 16, 20, 26, 28, 32, 33, 34; 46, pp. 12, 28, 32; 47, pp. 5, 6, 7; 51, pp. 8, 16; 64, pp. 10, 12, 13, 14, 15, 21). The background soil and AOC soil samples collected in June and December 2017 and March 2018 were documented as having been collected between 0 to 6 inches bgs (0 to 0.5 feet bgs) (Refs. 26, p. 14; 27, pp. 27, 30, 34, 38, 41, 44, 49, 51, 55, and 56; 47, p. 8; 35, pp. 3, 12, 13, 14, 15, and 16; 48, pp. 3, 10, 11). The December 2017 and March 2018 soil samples were collected using a dedicated polyethylene scoop and homogenizing the soil in a disposable aluminum pan (Refs. 26, p. 14; 47, p. 8).

The soil samples from the June 2017, December 2017, and March 2018 sampling events were submitted to and analyzed by an EPA Contract Laboratory Program (CLP) laboratory for Aroclors (i.e., PCBs) in accordance with CLP Statement of Work (SOW) SOM02.4, and the analytical data were validated by EPA Region 3 Environmental Services Assistance Team (ESAT) according to the National Functional Guidelines for Organic Superfund Methods Data Review and applicable USEPA Region 3 modifications (Refs. 26, pp. 3, 5-8, 10; 28, pp. 1, 2, 23; 30, pp. 14, 17, 18; 31, pp. 1-4, 41; 39, pp. 1, 2; 43, pp. 1, 2; 44, pp. 1-2, 35; 45, pp, 1,2; 46, pp. 1, 2; 47, pp. 5-7; 51, pp. 1, 2; 64. pp. 1-2, 21).

Background Concentrations

Table 14
Background Soil Sample Descriptions

CLP Sample ID	Field Sample ID	Date	Sample Description	Sample Depth (inches)	References
C0AD8	SS11	6/15/17	top soil; sand	0-6	30, p. 18; 31, p. 41; 35, p. 3
C0AD9	SS12	6/15/17	top soil; silty sand	0-6	30, p. 18; 31, p. 41; 35, p. 3
C0AG6	SEC-SS-R5-01	12/13/17	brown to dark tan; mostly silt with some sand	0-6	26, p. 7; 27, p. 30; 44, p. 35
C0AE6	SS-150	3/20/18	brown silt	0-6	47, p. 5; 48, pp. 1 and 10; 64, pp. 10, 21, 56
C0AE8	SS-152	3/20/18	black silt	0-6	47, p. 6; 48, pp. 1 and 11; 64, pp. 12, 21, 64
C0AE9	SS-153	3/20/18	medium brown silty clay	0-6	47, p. 6; 48, pp. 1 and 11; 64, pp. 13, 21, 67
C0AF0	SS-154	3/20/18	medium brown silty clay	0-6	47, p. 6; 48, pp. 1 and 11; 64, pp. 14, 21, 70
C0AF1	SS-155	3/20/18	medium brown silty clay	0-6	47, p. 7; 48, pp. 1 and 11; 64, pp. 15, 21, 73

Table 15
Background Soil Sample Analytical Data

CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AD8	SS11	6/15/17	PCB – Aroclor 1260	11J[1]	44	30, p. 18; 31, pp. 1-5, 18, 41, 101; 35, pp. 1 and 3
C0AD9	SS12	6/15/17	PCB – Aroclor 1260	15J[1]	43	30, p. 18; 31, pp. 1-5, 19, 41, 106; 35, pp. 1 and 3
C0AG6	SEC-SS-R5-01	12/13/17	PCB – Aroclor 1260	41U	41	26, p. 7; 27, p. 30; 38, pp. 1 and 11; 44, pp. 1-4, 30, 35, 145
C0AE6	SS-150	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 5-6; 48, pp. 1 and 10; 64, pp. 1-4, 10, 21, 56
C0AE8	SS-152	3/20/18	PCB – Aroclor 1260	48U	48	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 12, 21, 64
C0AE9	SS-153	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 13, 21, 67
C0AF0	SS-154	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 6; 48, pp. 1 and 11; 64, pp. 1-4, 14, 21, 70
C0AF1	SS-155	3/20/18	PCB – Aroclor 1260	46U	46	47, p. 7; 48, pp. 1 and 11; 64, pp. 1-4, 15, 21, 73

Notes:
The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Refs. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL = EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
SEC = Shaffer Equipment Company
µg/kg = micrograms per kilogram
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (Refs. 31, p. 1-5; 64, p. 4). Samples reporting concentrations of target analytes less than (CRQLs) are estimated and have been qualified J (Ref. 31, pp. 1-5; 49, pp. 246, 247).
U= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit (Refs. 44, p. 4; 64, p. 4)
[1] Qualified background data were used in accordance with EPA Fact Sheet *Using Qualified Data to Document an Observed Release and Observed Contamination*, which states "The adjustment factors apply only to "J" qualified data above the CRQL"; therefore, the qualified data was not adjusted (Ref. 37, pp. 4).

Contaminated Samples – AOC A

Table 16
Contaminated Soil Sample Descriptions

CLP Sample ID	Field Sample ID	Date	Sample Description	Sample Depth (inches)	References
C0AE0	SS13	6/15/17	sandy, silty top soil	0-6	30, p. 18; 35, p. 12; 43, p. 37
C0AE1* (C0AE2)*	SS14* (SS15)*	6/15/17	top soil; clay	0-6 0-6	30, p. 18; 35, p. 12; 43, p. 38 (30, p. 18; 35, p. 12; 43, p. 38)
C0AE3	SS16	6/15/17	top soil; silty sand, gravel	0-6	30, p. 18; 35, p. 12; 43, p. 38
C0AE5	SS18	6/15/17	top soil; sand	0-6	30, p. 18; 35, p. 13; 43, p. 38
C0AE6	SS19	6/15/17	top soil; some gravel	0-6	30, p. 18; 35, p. 14; 43, p. 38
C0AE7	SS20	6/15/17	sand, some silt	0-6	30, p. 18; 35; p. 13; 43, p. 38
C0AE9	SS22	6/15/17	fine sand with some silt	0-6	30, p. 18; 35, p. 13; 43, p. 39
C0AF2	SS25	6/15/17	top soil, silt with some organics	-	30, p. 18; 43, p. 39
C0AF3	SS26	6/15/17	Silt with fine sand	6 inches	30, p. 17; 43, p. 39
C0AF4	SS27	6/15/17	silt, sand, clay, some organics	-	30, p. 17; 43, p. 39
C0AM0	SS41	6/14/17	sand; brick and coal	0-6	30, p. 15; 35, p. 14; 43, p. 39
C0AM7	SS42	6/15/17	sand, silt	0-6	30, p. 17; 35, p. 14; 43, p. 40
C0AM8	SS43	6/15/17	silty sand	0-6	30, p. 17; 35, p. 15; 43, p. 40
C0AN1	SS44	6/15/17	sandy silt	0-6	30, p. 18; 51, p. 16; 35, p. 16
C0AG4	SEC-SS-TL-43C	12/13/17	dark brown silt with some sand	0-6	26, p. 6; 27, p. 27; 44, p. 35
C0AG0	SEC-SS-R3-01	12/13/17	very dark brown silt with some organics	-	26, p. 6; 44, p. 35
C0AC6	SEC-SS-R1-06	12/12/17	silt with organics	0-6	26, p. 3; 27, p. 56; 44, p. 34
C0AF6	SEC-SS-T8-04	12/13/17	Dark brown silt, organics	0-6	26, p. 6; 27, p. 55; 28, p. 22
C0AF2	SEC-SS-T8-05	12/13/17	brown sand	0-6	26, p. 6; 27, p. 51; 45, p. 34**
C0AF9	SEC-SS-R2-01	12/13/17	brown silt with some organics	-	26, p. 6; 44, p. 35
C0AE4	SEC-SS-T7-04	12/13/17	brown silt with some organics	0-6	26, p. 5; 27, p. 44; 45, p. 33
C0AE9	SEC-SS-T7-05	12/13/17	brown silt with gravel	0-6	26, p. 5; 27, p. 49; 45, p. 33
C0AE0	SEC-SS-T6-05	12/13/17	brown sand and silt, some organics	0-6	26, p. 5; 27, p. 41; 45, p. 33
C0AD2	SEC-SS-T5-04	12/13/17	brown with gravel and organics	0-6	26, p. 5; 27, p. 34; 45, p. 32

Table 16 Contaminated Soil Sample Descriptions					
CLP Sample ID	Field Sample ID	Date	Sample Description	Sample Depth (inches)	References
C0AD7	SEC-SS-T5-05	12/13/17	brown, sandy silt	0-6	26, p. 5; 27, p. 38; 45, p. 32
C0AA5	SEC-SS-105	3/20/18	silty sand	0-6	26, p. 8; 46, p. 32; 48, p. 3
C0AC5	SEC-SS-125	3/20/18	clay with some organics	0-6	26, p. 10; 46, p. 31; 48, p. 5

*Reference 35, p. 12 lists the same sample identifier, SS15 for both CLP sample numbers C0AE1 and C0AE2. As shown on Reference 43, p. 38, CLP sample number C0AE1 is associated with SS14. As noted in Reference 30, p. 18, samples SS14 and SS15 are a duplicate pair.
( ) = Data and information within parentheses indicates data and information for the field duplicate sample pair

Table 17 Contaminated Soil Sample Analytical Results						
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AE0	SS13	6/15/17	PCB – Aroclor 1260	450	49	30, p. 18; 35, pp. 1 and 12; 43, pp. 10, 37, 71
C0AE1* (C0AE2)*	SS14 (SS15)	6/15/17	PCB – Aroclor 1260	91 (90)	50 (50)	30, p. 18; 35, pp. 1 and 12; 43, pp. 1-4, 11, 12, 38, 76, 81)
C0AE3	SS16	6/15/17	PCB – Aroclor 1260	260	42	30, p. 18; 35, pp. 1 and 12; 43, pp. 1-4, 13, 38, 86
C0AE5	SS18	6/15/17	PCB – Aroclor 1260	340	39	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-4, 17, 38, 96
C0AE6	SS19	6/15/17	PCB – Aroclor 1260	210	46	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-4, 18, 38, 101
C0AE7	SS20	6/15/17	PCB – Aroclor 1260	160	40	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-4, 19, 38, 106
C0AE9	SS22	6/15/17	PCB – Aroclor 1260	200	74	30, p. 18; 35, pp. 1 and 13; 43, pp. 1-4, 21, 39, 116
C0AF2	SS25	6/15/17	PCB – Aroclor 1260	100	50	30, p. 18; 35, pp. 1 and 14; 43, pp. 1-4, 24, 39, 132
C0AF3	SS26	6/15/17	PCB – Aroclor 1260	660	67	30, p. 17; 35 pp. 1 and 14; 43, pp. 1-4, 25, 39, 137
C0AF4	SS27	6/15/17	PCB – Aroclor 1260	350	47	30, p. 17; 35, pp. 1 and 14; 43, pp. 1-4, 26, 39, 142
C0AM0	SS41	6/14/17	PCB – Aroclor 1260	130	47	30, p. 15; 35, pp. 1 and 14; 43, pp. 1-4, 27, 39, 147
C0AM7	SS42	6/15/17	PCB – Aroclor 1260	230	41	30, p. 17; 35, pp. 1 and 14; 43, pp. 1-4, 28, 40, 152
C0AM8	SS43	6/15/17	PCB – Aroclor 1260	1,300	49	30, p. 17; 35, pp. 1 and 15; 43, pp. 1-4, 29, 40, 162
C0AN1	SS44	6/15/17	PCB – Aroclor 1260	1200	89	30, p. 15, 18; 51, pp. 1-5, 8, 16, and 46; 35, pp. 1 and 16
C0AG4	SEC-SS-TL-43C	12/13/17	PCB – Aroclor 1260	58	47	26, p. 6; 27, p. 27; 38, pp. 1, 11; 44, pp. 1-4, 26, 35, 139

Table 17 Contaminated Soil Sample Analytical Results						
CLP Sample ID	Field Sample ID	Date	Hazardous Substance	Concentration (µg/kg)	Adjusted CRQL (µg/kg)	References
C0AG0	SEC-SS-R3-01	12/13/17	PCB – Aroclor 1260	310	49	26, p. 6; 38, pp. 1, 10; 44, pp. 1-4, 23, 35, 124
C0AC6	SEC-SS-R1-06	12/12/17	PCB – Aroclor 1260	64	49	26, p. 3; 27, p. 56; 38, pp. 1 and 9; 44, pp. 1-4, 15, 34, and 88
C0AF6	SEC-SS-T8-04	12/13/17	PCB – Aroclor 1260	220	44	26, p. 6; 27, p. 55; 28, pp. 1-4, 11, 22, 63; 38, pp. 1, 2
C0AF2	SEC-SS-T8-05	12/13/17	PCB – Aroclor 1260	410	41	26, p. 6; 27, p. 51; 38, pp. 1, 15**; 45, pp. 1-5, 28, 34, 146**
C0AF9	SEC-SS-R2-01	12/13/17	PCB – Aroclor 1260	140	46	26, p. 6; 38, pp. 1, 10; 44, pp. 1-4, 22, 35, 118
C0AE4	SEC-SS-T7-04	12/13/17	PCB – Aroclor 1260	60	43	26, p. 5; 27, p. 44; 38, pp. 1, 16; 45, pp. 1-5, 20, 33, 119
C0AE9	SEC-SS-T7-05	12/13/17	PCB – Aroclor 1260	59	39	26, p. 5; 27, p. 49; 38, pp. 1, 15; 45, pp. 1-5, 26, 33, 137
C0AE0	SEC-SS-T6-05	12/13/17	PCB – Aroclor 1260	140	46	26, p. 5; 27, p. 41; 38, pp. 1, 13; 45, pp. 1-5, 16, 33, 104
C0AD2	SEC-SS-T5-04	12/13/17	PCB – Aroclor 1260	200	42	26, p. 5; 27, p. 34; 38, pp. 1, 12; 45, pp. 1-5, 8, 32, 63
C0AD7	SEC-SS-T5-05	12/13/17	PCB – Aroclor 1260	290	41	26, p. 5; 27, p. 38; 38, pp. 1, 13; 45, pp. 1-5, 13, 32, 92
C0AA5	SEC-SS-105	3/20/18	PCB – Aroclor 1260	67J[1]	47	26, p. 8; 46, pp. 1-4, 12, 32 70; 48, pp. 1 and 3
C0AC5	SEC-SS-125	3/20/18	PCB – Aroclor 1260	58	52	26, p. 10; 46, pp. 1-4, 28, 31, 123; 48, pp. 1 and 5

Notes:

The Sample Adjusted CRQL is the CRQL adjusted for sample weight, volume, dilution, and percent solid (Ref. 36, pp. 134, 135, 503, 504).
CLP = Contract Laboratory Program
CRQL = EPA Contract Laboratory Program Contract Required Quantitation Limit
PCB = polychlorinated biphenyl
SEC = Shaffer Equipment Company
µg/kg = micrograms per kilogram
( ) = Data and information within parentheses indicates data and information for the field duplicate sample pair
J[1] = The percent recoveries for the following surrogate were outside of the lower control limits. Detected concentrations in these samples are estimated and have been qualified (Ref. 46, pp. 3, 12, 50, 152). In accordance with the EPA National Functional Guidelines for Organic Superfund Methods Data Review, low surrogate recoveries between 10% ≤ %R < 30% should be qualified J- indicating a low bias (Ref. 49, pp. 233-235). In accordance with the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination*, the qualified concentration was not adjusted (Ref. 37, pp. 7 and 8).
*Reference 35, p. 12 lists the same sample identifier, SS15 for both CLP sample numbers C0AE1 and C0AE2. As shown on Reference 43, p. 38, CLP sample number C0AE1 is associated with SS14. As noted in Reference 30, p. 18, samples SS14 and SS15 are a duplicate pair.
** References 38, p. 15 and 45, pp. 28 and 34 incorrectly identify the sample identifier as SEC-SD-T8-05. The correct sample identifier for this sample is recorded in References 26, p. 6 and 27, p. 51.

Attribution

The SEC built and serviced electrical substations for the local coal mining industry from approximately 1970 to 1984. The substations incorporated various types of transformers, capacitors, switches, and related voltage regulation and distribution devices. Oil containing PCBs was used in the electrical transformers (Refs. 90, pp. 1-3; 91, pp. 1-3). SEC stored nonessential, damaged or outdated transformers and capacitors on the approximate 1-acre property (Ref. 7, pp. 4 and 8). During the initial and subsequent investigations conducted by WVDEP and EPA, hundreds of transformers, capacitors, and drums in deteriorating condition were observed scattered around the SEC property on the ground surface (Ref. 7, pp. 218; 9. p. 1; 10, p. 3). Many of the transformers, capacitors, and drums were observed to be broken, cracked, or lying on their side and leaking fluid onto the soil (Refs. 7, p. 218; 10. p. 3). Two of the transformers were labeled as containing PCBs; however, many other transformers, capacitors, and drums were indicated to contain Chloroextol ™ and Pyranol™, PCB containing fluids (Ref. 7, pp. 32, 218, 231; 10, p. 3; 65, p. 2). Soil beneath transformers at one location was saturated with oil to a depth of at least 12 inches bgs (Ref. 7, p. 218). Preliminary results of two samples collected at this location contained PCBs at concentrations of 260,000 ppm at the surface and 40,000 ppm at 12 inches bgs (Ref. 7, p. 219). Rusty and leaking transformers were also observed inside the building located on the SEC property (Ref. 7, p. 231). It was noted that the floor drains in the building discharged directly into Arbuckle Creek (Ref. 7, p. 231).

Removal actions conducted between 1984 and 1987, in 1990, and in 2001 have not completely removed PCB-contaminated soil from the Shaffer property (**Section 2.2.2, Source 1**) upstream of AOC A. A portion of the contaminated soil on the SEC property has been capped; however, the cap has not been maintained and has compromised edges (Refs. 12, p. 16; 39, pp. 1-2; 66, p. 15). Additionally, samples collected from the backfilled area following the 1990 removal action showed the presence of PCBs ranging from 0.1 to 1,000 ppm (Ref. 12. p. 9).

PCB contaminated soil located on the SEC property resulted from the migration, deposition, or spillage of hazardous substances associated with the handling, storage, maintenance, and management practices involving hundreds of PCB-containing transformers and capacitors (**Section 2.2.2, Source 1**). Soil samples were collected in December 2017 from the SEC property; SEC-SS-SE-01 was collected from beyond the excavated and backfilled area adjacent to a demolished building reportedly used for storage in the southwest corner of the former SEC property and SEC-SS-SE-02 was collected from a drainage channel beneath a broken section of the capped wall in the northeast corner of the former SEC property (**Figure 3**; Refs. 26, p. 7; 27, pp. 31-32; 66, p. 15; 84, p. 2). There are no maintained engineering structures to prevent the contaminated soil from flowing off-site via overland flow or flooding (**Section 2.2.3**). Overland flow from the location of SEC-SS-SE-01 and SEC-SS-SE-02 is into a drainage channel constructed in 2001 that discharges into Arbuckle Creek (see **Figure 3**; Ref. 12, p. 10, 12, 53).

AOC A, which corresponds with Source 2 evaluated for the surface water migration pathway, consists of PCB contaminated soil located on portions of numerous parcels within and adjacent to the floodplain of Arbuckle Creek. AOC A is located along both sides of the PCB-contaminated portion of Arbuckle Creek downstream of the SEC property and Source 1, and likely resulted primarily from PCB-contaminated sediments within Arbuckle Creek being deposited onto the properties as a result of the periodic and historic flooding of Arbuckle Creek (**Section 2.2.2, Source 2**). AOC A samples were collected at a depth of 0 to 6 inches bgs (**Table 16**). PCB contamination was documented in AOC A at concentrations significantly above background (**Table 17**). No maintained engineered cover or functioning and maintained run-on control system and runoff management system or designed, constructed, operated, and maintained source containment to prevent a washout of hazardous substances by flood is documented for Source No. 2 (**Section 2.2.3, Source 2**). Overland flow from Source 2 is directly into Arbuckle Creek; additionally, as Arbuckle Creek is prone to annual periodic flooding and occasional significant flooding, Source 2 is in direct contact with Arbuckle Creek (Refs. 7, p. 102; 12, pp. 5, 319-328; 14, p. 1; 16, pp. 1-16; 17, pp. 1-11; 20, pp. 1-3; 21, pp. 1-3; and 22, pp. 1-5; **Figures 4, 5, 6**).

PCBs are not known to be naturally occurring. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs was halted in the United States in 1977 because of evidence they build up in the environment and can cause harmful health effects (Refs. 90, pp. 1-3; 91, pp. 1-11).

Possible other facilities and/or sources of PCB contamination that could potentially contribute to the PCB contamination detected in Arbuckle Creek are the Britt Bath House and the use of PCB-laden oil used to spray the roadways in Minden as a form of dust suppression.

In 1991, EPA assessed the Britt Bath House property located on the western end of the Town of Minden off Old Minden Road on the north side of Arbuckle Creek across from the SEC property (Ref. 53, pp. 1, 10, 12). The Britt Bath House consists primarily of a large brick building (i.e., bath house) located on approximately 3 acres of land that was used by the coal miners of New River and Pocahontas Coal Company (Ref. 53, pp. 5, 10, 12). Berwind Land Company owned the property until 1980 when it was sold (Ref. 53, p. 13). The purchaser stated that the SEC Company used the brick building for storage of equipment until 1978 or 1979 during the time the property was owned by the Berwind Land Company (Ref. 53, p. 13). The purchaser used the building as a garage to repair trucks and other equipment and infrequently refurbished transformers on the property (Ref. 53, p. 13). During the assessment, an abandoned transformer was observed on the property (Ref. 53, p. 35). EPA collected soil samples from the property, including near the transformer and from observed drainage ditches that discharge to Arbuckle Creek (Ref. 53, pp. 31-33). Two soil samples contained concentrations of PCBs at 2.6 ppm near a 55-gallon drum and 0.3 ppm at the end of a drainage ditch leading from the 55-gallon drum to Arbuckle Creek (Ref. 53, pp. 33 and 63). The remaining samples, including the samples collected near the abandoned transformer, did not contain PCBs (Ref. 53, pp. 33, 61, 63).

A former SEC employee has stated that throughout the 1960s he spread the PCB-containing oil from SEC onto the roadways throughout Minden as a means of dust suppression, which was a common practice at that time (Refs. 89, pp. 1-3; 90, p. 2; 91, p. 4). As shown in **Tables 15 and 17**, the concentrations of PCBs detected in soil samples within the floodplain of Arbuckle Creek downstream of the SEC property are at significant concentrations above the concentrations detected in the background soil samples, which were collected near and adjacent to roadways in Minden, upstream of the SEC property as shown on **Figure 3**.

The presence of site-attributable contamination (PCBs) in soil samples provide evidence that the AOC being evaluated for the Shaffer Equipment/Arbuckle Creek Area site is due, at least in part, to the Shaffer Equipment Company and not another facility or source of PCBs.

<u>Hazardous Substances Released:</u>

PCBs – Aroclor 1260

5.1.1.2.2 Hazardous Waste Quantity

Hazardous Constituent Quantity

The hazardous constituent quantity for AOC A could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the AOC is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (e.g., manifests, PRP records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the AOC. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for AOC A with reasonable confidence. Scoring proceeds to the evaluation of Tier B, Hazardous Wastestream Quantity (Ref. 1, Section 2.4.2.1.2, Table 5-2).

Hazardous Constituent Quantity (C) Value: NS

Hazardous Wastestream Quantity

The hazardous wastestream quantity for AOC A could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants in the AOC is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (e.g., manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) available to adequately calculate the total or partial mass of the wastestream plus the mass of all CERCLA pollutants and contaminants in the AOC. Therefore, there is insufficient information to calculate the hazardous wastestream quantity for AOC A with reasonable confidence. Scoring proceeds to the evaluation of Tier C, Volume (Ref. 1, Section 2.4.2.1.3, Table 5-2).

Hazardous Wastestream Quantity (W) Value: NS

Volume

The information available on the depth of AOC A is not sufficiently specific to support the volume of the contaminated soil with reasonable confidence; therefore, it is not possible to assign a volume (Tier C) for AOC A (Ref. 1, Section 2.4.2.1.3). AOC A has been assigned a value of 0 for the volume measure (Ref. 1, Section 2.4.2.1.3). As a result the evaluation of hazardous waste quantity proceeds to the evaluation of Tier D, area (Ref. 1, Section 2.4.2.1.4, Table 5-2).

Volume (V) Value: 0

Area

The area of AOC A is not adequately determined. AOC A is composed of contaminated soil on numerous residential and non-residential (vacant lots and commercial) properties that contain concentrations of PCBs that are equal to or greater than three times background levels. The approximate area of soil contamination, excluding impervious surfaces, was not estimated because of the large number of properties and area that comprise the AOC. Additionally, soil sample collection was focused towards occupied residential properties. Contamination can be inferred between sampling locations, however, because the area of observed contamination is a result of depositional flooding of contaminated sediments within Arbuckle Creek. Because the information available is insufficient to estimate the area and measure with reasonable confidence [as required in Section 2.4.2.1.4 of Reference 1], a value of greater than zero (>0) is established as the source hazardous waste quantity (HWQ) value for Tier D – area. The source type is "Contaminated Soil," so the area value is divided by 34,000 to obtain the assigned value of >0, as shown below (Ref. 1, Section 2.4.2.1.4, Table 5-2).

Area of AOC in ft^2 = >0
Area (A) Assigned Value: >0/34,000 = >0

AOC Hazardous Waste Quantity Value

The highest assigned hazardous waste quantity value for AOC A was assigned based on D – Area [Ref. 1, Table 5-2].

AOC Hazardous Waste Quantity Value: >0

5.1.1 RESIDENT POPULATION THREAT

5.1.1.1 LIKELIHOOD OF EXPOSURE

Surface soil samples collected in June 2017, December 2017, and March 2018 are used to establish observed contamination at Level I and Level II concentrations; these samples were collected from within the property boundaries of occupied residential properties within AOC A and within 200 feet of each residence (**Figures 4, 5, and 6**; Refs. 23, pp. 2, 3, 4, and 6; 26, p. 6; 80, pp. 1-4; 97, pp. 1-8). Therefore, a value of 550 is assigned to the likelihood of exposure factor category (Ref. 1a, Section 5.1.1.1).

The properties affected by PCB contamination are listed below.

Table 18
Resident Population Threat Likelihood of Exposure Factor

CLP Sample ID	Field Sample ID	Hazardous Substance	Concentration (µg/kg)	References
C0AE1* (C0AE2)	SS14 (SS15)	PCB – Aroclor 1260	91 (90)	Figure 4; 23, p. 2; 30, p. 18; 97, pp. 1 and 2; 43, pp. 1-5, 11, 38, 76; 80, pp. 1 and 4; 23, p. 2; 30, p. 18; 43, pp. 1-5, 12, 38, 81)
C0AF2	SS25	PCB – Aroclor 1260	100	Figure 5; 23, p. 4; 30, p. 18; 97, pp. 1 and 7; 43, pp. 1-5, 24, 39, 132; 80, pp. 1 and 3
C0AF3	SS26	PCB – Aroclor 1260	660	30, p. 17; 97, pp. 1 and 8; 46, pp. 28, 31, 123; 48, pp. 1 and 6; 80, pp. 1 and 4
C0AC5	SEC-SS-125	PCB – Aroclor 1260	58	26, p. 10; 97, pp. 1 and 8; 46, pp. 1-4, 28, 31, 123; 48, pp. 1 and 5; 80, pp. 1 and 4
C0AF4	SS27	PCB – Aroclor 1260	350	Figure 4; 23, p. 4; 30, p. 17; 97 pp. 1 and 6; 43, pp. 1-5, 26, 39, 142; 80, pp. 1 and 4
C0AM0	SS-41	PCB – Aroclor 1260	130	Figure 6; 23, pp. 4 and 6; 30, p. 15; 35, pp. 1 and 14; 43, pp. 1-5, 27, 39, 147; 80, pp. 1 and 2
C0AA5	SEC-SS-105	PCB – Aroclor 1260	67J[1]	Figure 6; 23, pp. 4 and 6; 26, p. 8; 97, pp. 1 and 3; 46, pp. 1-4, 12, 32 70; 80, pp. 1 and 2
C0AM7	SS-42	PCB – Aroclor 1260	230	Figure 4; 23, pp. 4; 30, p. 17; 97, pp. 1 and 5; 43, pp. 1-5, 28, 40, 152; 80, pp. 1 and 4
C0AF9	SEC-SS-R2-01	PCB – Aroclor 1260	140	Figure 4; 23, pp. 3; 26, p. 6; 97, pp. 1 and 5; 44, pp. 1-4, 22, 35, 118; 80, pp 1 and 4
C0AM8	SS43	PCB – Aroclor 1260	1,300	Figure 4; 23, p. 3; 30, p. 17; 97, pp. 1 and 4; 43, pp. 1-5, 29, 40, 162; 80, pp. 1 and 4
C0AG0	SEC-SS-R3-01	PCB – Aroclor 1260	310	Figure 4; 23, p. 3; 26, p. 6; 97, pp. 1 and 4; 44, pp. 1-5, 23, 35, 124; 80, pp 1 and 4
C0AF6	SEC-SS-T8-04	PCB – Aroclor 1260	220	Figure 4; 23, p. 3; 28, pp. 1-4, 11, 22, 63; 97, pp. 1 and 4; 80, pp. 1 and 4

Notes:

J[1] = The percent recoveries for the following surrogate were outside of the lower control limits. Detected concentrations in these samples are estimated and have been qualified (Refs. 46, pp. 3, 50, 152). In accordance with the EPA National Functional Guidelines for Organic Superfund Methods Data Review, low surrogate recoveries between 10% ≤ %R < 30% should be qualified J- indicating a low bias (Ref. 49, pp. 233-235). In accordance with the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination*, the qualified concentration was not adjusted (Ref. 37, pp. 7 and 8).

*Reference 35, p. 12 lists the same sample identifier, SS15 for both CLP sample numbers C0AE1 and C0AE2. As shown on Reference 43, p. 38, CLP sample number C0AE1 is associated with SS14. As noted in Reference 30, p. 18, samples SS14 and SS15 are a duplicate pair.

Resident Population Threat Likelihood of Exposure Factor Category Value: 550

5.1.1.2 WASTE CHARACTERISTICS

5.1.1.2.1 Toxicity

Table 19 Toxicity		
Toxicity Hazardous Substance	**Toxicity Factor Value**	**References**
PCBs	10,000	Ref. 1a, Section 2.4.1.1; Ref. 2, p. 2

Toxicity Factor Value: 10,000

5.1.1.2.2 Hazardous Waste Quantity

The Hazardous Waste Quantity Factor Value is assigned as specified in HRS Sections 2.4.2 and 5.1.1.2.2, based on the Area Factor Value for AOC A.

Table 20 Hazardous Waste Quantity		
Hazardous Waste Quantity Area Letter	**Source Type**	**Area Hazardous Waste Quantity**
A	Contaminated Soil	>0
Sum of Values:		>0

Sum of Values: >0

Based on HRS Section 2.4.2.2, if the Hazardous Constituent Quantity is not adequately determined for one or more areas of observed contamination, a factor value is assigned from Table 2-6 or a value of 10, whichever is greater, as the Hazardous Waste Quantity Factor Value for that pathway (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value (Ref. 1, Section 2.4.2.2, Table 2-6): 10

5.1.1.2.3 Calculation of Waste Characteristics Factor Category Value

The Toxicity Factor Value for PCBs (10,000) is multiplied by the Hazardous Waste Quantity Factor Value for the site (10) in order to determine the Waste Characteristics Product, subject to a maximum value of 1×10^8 (Ref. 1, Section 2.4.3.1).

$10{,}000 \times 10 = 1 \times 10^5$

Toxicity Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 10
Toxicity Factor Value × Hazardous Waste Quantity Factor Value: 1×10^5

From HRS Table 2-7, a Waste Characteristics Product of 1×10^5 is assigned a Waste Characteristics Factor Category Value of 18 (Ref. 1, Section 2.4.3.1, Table 2-7).

Waste Characteristics Factor Category Value: 18

5.1.1.3 TARGETS

Although contamination within the AOC can be inferred between sampling points, only those individuals whose residence is both on the property and within 200 feet of documented contamination that meets observed contamination criteria are included as resident population threat targets for this evaluation. Parcels within the AOC that were vacant, or contained unoccupied residences or buildings, such as garages, were not evaluated as targets in accordance with Section 5.1.1.3 of the HRS (Refs. 23, pp. 1-10; 80, pp. 1-8).

Table 21
Resident Population

CLP Sample ID	Field Sample ID	Hazardous Substance	Concentration (µg/kg)	Benchmark	References
C0AE1* (C0AE2)	SS14 (SS15)	PCB – Aroclor 1260	91 (90)	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 2; 30, p. 18; 97, pp. 1 and 2; 43, pp. 1-5, 11, 38, 76; 80, pp. 1 and 4 (23, p. 2; 30, p. 18; 43, pp. 12, 38, 81)
C0AF2	SS25	PCB – Aroclor 1260	100	Cancer Risk (300 µg/kg)	Figure 5; 2, p. 3; 23, p. 4; 30, p. 18; 97, pp. 1 and 7; 43, pp. 1-5, 24, 39, 132; 80, pp. 1 and 3
C0AC5	SEC-SS-125	PCB – Aroclor 1260	58	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 26, p. 10; 97, pp. 1 and 8; 46, pp. 28, 31, 123; 48, pp. 1 and 6; 80, pp. 1 and 4
C0AF3	SS26	PCB – Aroclor 1260	660	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 4; 30, p. 17; 97, pp. 1 and 8; 46, pp. 28, 31, 123; 48, pp. 1 and 6; 80, pp. 1 and 4
C0AF4	SS27	PCB – Aroclor 1260	350	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 4; 30, p. 17; 97, pp. 1 and 643, pp. 1-5, 26, 39, 142; 80, pp. 1 and 4
C0AM0	SS41	PCB – Aroclor 1260	130	Cancer Risk (300 µg/kg	Figure 6; 2, p. 3; 23, pp. 4 and 6; 30, p. 15; 35, pp. 1 and 14; 43, pp. 1-5, 27, 39, 147; 80, pp. 1 and 2
C0AA5	SEC-SS-105	PCB – Aroclor 1260	67J[1]	Cancer Risk (300 µg/kg)	Figure 6; 2, p. 3; 23, pp. 4 and 6; 26, p. 8; 97, pp. 1 and 3; 46, pp. 1-4, 12, 32 70; 80, pp. 1 and 2
C0AM7	SS-42	PCB – Aroclor 1260	230	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, pp. 3 and 4; 97, pp. 1 and 5; 43, pp. 1-5, 28, 40, 152; 80, pp. 1 and 4
C0AF9	SEC-SS-R2-01	PCB – Aroclor 1260	140	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, pp. 3 and 4; 26, p. 6; 97, pp. 1 and 5; 44, pp. 1-4, 22, 35, 118; 80, pp 1 and 4
C0AM8	SS43	PCB – Aroclor 1260	1,300	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 3; 30, p. 17; 97, pp. 1 and 4;

Table 21 **Resident Population**					
CLP Sample ID	Field Sample ID	Hazardous Substance	Concentration (µg/kg)	Benchmark	References
					43, pp. 1-5, 29, 40, 162; 80, pp. 1 and 4
C0AG0	SEC-SS-R3-01	PCB – Aroclor 1260	310	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 3; 26, p. 6; 97, pp. 1 and 4; 44, pp. 1-4, 23, 35, 124; 80, pp 1 and 4
C0AF6	SEC-SS-T8-04	PCB – Aroclor 1260	220	Cancer Risk (300 µg/kg)	Figure 4; 2, p. 3; 23, p. 3; 28, pp. 1-4, 11, 22, 63; 44, 1-5; 97, pp. 1 and 4; 80, pp. 1 and 4

Notes:
J^1 = The percent recoveries for the following surrogate were outside of the lower control limits. Detected concentrations in these samples are estimated and have been qualified (Refs. 46, pp. 3, 12, 50, 152). In accordance with the EPA National Functional Guidelines for Organic Superfund Methods Data Review, low surrogate recoveries between 10% ≤ %R < 30% should be qualified J- indicating a low bias (Ref. 49, pp. 233-235). In accordance with the EPA Fact Sheet, *Using Qualified Data to Document an Observed Release and Observed Contamination,* the qualified concentration was not adjusted (Ref. 37, pp. 7 and 8).
*Reference 35, p. 12 lists the same sample identifier, SS15 for both CLP sample numbers C0AE1 and C0AE2. As shown on Reference 43, p. 38, CLP sample number C0AE1 is associated with SS14. As noted in Reference 30, p. 18, samples SS14 and SS15 are a duplicate pair.
µg/kg – micrograms per kilogram

5.1.1.3.1 Resident Individual

Area Letter: A

Level of Contamination: Level I

According to the HRS, hazardous constituents that meet the criteria for an observed release (or observed contamination) and equal or exceed media-specific benchmark values meet the criteria for Level I contamination (Ref. 1, Sect. 2.5). Based on results as shown in **Table 17**, Level I concentrations of PCBs (i.e., at or above the lowest applicable benchmark value of 300 µg/kg) exist on occupied residential properties. A value of 50 is assigned to resident individual because there is at least one resident individual subject to Level I concentrations (Ref. 1a, Sections 2.5.2, 5.1.1.3.1).

Resident Individual Factor Value: 50

5.1.1.3.2 Resident Population

5.1.1.3.2.1 Level I Concentrations

Level I Resident Population Targets

Observed contamination has been documented at residences in AOC A (see Section 5.1.0). The population of the residences was obtained during interviews conducted by an EPA representative (Refs. 23, pp. 3 and 4; 80, pp. 1–4).

Table 22
Level I Targets

Sample ID*	Number of Residents	References
SS26	2	Figure 4; 23, p. 4; 97, pp. 1 and 8; 80, pp. 1 and 4
SS27	3	Figure 4; 23, p. 4; 97, pp. 1 and 6; 80, pp. 1 and 4
SS43 SEC-SS-R3-01 SEC-SS-T8-04	1	Figure 4; 23, p. 3; 26, p. 6; 97, pp. 1 and 4; 80, pp. 1 and 4

* As shown in **Tables 17 and 21**, these sample locations exceed the benchmark value of 300 µg/kg for PCBs.
SEC = Shaffer Equipment Company

Sum of individuals subject to Level I concentrations: 6

Sum of individuals subject to Level I concentrations x 10: 60

Level I Concentrations Factor Value: 60

5.1.1.3.2.2 Level II Concentrations

Observed contamination has been documented at residences in AOC A (see **Section 5.1.0**). The population of the residences was obtained during interviews conducted by an EPA representative (Refs. 23, pp. 2, 3, and 4; 97, p. 1-2; 80, pp. 1-4). The following populations are subject to Level II concentrations:

Sample ID*	Number of Residents	References
SS14 SS15	6	Figure 4; 23, p. 2; 97, pp. 1 and 2; 80, pp. 1 and 4
SS25	2	Figure 5; 23, p. 4; 97, pp. 1 and 7; 80, pp. 1 and 3
SS-105	1	Figure 6; 23, p. 4; 97, pp. 1 and 3; 80, pp. 1 and 2
SS42 SEC-SS-R2-01	4	Figure 4; 23, pp. 3, 4; 26, p. 6; 97, pp. 1 and 5; 80, pp. 1 and 4

* As shown in **Tables 17 and 21**, these sample locations do not exceed the benchmark value of 300 µg/kg for PCBs.
SEC = Shaffer Equipment Company

Sum of individuals subject to Level II concentrations: 13

Level II Concentrations Factor Value: 13

5.1.1.3.3 Workers

Several parcels within the AOC are owned by businesses that occupy a former residential structure. The number of persons who work in these buildings is not known, but is believed to be minimal (significantly less than 100); therefore, because the number of target workers would not significantly affect the site score, the workers factor value is not scored and is assigned a value of 0 (Ref. 1a, Section 5.1.1.3 and 5.1.1.3.3).

5.1.1.3.4 Resources

No known commercial agriculture, silviculture, or livestock production or grazing is known to be conducted within the area of observed contamination attributable to the Shaffer Equipment/Arbuckle Creek Area site. Therefore, the resources factor is assigned a value of 0 (Ref. 1a, Section 5.1.1.3.4).

5.1.1.3.5 Terrestrial Sensitive Environments

There are no known terrestrial sensitive environments within the area of observed contamination attributable to the Shaffer Equipment/Arbuckle Creek Area site. Therefore, the terrestrial sensitive environments factor is assigned a value of 0 (Ref. 1a, Section 5.1.1.3.5).