HRS DOCUMENTATION RECORD COVER SHEET

Name of Site: SBA Shipyard

CERCLIS No.: LAD008434185

Contact Persons

Site Investigation:	Brenda Nixon Cook, EPA Region 6	(214) 665-7436
	(Name)	(Telephone)
Documentation Record:	Brenda Nixon Cook, EPA Region 6	(214) 665-7436
	(Name)	(Telephone)

Pathways, Components, or Threats Not Scored

1) **Ground Water Pathway:** The ground water migration pathway has not been scored. Ground water monitoring wells located on SBA Shipyard have shown elevated levels of polycyclic aromatic hydrocarbons (PAHs) (Ref. 4, p.48). Based on information available at this time, further evaluation of the ground water migration pathway would not significantly affect the listing decision (Ref. 1, Sec. 2.2.3).

2) **Surface Water Pathway: Ground Water to Surface Water Migration Component:** The overland/flood migration component of the Surface Water Migration Pathway has been scored for the Human Food Chain Threat and Environmental Threat. The Ground Water to Surface Water Migration component has not been scored. Based on information available at this time, evaluation of this component would not significantly affect the listing decision (Ref. 1, Sec. 2.2.3).

3) **Air Migration Pathway:** Based on information available at this time, evaluation of the air migration pathway would not significantly affect the listing decision (Ref. 1, Sec. 2.2.3).

4) **Soil Exposure Pathway:** Based on information available at this time, further evaluation of the soil exposure pathway would not significantly affect the listing decision (Ref. 1, Sec. 2.2.3).

These pathways and components are of concern to the U.S. Environmental Protection Agency (EPA) and may be considered during a future evaluation.

HRS DOCUMENTATION RECORD

Name of Site: SBA Shipyard Date Prepared: September, 2015

CERCLIS Number: LAD008434185

Site Spill Identifier Number (SSID): A6FX

EPA Region: 6

Street Address of Site*: Section 19 of Range 2 West, Township 10 South and is located at the end of State Highway 3166 and adjacent to the west bank of the Mermentau River (Ref. 5, p. 9, Fig. 1 of this HRS documentation record)

City, County, State, Zip Code: Jennings, Jefferson Davis Parish, LA 70546

General Location in the State: SBA Shipyard is located southeast of the city of Jennings in the south central portion of the state (Figure 1)

Topographic Map: Mermentau Quadrangle Louisiana (Ref. 3, p. 1)

Latitude: 30 ^{o} 9' 38.17" North
Longitude: 92^{o} 36' 44.05" West
Location coordinates were taken at Source No. 2, location SBA-003 (Ref. 4, p. 175; Figure 3)

Air Pathway	Not Scored
Ground Water Pathway	Not Scored
Soil Exposure Pathway	Not Scored
Surface Water Pathway	100.00
HRS SITE SCORE	**50.00**

* The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. 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 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 CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

FIGURES

NOTES TO THE
READER

The following rules were used when citing references in the HRS (Hazard Ranking System) package.

1. Hazardous substances are listed by how they appear in the Superfund Chemical Data Matrix (SCDM).

2. Significant figures: Calculations are reported to two significant figures to the right of the decimal place when the HRS does not specify rounding.

3. Abbreviations/Conventions used to identify references and citations:

Figure	Fig
Number	No.
Reference	Ref
Section	Sec.
Single Pages	p.
Multiple Pages	pp.
"."	Next Reference
()	Selected acronyms

ABBREVIATIONS

BGS	Below Ground Surface
CACO	Consent Agreement and Consent Order
CDD	Chlorinated Dibenzo-p-Dioxins
CDF	Chlorinated Dibenzofurans
CERLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFS	Cubic feet per second
DRO	Diesel Range Organics
COC	Contaminants of Concern
ERT	Environmental Response Team
ESI	Expanded Site Inspection
FIRM	Flood Insurance Rate Map
ft^2	Square Feet
ft^3	Cubic Feet
HRS	Hazard Ranking System
IM/RA	Interim Measures/Removal Actions
LBS	Pounds
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife and Fisheries
LTU	Land Treatment Unit
MSDS	Material Safety Data Sheet
NRC	National Response Center
NWI	National Wetlands Inventory
OCDD	Octachlorodibenzo-p-dioxin
OPA	Oil Pollution Act
ORO	Oil Range Organics
QASP	Quality Assurance Sampling Plan
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
PPE	Probable Point of Entry
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	Reporting Limit
SBA	SBA Shipyard
SCDM	Superfund Chemical Data Matrix
SFHA	Special Flood Hazard Area
SI	Site Inspection
SOP	Standard Operating Procedure

SSID	Site Spill Identifier Number
START	Superfund Technical Assessment and Response Team
SVOA	Semi-Volatile Organic Analysis
SWD	Solid Waste Division
TAL	Target Analyte List
TCL	Target Compound List
TDL	Target Distance Limit
TPH	Total Petroleum Hydrocarbon
USGS	United States Geological Survey
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
yd^3	Cubic Yards

Figure References

Figure 1:
Base Map Source* 2013 National Geographic Society, i-cubed

*Map annotated by EPA START-3 on 05/30/2013 (Ref. 4, p. 12; Ref. 5, pp. 9, 23 & 46; Ref. 24, p. 6)

Figure 2:
Base Map Source* Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

*Map annotated by EPA START-3 on 6/25/2015 (Ref. 5, p. 24, Ref. 16, p. 2; Ref. 24, p. 10; Ref. 29, p.1)

Figure 3:
Base Map Source* Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

*Map Annotated by EPA START-3 on 7/15/2015 to depict source locations and sample locations (Ref. 4, pp. 18-22, 26-35, 38-39, 41-47, 57, 109-120, 128-134, 138-142, 147-157, 175, 868-880 &971-1026; Ref. 5, p. 24; Ref. 7, pp. 18-21, 25-27, 30, 32-33, 35-37, 40, 50, 89-91, 93-94, 96-99, 101-103, 105-106, 110-111, 114-115, 118-119, 122-123, 126-127, 133-135, 137, 139-142, 173 & 967-982; Ref. 16, p.2

Figure 4:
Base Map Source* Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
*Map annotated by EPA START-3 on 7/6/2015 for PPE, Drainage, Overland Flow, Sources and START-3 Observations/Logbooks (Ref. 4, pp. 147-157; Ref. 5, pp. 24 & 46; Ref. 7, p. 147-167; Ref. 9, pp. 44-49; Ref. 16, pp. 1-2; Ref. 20, pp. 4-5; Ref. 24, pp. 10, 12, 16 & 128)

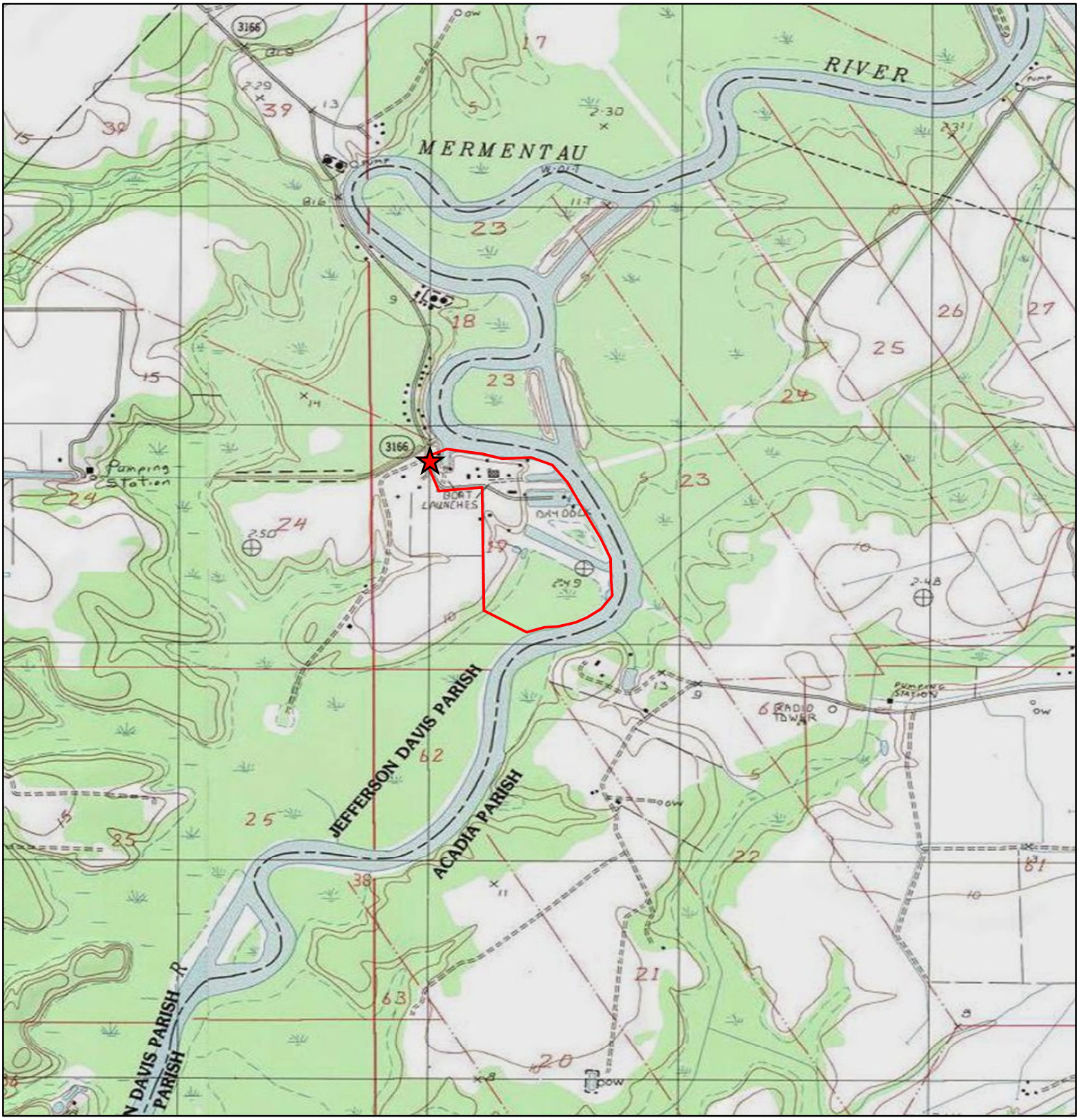
Figure 5
Base Map Source* Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

*Map Annotated by EPA START-3 on 7/15/2015 to depict background and release sample locations, PPEs, Fishery & Wetland Contamination and START-3 observations/logbooks (Ref. 4, pp. 26-27, 31, 33, 41, 43, 57, 109-113, 116-128, 147-157, 175, 868, 971-979, 1007-1008, 1011, 1013, 1015, 1017 & 1019; Ref. 5, p. 24; Ref. 7, pp. 20-21, 25, 33-36, 50,

89-91, 97-98, 101-103, 110-112, 114-116, 118-120, 126-127, 133 135, 140-141 &146-167; Ref. 9, pp. 44-49; Ref. 16, p. 2; Ref. 20, pp. 4-5; Ref. 24, pp. 12, 16 & 128)

Figure 6:
Base Map Source* Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; National Wetlands Inventory; and National Hydrography Dataset.

*Map annotated by EPA START-3 on 7/15/2015 for Surface Water Flow, Common Drainage, Facility Boundary, Wetland delineation Maps, National Wetland Inventory and START-3 observations/logbooks (Ref. 3, p. 1; Ref. 4, pp. 12, 116, 119-127 & 147-157; Ref. 5, pp. 9, 23 & 46; Ref. 7, pp. 140-141 & 146-167; Ref. 9, pp. 44-49; Ref. 10, p. 1; Ref. 24, p. 6)



Map of Louisiana

Legend

Facility Entrance

Facility Boundary

N
W E
S

1:24,000

0 1,250 2,500 5,000 Feet

US EPA Region 6
START-3

Figure 1. Facility Location Map
(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: TO-0009-12-10-02

May 2013

Legend

Sources

N
W E
S

1:4,000

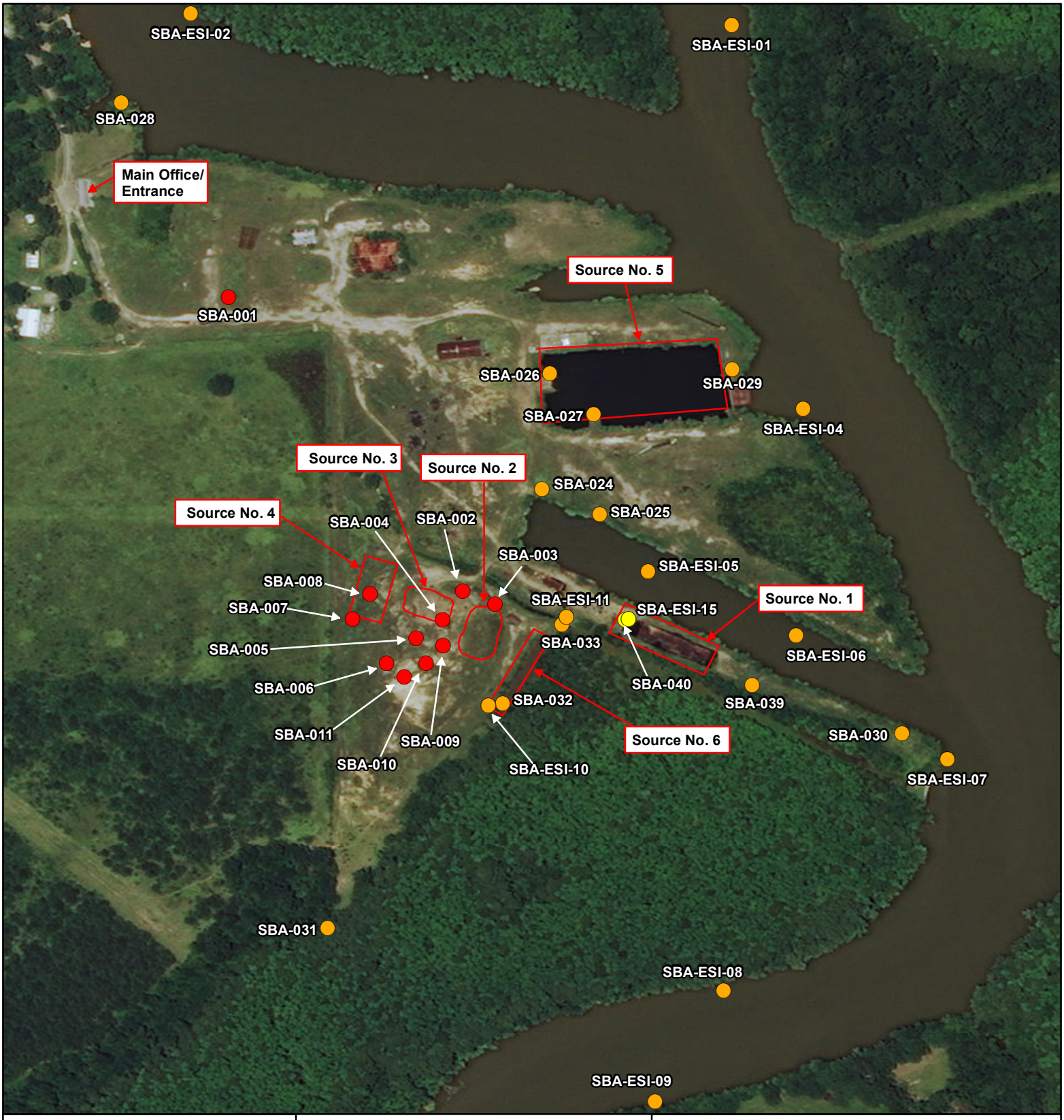
0 150 300 600 Feet

US EPA Region 6
START-3

Figure 2. Aerial Site Sketch
(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: 9/TO-0009-12-10-02

September 2013



Map of Louisiana

Legend

- Sediment
- Soil
- Waste
- Sources

N
W E
S

1:5,000

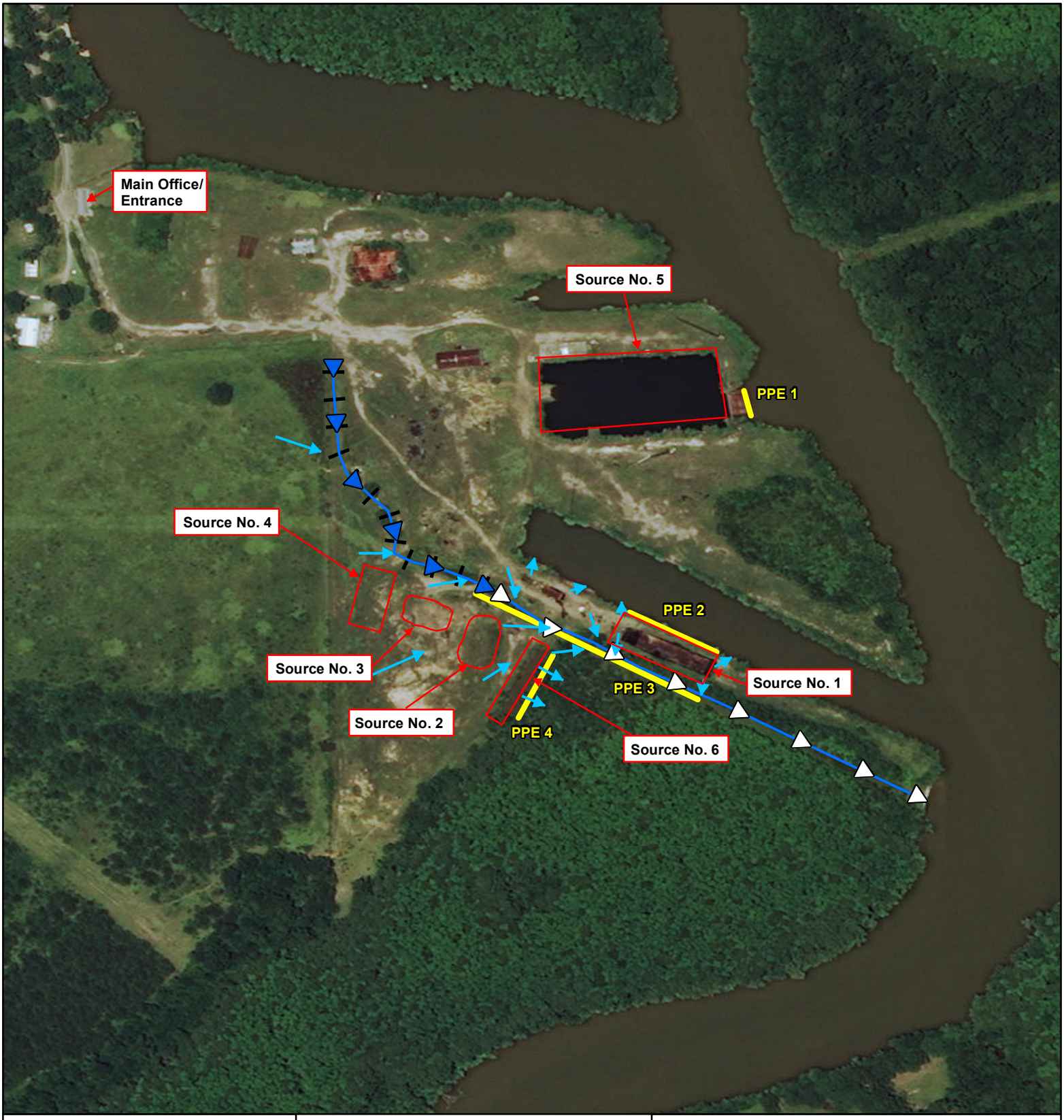
0 125 250 500 750 1,000 Feet

US EPA Region 6
START-3

Figure 3. Sources with Site Inspection and Expanded Site Inspection Sampling Locations Map
(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: 9/TO-0009-12-10-02

September 2013



Map of Louisiana

Legend

- PPE Location
- Drainage Ditch (Perennial)
- Drainage Ditch (Intermittent)
- Overland Flow Direction
- Sources

N, W, E, S

1:5,000

0 125 250 500 750 1,000 Feet

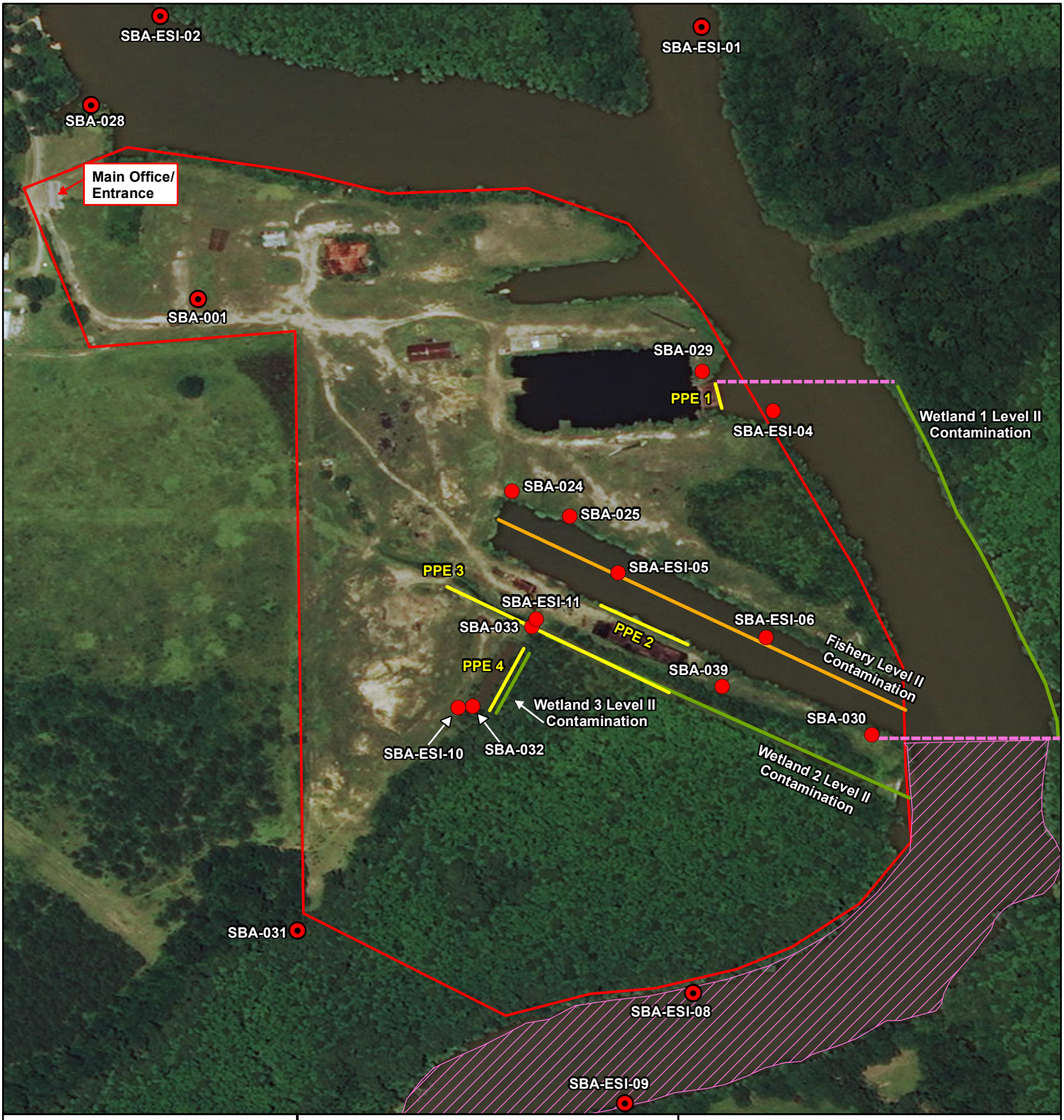
US EPA Region 6
START-3

Figure 4. PPE Locations and Overland Flow Pathways Map

(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: 9/TO-0009-12-10-02

September 2013



Map of Louisiana

Legend

- PPE
- SBA Shipyard, Inc.
- Segment 2: Potential Contamination
- Potential Contamination
- Fishery Level II Contamination
- Wetland Level II Contamination
- Background Sample
- Release Sample

N W E S

1:5,000

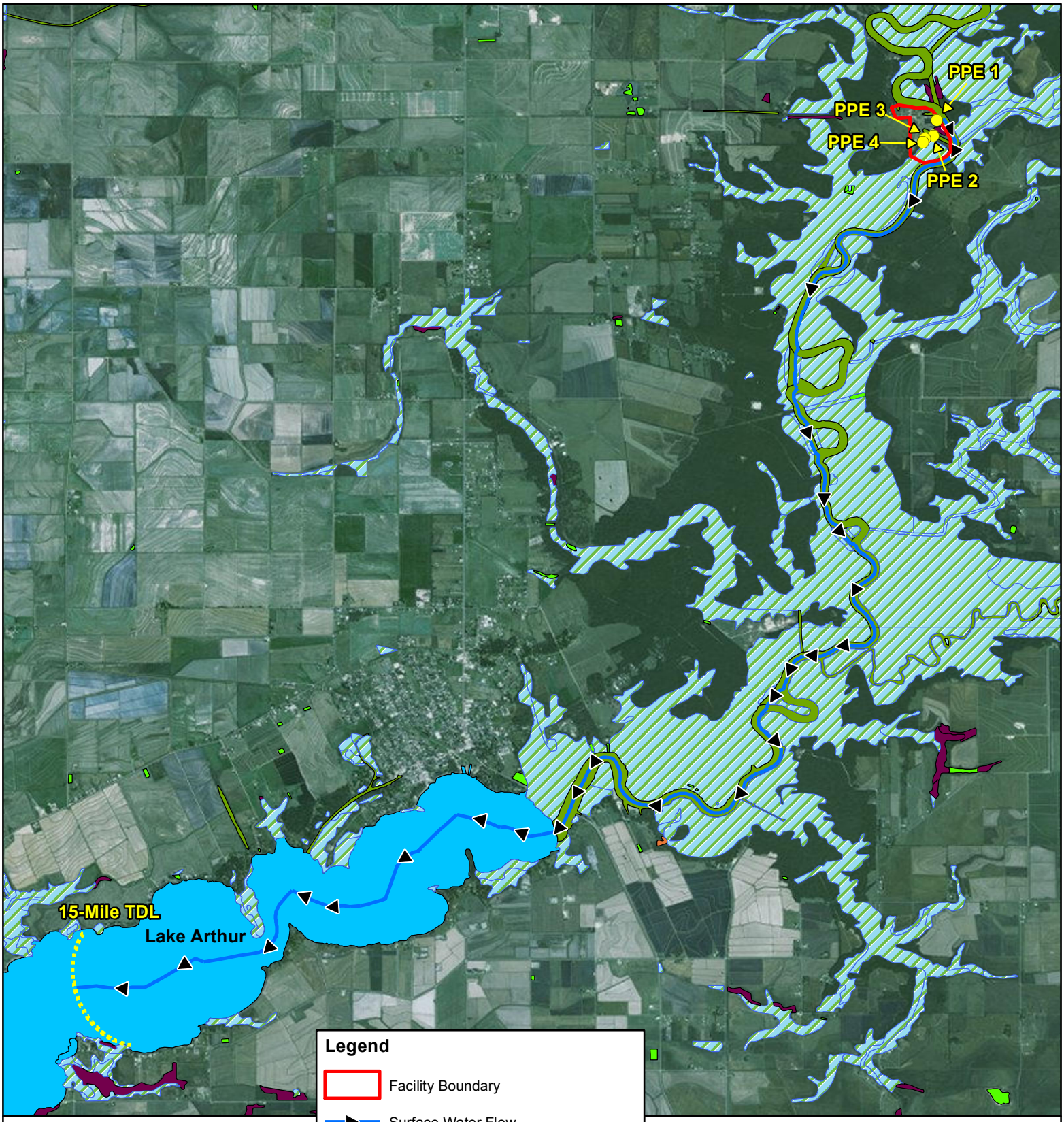
0 125 250 500 750 1,000 Feet

US EPA Region 6
START-3

Figure 5. Level II Contamination Segments
(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: 9/TO-0009-12-10-02

September 2013



Map of Louisiana

Legend

- Facility Boundary
- Surface Water Flow
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

N
W E
S

1:75,000

1 0.5 0 1 Miles

US EPA Region 6
START-3

Figure 6. Surface Water Migration Pathway
(SBA Shipyard)
9040 Castex Landing Road, Highway 3166,
Jefferson Davis Parish, Jennings, LA 70546

CERCLIS: LAD008434185
TDD #: TO-0009-12-10-02

January 2013

WORKSHEET FOR COMPUTING HRS SITE SCORE

	s	s^2
1. Ground Water Migration Pathway Score (S_{gw})	NS	NS
2a. Surface Water Overland/Flood Migration Component (from Section 4.3 of the HRS Documentation Record)	100.00	10,000
2b. Ground Water to Surface Water Migration Component	NS	NS
2c. Surface Water Migration Pathway Score (S_{sw}) Enter the larger of the line 2a and 2b as the pathway score	100.00	10,000
3. Soil Exposure Pathway Score (S_s)	NS	NS
4. Air Migration Pathway Score (S_a)	NS	NS
5. Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000
6. HRS Site Score: Divide the value on line 5 by 4 and take the square root.		50.00

NS = Not Scored

Table 4-1 Surface Water Overland/Flood Migration Component Score Sheet

Factor Categories and Factors		Maximum Value	Value Assigned
DRINKING WATER THREAT			
	Likelihood of Release		
1.	Observed Release	550	550
2.	Potential to Release by Overland Flow:		
	2a. Containment	10	
	2b. Runoff		
	2c. Distance to Surface Water	25	
	2d. Potential to Release by Overland Flow (Lines 2a X [2b+2c])	500	NS
3	Potential to Release by Flood		
	3a. Containment (Flood)	10	
	3b. Flood Frequency	50	
	3c. Potential to Release by Flood (Line 3a X 3b)	500	NS
4.	Potential to Release (Lines 2d + 3c, subject to a maximum of 500)	500	NS
5.	Likelihood to Release (Higher of Lines 1 and 4) NS	550	550
	Waste Characteristics		
6.	Toxicity/Persistence	*	
7.	Hazardous Waste Quantity	*	
8.	Waste Characteristics	100	NS
	Targets		
9.	Nearest Intake	50	NS
10.	Population:		
	10a. Level I Concentrations	**	NS
	10b. Level II Concentrations	**	NS
	10c. Potential Contamination	**	NS
	10d. Population (Lines 10a+10b+10c)	**	NS

Factor Categories and Factors		Maximum Value	Value Assigned
11.	Resources	5	NS
12.	Targets (Lines 9+10d+11)	**	NS
DRINKING WATER THREAT (Concluded)			
	Drinking Water Threat Score		
13.	Drinking Water Threat Score ([Lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	550	NS
HUMAN FOOD CHAIN THREAT			
	Likelihood of Release		
14.	Likelihood of Release (Same value as Line 5)	550	550
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	*	$5x10^8$
16.	Hazardous Waste Quantity	*	10,000
17.	Waste Characteristics	1,000	1,000
	Targets		
18.	Food Chain Individual	50	45
19.	Population:		
	19a. Level I Concentrations	**	0
	19b. Level II Concentrations	**	0.03
	19c. Potential Contamination	**	0.000006
	19d. Population (Lines 10a+10b+10c)	**	0.030006
20.	Targets (Value from Lines 18+19d)	**	45.030006
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score ([Lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	100.00
ENVIORNMENTAL THREAT			
	Likelihood of Release		
22.	Likelihood of Release (Same value as Line 5)	550	550
	Waste Characteristics		
23.	Ecosystem Toxicity/Persistence/ Bioaccumulation	*	$5 X 10^8$
24.	Hazardous Waste Quantity	*	10,000
25.	Waste Characteristics	1,000	1,000

Factor Categories and Factors	Maximum Value	Value Assigned
Targets		
26. Sensitive Environments:		
26a. Level I Concentrations	**	0
26b. Level II Concentrations	**	25
26c. Potential Contamination	**	0.065
26d. Sensitive Environments (Lines 26a+26b+26c)	**	25.065
27. Targets (Value from Line 26d)	**	25.065
ENVIORNMENTAL THREAT		
28. Environmental Threat Score ([Lines 22 x 25 x 27]/82,500subject to a maximum of 60)	60	60.00
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED		
29. WATERSHED SCORE (Lines 13 + 21 + 28, subject to a maximum of 100)	100	100.00
30. Component Score (S0,) (Highest score from Line 29 for all watersheds evaluated, subject to a maximum of 100)	100	100.00

Maximum value applies to waste characteristic category
Maximum value applicable
Do not round to the nearest integer

REFERENCE SHEET

Ref.
No. Description of the Reference

1. U.S. EPA. Hazard Ranking System (HRS); Final Rule. Federal Register. Volume 55, Number 241.Washington, DC: U.S. Government Printing Office, December 14, 1990. Title Page only. A complete version of this document is available online at: http://www.epa.gov/superfund/sites/npl/hrsres/index.htm.

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7. Dynamac Corp. Expanded Site Inspection Report. SBA Shipyard Inc., Jennings, Jefferson Davis Parish, Louisiana. Prepared in cooperation with U.S. EPA Region 6. July 24, 2015. Total Pages: 1017.

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9. Dynamac Corporation. Preliminary Assessment Report for SBA Shipyard, Jennings, Jefferson Davis Parish, Louisiana. Prepared for U.S. EPA Region 6. June 3, 2013. Total Pages: 66.

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15. Hook and Bullet. Lake Arthur, LA – Fishing, Guides, Charters, Bait Information. Accessed at: http://www.hookandbullet.com/c/fishing-lake-arthur-la/. Accessed July 13, 2104. Total Pages: 2.

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21. Louisiana Department of Environmental Quality. Correspondence National Response Center Report. October 23, 2012. Total Pages: 14.

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SITE DESCRIPTION AND HISTORY:

The site defines the release from SBA Shipyard (SBA) referring to sources of hazardous substances and areas of contaminated water that are to be scored as a single unit. SBA Shipyard (SBA) is situated on approximately 98 acres of land located in a rural-industrial area, at 9040 Castex Landing Road, Jennings, Jefferson Davis Parish, LA 70546, at the end of State Highway 3166 and adjacent to the west bank of the Mermentau River (Ref. 6, p. 7 & 17; Ref. 9, p. 7; Figure 1). SBA is located approximately 2.3 miles southwest (downstream) of Mermentau, Louisiana (Ref. 5, p. 9; Ref. 6, p. 7). SBA is bordered to the north by residents, south and west by wetlands, and to the east by the Mermentau River (Ref. 4, pp. 12-13; Figure 1). Property ownership of SBA is divided into two parcels, with the property north of the dry dock owned by LeeVac Shipyard, Inc. and the property south of the dry dock owned by Louis & Suzanne Smailhall (Ref. 5, pp. 10, 23 & 46; Ref. 7, p. 167; Ref. 9, p. 46). Property division of SBA is between the dry dock and barge slip (Ref. 5, pp. 24 & 46; Ref. 20, p. 5). Currently SBA is inactive and vacant (Ref. 9, p. 9).

The SBA Shipyard site as scored includes six sources: a partially buried barge container, two buried/backfilled surface impoundments, the former land treatment unit (LTU) and surface impoundments that have not been buried/backfilled, as well as a documented release to surface water. Contamination in the sources document numerous hazardous substances, including petroleum hydrocarbons, numerous polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, metals and volatile organic compounds (VOCs) (Ref. 4, p.48; Ref. 7, pp. 40-42). Metal and PAH surface water contamination is documented based on wetland and channel sediment samples from one of the barge slips and the Mermentau River. Slightly greater than 2,800 feet of wetland frontage is located within the zone of Level II contamination, and an estimated 24.5 miles of wetland frontage is located along the 15-mile target distance limit (TDL) outside of the zone of actual contaminations (Figure 5 & 6). Additionally, the HRS documentation record identifies a human food fishery in the Mermentau River both within and outside the zone of actual contamination as well as in Lake Arthur at the terminus of the 15-mile TDL (Figure 5 & 6; Ref. 7, pp. 42, 984- 992). The surface water overland migration pathway is the pathway of concern being evaluated for this HRS package. An observed release has been documented to the Mermentau River and associated wetlands. Contaminates of Concern (COCs) for the surface water pathway include: aroclor-1254, benzo(a)anthracene, benzo(a)pyrene, cadmium, copper, dibenz(a,h)anthracene, hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-, hexachlorodibenzofuran 1,2,3,4,7,8-, hexachlorodibenzofuran 1,2,3,6,7,8-, hexachlorodibenzofuran 2,3,4,6,7,8,-, mercury, octachlorodibenzo-p-dioxin (OCDD), pentachlorodibenzofuran 2,3,4,7,8-, phenol and pyrene.

SBA used the facility for construction, repair, retrofitting, sandblasting, and cleaning and painting of barges beginning in 1965 (Ref. 7, p. 13). Three barge slips and a dry dock are located off the Mermentau River (Ref. 5, pp. 38-39; Ref. 6, p. 7; Figure 2). Two of the barge slips are located on the northern portion of the property and are not included in the site as scored; the third barge slip is applicable and will be considered in the site HRS scoring (Figure 2). The slips were used to dock barges during cleaning or repair (Ref. 7, p. 13). The wastes from barges consisted of hydrocarbons and typically held diesel, coal, tar crude oil, gasoline and asphalt (Ref. 6, p. 10). Mr. Smailhall stated that the facility had in the past cleaned barges which previously contained coal tar (Ref. 33, p. 1). Some of the barges serviced at the facility held coal tar, creosote, miscellaneous chemicals or agricultural related materials such as tallow, corn oil or soybean (Ref. 32, p. 46). A deposition taken from the owner, Mr. Smailhall, indicated that he had used chlorinated solvents in his cleaning process in the past (Ref. 22, p.

3). Solvents used to clean painting equipment were saved and used to thin coatings applied to the barges. Paint cans were then taken to a central location at the western end of the facility and turned upside down to drain on the ground (Ref. 33, p. 2). Material Data Safety Sheets (MSDS) provided by Mr. Smailhall in 1993 listed the paints and coatings used on the barges within the previous two years (Ref. 34, pp. 2 & 80-235). A review of the MSDSs revealed that the material was hazardous when discarded due to ignitability (EPA Hazardous Waste Code D0010) and the material exhibited the characteristic for MEK (EPA Hazardous Waste Code D035 - methyl ethyl ketone) (Ref. 34, p. 2).

The barge cleaning services operation provided by SBA included the following steps: A barge was floated into the barge slip adjacent to the boilers and operations area (Ref. 16, p. 2; Ref. 36, p. 38); The first step in cleaning and gas freeing barges was to remove the gross residuals from the entire barge or just those compartments scheduled for maintenance (Ref. 42 p. 51; Ref 43. P.5; Ref. 51, p. 5). The barge was then cleaned by a combination of methods including: spraying with high pressure hot water, and/or removing solids and sludges by hand shoveling, and removing any remaining residual with a "butterworth" apparatus which consisted of a high pressure wash with diesel, water and a surfactant (Ref. 51, pp. 5-6). Originally, all residuals along with any wash water were pumped from the barge to the surface impoundments (Ref. 51, p. 5). The solids were then carried to a double walled container and solidified/stabilized with the addition of lime, fly ash and fertilizer (Ref. 36, p. 38). The waste water generated as a result of washing comprises the predominant water flow (Ref. 36, p. 38). The waste water was initially pumped into an oil water settling tank WT-8, with the separated oil flowing to T-1 or T-2 (Ref. 16, p. 2; Ref. 36, p. 38; Ref. 50, pp. 5-6). Since the wash water may have contained contaminates from the washing, it was pumped through WT-2 or WT-3 then through an oil water separator OWS-1 (Ref. 16, p. 2; Ref. 36, p. 38; Ref. 51, pp. 5-6). The oil within T-1 and T-2 was transported off-site for recovery of thermal value within 90 days (Ref. 36, p. 38). The oil/water from OSW-1was recycled back to WT-8 (Ref. 16, p. 2; Ref. 36, p.38). The water from OWS-1 flows to WT-5 and was used as the primary source of water for barge cleaning (Ref. 16, p. 2; Ref. 36, p.38). Some of the water was recycled or converted to steam for the cleaning operations (Ref. 6, p. 10). Water, hydrocarbon and water/hydrocarbon emulsions generated by the sludge and residue removal process were stored on-site in a variety of tanks and converted barges (Ref. 51, p. 6). As part of the cleaning process the petroleum hydrocarbons were separated from the water into surface impoundments that were known as the Oil Pit, Water Pit 1, Water Pit 2 and Water Pit 3 (Ref. 6, p. 10). A large quantity of water/hydrocarbon emulsions was stored in one of the surface impoundments, the Oil Pit (Ref. 16, p. 2; Ref. 51, p. 6). Waste water was stored in two of the surface impoundments, the Oil Pit and Pit No. 2 prior to closure of the surface impoundments (Ref. 51, p. 6). Aboveground oil/water separators and storage tanks eventually replaced the functions of the pits (a.k.a. surface impoundments) (Ref. 6, p. 10). Figure 2 provides a layout of SBA features and former waste management areas.

Wastes from the barge cleaning, for the most part, consisted of petroleum hydrocarbon residues (Ref. 6, p. 10). In addition to the hydrocarbons other wastes on site included asphalt, creosote, methyl-methacrylate, methanol, caustic soda, styrene, coal tar, vinyl acetate, carbon tetra chloride, ethyl acrylate and acrylates (Ref. 41, p. 11; Ref. 44, pp. 162, 226, 232, 254, 274 & 379; Ref. 45, pp. 115 & 197; Ref. 46, pp. 9 & 203; Ref. 47, pp. 4, 15, 40, 50, 76, 78, 79, 125, 126, 236 & 241; Ref. 48, pp. 14, 16 & 388; Ref. 49, pp. 3, 33, 34, 38, 39, 110 & 236; Ref. 50, pp. 25, 130 & 133; Ref. 51, pp. 1-3 & 36-39). Waste samples taken from the water pits were found to contain benzene, vinyl chloride, 1,2-dichloroethane, tetrachloroethylene, trichloroethylene, methylene chloride, methyl ethyl ketone, carbon tetrachloride, acetone and styrene (Ref. 35, pp. 6 -7; Ref. 37, pp .1, 4-12 & 19-41). Since approximately 1970, D018

(EPA Hazardous Waste Code – benzene), D043 (EPA Hazardous Waste Code – vinyl chloride) and D019 (EPA Hazardous Waste Code - carbon tetrachloride) toxicity characteristic waste were placed in Water Pit 1 and 2 per a 1997 EPA Compliant, Compliance Order and Notice of Opportunity Hearing (Ref. 35, p.10). Beginning in 1991 and on several occasions since 1991, sludge from Water Pit 1 was mixed with fly ash and lime, removed and placed on the ground surface adjacent to the Water Pit 1 (Ref. 35, p. 12). Samples collected in October 1995 detected waste in some of the tanks to be characteristically hazardous based on benzene, 1,2-dichloroethane, tetrachloroethene, vinyl chloride or ignitability (Ref. 32, p. 46).

The presence of petroleum products at the site, as part of a site contamination, does not exclude the site from Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) consideration. Sites are excluded from HRS scoring if they contain only CERCLA-excluded petroleum products. Any fractions of petroleum product that may fall under the Petroleum Exclusion in CERCLA have been comingled with other CERCLA hazardous substances onsite. The CERLCA hazardous substances are subject to CERCLA response authority and responsibility. In 1980 SBA submitted a notification of hazardous waste activity to SBA as a generator of a Resource Conservation Recovery Act (RCRA) listed hazardous waste, D001 (ignitable waste) (Ref. 6, p. 44). Invoices and manifests from customers that had barges repaired, retrofitted or cleaned and painted during the operational period of SBA contained CERLCA eligible substances which included: asphalt, creosote, methyl-methacrylate, methanol, caustic soda, styrene, coal tar, vinyl acetate, carbon tetra chloride, ethyl acrylate and acrylates (Ref. 41, p. 11; p. 33; Ref. 44, pp. 162, 226, 232, 254, 274 & 379; Ref. 45, pp. 115 & 197; Ref. 46, pp. 9 & 203; Ref. 47, pp. 4, 15, 40, 50, 76, 78, 79, 125, 126, 236 & 241; Ref. 48, pp. 14, 16 & 388; Ref. 49, pp. 3, 33, 34, 38, 39, 110 & 236; Ref. 50, pp. 25, 130 & 133; Ref. 51, pp. 1-3 & 36-39). Chemical hazards at this site included: arsenic, barium, mercury, lead, benzene, chloroform, 1,1,1-trichloroethane, 1,2-dichloroethane, ethylbenzene, tetrachloroethene, trichloroethene, toluene, vinyl chloride, ortho-cresol, meta-cresol, styrene and pyridine based on analysis of samples collected from the facilities four surface impoundments (Ref. 32, p. 49-52 & 75-94; Ref. 34, p. 1). Louisiana Department of Environmental Quality (LDEQ) concluded that the only explanation for the presence of chlorinated hydrocarbons in the sludge and water samples collected and analyzed from the four impoundments on site, was that someone had negligently or intentionally mixed spent solvents with the barge contents, or that one of the barges contained these compounds as pure commodities (Ref. 33, p .15). Wastes from the barge cleaning operations were managed in a waste management area that included four impoundments (Oil Pit, Water Pit 1, Water Pit 2, and Water Pit 3), a land treatment unit (LTU) and storage tanks (Ref. 6, pp. 5, 7-8). Waste from cleaning operations on site were comingled within the waste management units and not segregated during the operations or processing (Ref. 30, pp. 5, 21-26).

SBA has a regulatory history in regards to the storage and handling of hazardous wastes. In 1980, SBA submitted a RCRA Part A Application to EPA indicating that SBA did not treat, store or dispose of hazardous waste (Ref .6, p. 44). In late 1989, SBA entered into an agreement with a contractor to handle the remediation and closure the former oil pit and former water pits 1, 2 and 3 that were in service since 1968 (Ref. 6, pp. 10 & 44). Visual indications of the possible presence of contamination were observed during subsurface investigations conducted from November 1989 to February 1990 by SBA contractors (Ref 6, pp. 25 & 44). In 1990, SBA submitted a notification to LDEQ as generator of hazardous waste (Ref. 6, p. 45). On February 15, 1990, the LDEQ Groundwater Protection Division (GWPD) issued a notification to SBA for the presence of subsurface contamination at the SBA site (Ref. 6, p. 45). In August 1990, the LDEQ, Solid Waste Division (SWD) issued an Order (OC-159) to SBA to close the

waste management units (Ref. 6, p. 45). In early1991, the bio-remediation started on May 29, 1990 on one of the impoundments (Water Pit 1) was deemed unsuccessful (Ref. 6, p. 10).

During 1994 LDEQ and EPA determined that closure activities for the site would be handled under the regulatory authority of either LDEQ Hazardous Waste Division or EPA (Ref. 6, pp. 10-11 & 46). In 1994 the EPA Region 6 RCRA Enforcement Branch assumed the role for regulatory authority for the site, and hired a contractor to conduct a Compliance Evaluation Inspection (Ref. 6, p. 47; Ref. 22, p. 3). SBA proposed to implement the RCRA Facility Investigation (RFI) and submitted an RCRA RFI work plan in 1996, that proposed the compete closure of the impoundments and tanks (Ref. 6, pp 5 & 11). EPA issued a RCRA 3008(a) Compliant, Compliance Order on July 1, 1997 (Ref. 22, p. 4). On September 9, 1997 SBA entered into a Consent Agreement and Consent Order (CACO) with EPA to resolve all issues presented in the complaint of storage, disposal and treatment of hazardous waste without a permit, and clean-up the facility (Ref. 22, p. 4; Ref. 35, pp. 5-13). In December 2002 EPA issued an Order and Agreement for Interim Measures/Removal Action (IM/RA) of Hazardous/Principal Threat Wastes at SBA Shipyards, Inc., pursuant to RCRA Section 3008(h) (Ref. 5, pp. 29-37). Interim removal activities were conducted from March 2001 through January 2005 under the EPA 2002 Order and Agreement for IM/RA (Ref. 5, p. 6). Interim removal activities consisted of the removal of approximately 33.8 million pounds of oils, waxes and sludges, pumpable oily material and oily tank heels, 70 tons of contaminated debris, and 88 tons of recyclable scrap metal from the site (Ref. 5, p. 6). Since regulatory site closure in 2002, tar-like material was observed in 2008 by LDEQ in soils down to a depth of 3 to 4 feet below ground surface (bgs) (Ref. 13, p. 1).

During the August 2013 EPA Site Inspection (SI) soil samples were collected down to 16 feet below ground surface (bgs) to identify the source material and contamination at SBA, ground water was collected to assess migration of contamination in the ground water pathway, and surface water samples and sediment samples were collected to assess the migration of contamination in the surface water pathway (Ref. 4, p.47). Analytical data from the soil and ground water samples indicated that the presence of numerous polycyclic aromatic hydrocarbons (PAHs) that exceeded background sample concentrations and met observed release criteria (Ref. 4, p. 48). As stated in the HRS, observed releases may be established based on either direct observation or chemical analysis of samples (Ref. 1, p. 51589). Direct observation of the release of a hazardous substance into the media being evaluated establishes an observed release (Ref. 1, p. 51589). An observed release by chemical analysis is established when analytical evidence of a hazardous substance in the media being evaluated is significantly above the background level, and available information attributes some portion of the significant increase in the concentration of the hazardous substance to the site (Ref. 1, p. 51589).

During the September 2014 EPA Expanded Site Inspection (ESI) river sediment samples from the Mermentau River and wetland sediment samples were collected to identify and assess the migration of contamination at SBA to the surface water pathway (Ref. 7, p. 40). Additional ground water was collected on-site to assess the migration of contamination to the ground water pathway (Ref. 7, p.40). Waste samples were collected to identify the source material and contamination at SBA (Ref. 7, p. 40). Analytical data from the sediment samples indicated the presence of polycyclic aromatic hydrocarbons (PAHs) that met observed release criteria (Ref. 7, pp. 41-42).

Mermentau River is fished recreationally as was observed and documented during the September 2014 ESI (Ref. 7, pp. 34 & 89-90). During the September 2014 ESI, a family of five was observed fishing in

the Barge Slip adjacent to the Mermentau River and fishermen were observed during sediment sample collection along the Mermentau River (Ref. 7, pp. 89-91). Largemouth bass, crappie, bream, bluegill, catfish, gar, bullhead, carp, striped bass and sunfish are caught from Lake Arthur (Ref. 15, p. 1).

2.2 SOURCE CHARACTERIZATION

The sources evaluated at SBA Shipyard, for HRS purposes, are:

- Source No. 1: Partially Buried Barge (Container)
- Source No. 2: Former Oil Pit (Surface Impoundment, Buried/Backfilled)
- Source No. 3: Former Water Pit 1 (Surface Impoundment, Buried/Backfilled)
- Source No. 4: Former Land Treatment Unit (Land Treatment)
- Source No. 5: Dry Dock (Surface Impoundment, Not Buried/Backfilled)
- Source No. 6: Former Water Pit 3 (Surface Impoundment, Not Buried/Backfilled)

2.2.1 SOURCE IDENTIFICATION – SOURCE 1

The following information corresponds to the first source identified for this documentation record.

Number of source: 1

Name of source: Partially Buried Barge

Source Type: Container

Description and Location of Source: A partially buried steel barge located on the southeast portion of the property, north of a designated wetland area (Figure 2). The Partially Buried Barge is approximately 250 feet x 50 feet (Ref. 9, p.11). Waste oil and liquids from the barge are being released into the wetlands (Ref. 9, pp. 53-55). An anonymous caller notified the National Response Center (NRC) in October 2012 that the barge was being scrapped and oil was being allowed to discharge to the ground (Ref. 21, p. 2). LDEQ conducted an investigation in October 2012 and reported evidence of the barge scrapping activities and that oil was still visible inside the portion of the barge being salvaged, and along the perimeter and east end of the barge (Ref. 21, p. 14; Ref. 25 pp. 1-15).

Two (2) waste samples were collected from within the Partially Buried Barge: one at location SBA-040 (Figure 3; Ref. 4, pp. 18, 22, 29, 141-142, 157, 895, 906-907 & 1026) and one at SBA-ESI-15 (Figure 3; Ref. 7, pp. 18, 21, 26, 93, 151, 921, 926-927 & 981).

- Location SBA-040, Sample SBA-040 – collected from the west corner of buried barge. Sample description is oily, asphaltic, black/saturated, and tarry material (Figure 3; Ref. 4, pp. 29 & 1026).
- Location SBA-ESI-15, Sample SBA-ESI-15 – collected at the northwestern edge of the partially buried barge. Sample description is hard, black and oily (Figure 3; Ref. 7, pp. 26 & 981).

Sample SBA-040 was shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2 (method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/ Polychlorinated Biphenyls (PCB) by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), Target Analyte List (TAL) Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 22, 47 & 664 - 671).

Sample SBA-ESI-15 was shipped to ALS Environmental in Houston for analysis for Dioxin/Furan by EPA Method 8290 (Ref. 7, p. 283-285).

Sample SBA-040 contained polycyclic aromatic hydrocarbons (PAHs) that included: acenaphthene , anthracene, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, 1,1'-biphenyl, carbazole, chrysene, dibenzofuran, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene,

naphthalene, phenanthrene and pyrene at concentrations equal to or greater than their corresponding report limits (RLs) (Ref. 4, pp. 29 & 70; Table 4).

Semi-volatile organic compounds (VOCs) identified included: cyclohexane, benzene, methylcyclohexane, tetrachloroethene, toluene, ethylbenzene, xylene, isopropylbenzene, 1,2-dichlorobenzene and vinyl chloride were also detected at concentrations equal to or greater than their corresponding RLs (Ref. 4, pp. 29 & 70; Table 4).

Metals constituents included: arsenic, chromium, cobalt, lead and mercury at concentrations equal to or greater than their corresponding RLs (Ref. 4, pp. 29 & 70; Table 4).

Sample SBA-ESI-15 contained Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs). Those with some of the highest TEQs include: 2,3,4,7,8-Pentacholordibenzofuran (PeCDF), 2,3,4,6,7,8-Hexacholordibenzofuran (HxCDF), 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF), 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF), 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) and Octachlorodibenzo-p-dioxin (Ref. 7, pp. 26-27, 57 & 1005-1008; Table 3).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The substances listed in Table 1 and 2 are associated with Source No. 1 based on analytical results from waste samples collected from the Partially Buried Barge during the 2013 SBA Shipyard SI and 2014 ESI. Sampling was conducted following the procedures set forth in the Quality Assurance Sampling Plan (QASP) (Ref. 4, pp. 882-969).

Table 1 – Source 1 - Partially Buried Barge SI Sample

EPA/START Sample No.	**SBA-40**	
EPA Lab. Sample No.	**1308020-30**	
Source No. 1	**Barge**	
% Solids	**79.29%**	
	Result	**RL**
Units	**µg/kg**	**µg/kg**
Analyte: SVOCs		
Acenaphthene	**3.20E6**	472000
Benzo (b) fluoranthene	**1.02E6**	118000
Benzo (g,h,i) perylene	**389000**	118000
Benzo (k) fluoranthene	**914000**	118000
1,1'-Biphenyl	**645000**	118000
Acenaphthylene	**385000**	47200
Carbazole	**1.66E7 J**	1.18E6
Chrysene	**3.04E6**	1.18E6
Dibenzofuran	**3.77E6**	1.18E6
Dibenz (a,h) anthracene	**145000**	118000
Anthracene	**4.61E7**	4.72E6
Fluoranthene	**6.79E6**	472000
Fluorene	**7.23E6**	472000
Indeno (1,2,3-cd) pyrene	**450000**	118000
2-Methylnaphthalene	**2.78E6**	472000
Naphthalene	**6.15E6**	472000
Phenanthrene	**1.69E7**	472000
Pyrene	**5.08E6**	472000
Benzo (a) anthracene	**1.98E6**	118000
Benzo (a) pyrene	**1.12E6**	118000
Analyte: Total Metals	**mg/kg**	**mg/kg**
Mercury	**1.46**	0.074
Chromium	**16.6**	1.2
Cobalt	**4.1**	2.4
Lead	**29.7**	0.6
Arsenic	**5.4**	0.6
Analyte: VOCs	**µg/kg**	**µg/kg**
Cyclohexane	**10800**	199
Benzene	**17400**	199
Methylcyclohexane	**15300**	199
Toluene	**36500**	199
Tetrachloroethene	**267**	199
Ethylbenzene	**17900**	199
meta-/para-Xylene	**66400**	398
ortho-Xylene	**29600**	199
Isopropylbenzene	**24700**	199
1,2-Dichlorobenzene	**565**	199
Vinyl chloride	**313**	199

Key:

µg/kg = Concentrations in microgram per kilogram
mg/kg = Concentrations in milligrams per kilogram

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported value for carbazole is biased unknown (Ref. 4, p. 181), but did not need to be adjusted as the presence of the hazardous substance is not in question.

RL - Reporting Limit
BOLD - Concentration is greater than reporting limit

References	
Chain of Custody:	Ref. 4, pp. 172-173
Laboratory Reports:	Ref. 4, pp. 664-671
Data:	Ref. 4, pp. 181, 666 & 865; Ref. 31, pp. 8 & 14; Ref. 52

Table 2- Source 1- Partially Buried Barge ESI Sample

EPA/START Sample Number:	**SBA-ESI-15**			
ELS Laboratory Sample Number:	**E1401160-002**			
Sampling Location:	**SBA-ESI-15**			
Sample Description:	**Waste sample from NW corner of partially buried barge (Source 1)**			
% Solids:	**80.30%**			
Units:	**ng/kg**			
Analyte: Dioxins and Furans	Result	Flag	MRL	TEQ
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**26.6**	KJ	16	2.66
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**26.2**	KJ	18.6	2.62
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**32.2**	J	22.8	3.22
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**46.8**	KJ	38.9	14.0
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**52.1**	J	19.4	5.21
Octachlorodibenzo-p-dioxin (OCDD)	**1370**	J	6.1	0.411
Total TCDD TEQ - 2005 WHO (ND = MRL)	30.2			

Key:

MRL - Method Reporting Limit
ND - Indicates concentration is reported "Not Detected"
ng/kg - nanograms per kilogram
MRL = Method Reporting Limit
TCDD -Tetrachlorodibenzodioxins
TEQ - Toxicity Equivalency Quotient
U = Undetected at Reporting Limit
WHO - World Health Organization
J = an estimated value (Ref. 7, p. 262). The reported value for octachlorodibenzo-p-dioxin (OCDD) is biased unknown (Ref. 7, p. 998) but did not need to be adjusted as the presence of the hazardous substance is not in question.
K = estimated maximum possible concentration for the associated compound (Ref. 7, p. 262).
Bold = Concentration detected above the Reporting Limits

References

Chain of Custody:	Ref. 7, p. 171
Laboratory Results:	Ref. 7, pp. 1005-1008
Data:	Ref. 7, pp. 262, 998 & 1005; Ref. 52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored; therefore, ground water containment was not evaluated.

Release via overland migration: Documentation or evidence exists to indicate that Source No. 1 had either a dike or similar structure surrounding the container area, but hazardous substances have migrated from the container area (Ref. 4, p. 141-142; Ref. 19, pp. 7-8; Ref. 21, p. 2; Ref. 24, p. 8). The containment factor value of 10 is assigned to Source No.1 because of evidence of hazardous substance migration from the container area (Ref. 1, Table 4-2).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Migration Pathway (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthene
- Acenaphthylene
- Anthracene
- Arsenic
- Benzene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Biphenyl, 1,1'
- Carbazole
- Chromium
- Chrysene
- Cobalt
- Cyclohexane
- Dibenz(a,h)anthracene
- Dibenzofuran
- Dichlorobenzene, 1,2-
- Ethylbenzene
- Fluoranthene
- Fluorene
- Hexachlorodibenzo-p-dioxin, 1,2,3,7,8,9- (HxCDD)
- Hexachlorodibenzofuran, 1,2,3,4,7,8- (HxCDF)
- Hexachlorodibenzofuran, 1,2,3,6,7,8- (HxCDF)
- Hexachlorodibenzofuran, 2,3,4,6,7,8- (HxCDF)
- Indeno(1,2,3-cd)pyrene
- Isopropylbenzene
- Lead
- Mercury
- Methylcyclohexane
- Methylnaphthalene, 2-
- Naphthalene
- Octachlorodibenzo-p-dioxin (OCDD)
- Pentachlorodibenzofuran, 2,3,4,7,8 – (PeCDF)
- Phenanthrene
- Pyrene
- Tetrachloroethene
- Toluene
- Vinyl chloride

- Xylene, -m, -p, -o

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 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, pp. 51590-51591). Insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 1 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, p. 51591). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) are available to adequately calculate the total or partial mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity for Source 1 with reasonable confidence.

Hazardous Wastestream Quantity Value (W): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No.

2.4.2.1.3. Volume – Tier C

The volume of Source 1 can be adequately determined based on a one time capacity volume, and not the actual contents of the source (Ref 1, Sec. 2.4.2.1.3).

Completed interim measures/removal actions (IM/RA) at SBA specify that a total of 1.19 million gallons of pumpable oily material was pumped from the Partially Buried Barge and thermal destroyed (Ref. 5, p. 14). Pumpable oily material was removed from the partially buried barge till approximately 4 to 6 inches of heel remained between the structural members in the vessel, which could not be removed (Ref. 5, p. 14).

After completion of the IM/RA on the Partially Buried Barge the emptied vessel was used as a collection tank for contaminated water generated by subsequent (IM/RA) cleanup activities (Ref. 5, p.14). The approximate 850,000 gallons of contaminated water collected in the Partially Buried Barge was later removed (Ref. 5, p. 8). The partially buried barge was ultimately emptied of all but

approximately 2 to 6 inches of water and oily heel retained by structural members in the vessel (Ref. 5, p. 17). To prevent water from refilling the vessel, all hatches and covers on the Partially Buried Barge were tack-welded shut (Ref. 5, p. 17). This was ineffective, because in October 2012 an anonymous caller notified the National Response Center (NRC) that the barge was being scrapped and oil was being allowed to discharge to the ground (Ref. 21, p. 2). LDEQ conducted an investigation and reported evidence of the barge scrapping activities and that oil was still visible inside the portion of the barge being salvaged, and along the perimeter and east end of the barge (Ref. 21, p. 14).

Based on the IM/RA information available the one time volume capacity volume can be determined for the Partially Buried Barge (Source No. 1). According to the pumpable oily material inventory the estimated maximum capacity was calculated for each compartment of the vessel (Ref. 5, p. 47). The one time capacity volume will be based on the IM/RA which calculated the estimated maximum capacity for each compartment of the partially buried barge.

Bow Rake Tank	26,853 gallons
Deck Tank S	Not Measured
Deck Tank P	Not Measured
Compartment 1S	75,054 gallons
Compartment 1P	75,054 gallons
Compartment 2S	71,808 gallons
Compartment 2P	71,808 gallons
Compartment 3S	100,279 gallons
Compartment 3P	100,279 gallons
Compartment 4S	100,279 gallons
Compartment 4P	100,279 gallons
Compartment 5S	86,908 gallons
Compartment 5P	86,908 gallons
Aft Trim Tank	18,388 gallons
TOTAL	913, 897 gallons

The hazardous waste quantity evaluation equation applied for the conversion of gallons to cubic yards (yds^3) is 1 yd^3 = 200 gallons (Ref. 1, Table 2-5, footnote b). The one time estimated capacity of the Partially Buried Barge is 4,569.49 cubic yards (Ref. 1, Sec 2.4.2.1.3).

913,897 gallons X 1 yd^3 / 200 gallons per 1 yd^3 = 4,569.49 yd^3

The hazardous waste quantity evaluation equation for a container is V/2.5 (Ref. 1, Table 2-5). The volume source will be assigned a volume hazardous waste quantity value of 1,827.79

4,569.49 yd^3 / 2.5 = 1,827.79

Volume of Source No. 1 (yd^3): 4,569.49
Reference(s): Ref. 1, Table 2-5, p. 51591
Volume Assigned Value: 1,827.79

2.4.2.1.4. Area – Tier D

Area was not calculated for Source 1 since volume was adequately determined and assigned a value. Therefore, according to HRS, area is not calculated (Ref. 1, Sec. 2.4.2.1.3 and 2.4.2.1.4).

Area of Source No. 1 in square feet (ft^2): Not calculated
Area Assigned Value: 0
References: Ref. 1, Sec. 2.4.2.1.4

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 1, Partially Buried Barge.

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	1,827.79
Tier D	NC
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	1,827.79

NC: Not Calculated

The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 1 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier C.

Source No. 1 Hazardous Waste Quantity Value: 1,827.79

2.2.1 SOURCE IDENTIFICATION – SOURCE 2

The following information corresponds to the second source identified for this documentation record.

Name of source: Former Oil Pit

Number of source: 2

Source Type: Surface Impoundment Buried/Backfilled

Description and Location of Source: The Former Oil Pit is a former surface impoundment located in the southeast portion of the property, northwest of a designated wetland area (Figure 2; Ref. 16, p. 2). The Former Oil Pit was originally excavated to approximately 18 feet deep sometime around 1968, and the soils below the unlined impoundment consisted of clay to a depth of 20 – 25 feet below ground surface (bgs) (Ref. 24, p. 8). Waste from the barge cleaning services at SBA that were stored in the Former Oil Pit mainly consisted of hydrocarbons residues (Ref. 6, p. 10). A partially buried barge tank used for sludge storage (Source 1) was adjoining and positioned on the lower west side of the Oil Pit (Ref. 16, p. 2; Ref. 24, p. 12). The sludge storage tank was a converted barge that was sealed, overturned, and tested for leaks before entering service (Ref. 24, p. 14). The tank was used to store sludge from the other tanks and impoundments, and had observed leaks on the west side of the barge (Ref. 24, p. 14). Subsequently, aboveground oil/water separators and storage tanks replaced the functions of the surface impoundments (Ref. 6, p. 10). The Former Oil Pit contained oils, waxes and sludges (Ref. 5, p. 10).

The Former Oil Pit underwent an IM/RA under the RCRA in accordance with the December 2002 IM/RA agreed order (Ref. 5, p. 6). During the IM/RA, a stabilizing agent was mixed into oily material in the Former Oil Pit, allowed to cure for a minimum of three days, and later excavated from the oil pit until underlying clayey soils showed no staining (Ref. 5, pp. 15 & 57-59). Excavated material from the oil pit was temporarily stockpiled on-site in a bermed area lined with plastic sheeting (Ref. 5, pp. 15 & 60-63). The oil pit was excavated of an estimated 11,954 tons of oily material, and portions of the Former Oil Pit were backfilled with clean clay soil and fill material acquired onsite from unaffected areas southwest of the former oil pit (Ref. 5, pp. 7, 16, 64 & 86-87). In addition, 4,119 tons of clean fill soil and 15 tons of roadbed gravel were imported from off-site (Ref. 5, p. 7). Storm water control berms around the temporary stockpiles diverted and collected water in contact with uncovered oily materials, in the open excavation of the Former Oil Pit (Ref. 5, p.15). Storm water that collected in the excavated former oil pit was pumped to the partially buried barge, but no indication of further excavation was completed after the removal of storm water (Ref. 5, p. 19).

The impoundment formerly known as the Oil Pit was recorded in a 1994 report to have the estimated dimensions of 100 feet long, 75 feet wide and 18 feet deep (Ref. 24, p. 8). In a later dated 1996 work plan, the oil pits dimensions were given as approximately 160 feet x 100 feet x 6 feet and was estimated to contain approximately 3,600 cubic yards of oily sludge (Ref. 4, p. 30; Ref. 6, p.7).

Soil borings were advanced using direct push technology at two (2) locations from the Former Oil Pit area during the August 2013 EPA SI (Ref. 4, pp. 57; Figure 3). The borings were advanced to a maximum depth of 16 feet bgs using the procedures in the EPA Environmental Response Team (ERT) Standard Operating Procedure (SOP) 2050, modified for the actual unit used by the driller (Ref. 4, pp.

20, 149 & 934-946). Grab soil samples were collected from each boring, from intervals of visual contamination or where photoionization detector (PID) readings for VOCs above background were detected (Ref. 4, pp. 20, 893 & 934-946). Soil types for the two samples collected ranged from clayey silt, silt and clay (Ref. 4, p. 870 & 876).

Sample location SBA-003 was from the northern edge of the Former Oil Pit, and sample location SBA-009 was in the area of concern for the former sludge storage tank located on the west side of the former oil pit (Figure 3). The following samples were collected (Ref. 4, pp. 30-31, 57):

- Sample Location SBA-003 Sample SBA-003-68 (6-8 feet bgs) – chemical odor
- Sample SBA-003WT (10-12 feet bgs) –collected above water table; chemical odor
- Sample SBA-009-02 (0-2 feet bgs) – asphalt like material, slight odor
- Sample SBA-009WT (12-14 feet bgs) – collected above water table; chemical odor

Soil types of the background soils for the samples collected at various depths ranged from silty clay to clay (Ref. 4, p.868). The Soil Survey for Jefferson Davis Parish, Louisiana was reviewed to determine the similarity of soil types within the area of concern (Ref. 8, pp. 13-21. The background soil sample was collected using similar sample collection methods (Ref. 4, pp. 26-28). The background soil samples were collected at various depths from the same boring (Ref. 4, p. 868).

Based on sample boring logs background and source samples soil types were similar, with varying amounts of clay, silts and clayey silts (Ref. 4 p. 868, 870 & 876).

The background sample was collected approximately 450 feet southeast of the SBA entrance where no designated operations were known to have taken place (Ref. 4, p. 26; Figure 3). The eight (8) soil samples were collected from sample location SBA-001 at two (2) foot intervals (Ref. 4, p.26-29, 57, 149, 871-873 & 876-878).

Soil was shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used - CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCBs by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used - 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 20, 47, 426-481, 538-545, & 564-581).

The soil sample results from this source area were compared to the concentrations in the corresponding foot intervals from the background soil sample (Table 3). PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, 1,1'-biphenyl, chrysene, carbazole, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, phenol and pyrene were detected above background levels. COCs were detected above observed release criteria at varying depths between 0 to 2 feet bgs, 6 to 8 feet bgs, 10 to 12 feet bgs and/or 12 to 14 feet bgs (Ref. 4, pp. 31, 564-581 & 608-623; Tables 3-4). While this increase in concentration is not

required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background.

In addition, numerous volatile organic compounds (VOCs) such as benzene, cyclohexane, methylcyclohexane, 1,2-dichlorobenzene, ethylbenzene, tetrachloroethene, styrene, isopropylbenzene, tetrachloroethene, xylene, cis-1,2-dichloroethane and toluene were detected in the 0 to 2 feet bgs, 6 to 8 feet bgs, 10 to 12 feet bgs and/or the 12-14 feet bgs above background levels. While this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background.

Metals concentrations were detected from the 6 to 8 feet bgs and 10 to 12 feet bgs intervals to include manganese and cadmium at concentrations greater than background level (Ref. 4, pp. 31, 564-581; Tables 3 & 4). Again, while this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, 1,1'-biphenyl, chrysene, carbazole, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, phenol and pyrene were detected (Table 4). These constituents were also detected in other sources at SBA including the Dry Dock and Partially Buried Barge (Sources 6 and 1, respectively) (Ref. 4, p. 31).

In addition, numerous volatile organic compounds (VOCs) such as benzene, cyclohexane, methylcyclohexane, 1,2-dichlorobenzene, ethylbenzene, tetrachloroethene, styrene, isopropylbenzene, tetrachloroethene, xylene, cis-1,2-dichloroethane and toluene were detected. Metal concentrations included manganese and cadmium (Ref. 4, pp. 31, 564-581 & 608-623; Tables 3-4).

Table 3 - Background Soil Samples

EPA/START Sample No.	SBA-001-02		SBA-001-24		SBA-001-46		SBA-001-68		SBA-001-10		SBA-001-12		SBA-001-14		SBA-001-16	
EPA Lab. Sample No.	1308020-01		1308020-06		1308020-15		1308020-07		1308020-02		1308020-03		1308020-04		1308020-05	
Sample Depth	Bkgd 0-2 feet		Bkgd 2-4 feet		Bkgd 4-6 feet		Bkgd 6-8 feet		Bkgd 8-10 feet		Bkgd 10-12 feet		Bkgd 12-14 feet		Bkgd 14-16 feet	
% Solids:	90.04%		76.83%		77.75%		81.26%		83.69%		82.89%		76.60%		79.90%	
	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Analyte: SVOCs																
Acenaphthene	538	217	U	256	U	255	U	246	U	236	U	240	U	259	U	247
Benzo (b) fluoranthene	4790	543	U	639	693	639	U	615	U	590	U	599	U	649	U	618
Benzo (g,h,i) perylene	4170	543	U	639	1080	639	U	615	U	590	U	599	U	649	U	618
Benzo (k) fluoranthene	3310	543	U	639	701	639	U	615	U	590	U	599	U	649	U	618
1,1'-Biphenyl	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Bis(2-ethylhexyl)phthalate	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Acenaphthylene	1620	217	U	256	U	255	U	246	U	236	U	240	U	259	U	247
Carbazole	1530 J (15,300)*	543	U	639	838 J (8,380)*	639	U	615	U	590	U	599	U	649	U	618
Chrysene	2990	543	U	639	693	639	U	615	U	590	U	599	U	649	U	618
Dibenz (a,h) anthracene	1200	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Dibenzofuran	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
2,4-Dimethylphenol	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Anthracene	4820	217	U	256	2560	255	U	246	265	236	U	240	U	259	U	247
Fluoranthene	5650	217	U	256	853	255	U	246	U	236	U	240	U	259	U	247
Fluorene	391	217	U	256	U	255	U	246	U	236	U	240	U	259	U	247
Indeno (1,2,3-cd) pyrene	4290	543	U	639	929	639	U	615	U	590	U	599	U	649	U	618
2-Methylnaphthalene	289	217	U	256	U	255	U	246	U	236	U	240	U	259	U	247
3 &/or 4-Methylphenol	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Naphthalene	2290	217	U	256	306	255	U	246	U	236	U	240	U	259	U	247
Phenanthrene	2480	217	U	256	566	255	U	246	U	236	U	240	U	259	U	247
Phenol	U	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Pyrene	5870	217	U	256	972	255	U	246	U	236	U	240	U	259	U	247
Benzo (a) anthracene	1840	543	U	639	U	639	U	615	U	590	U	599	U	649	U	618
Benzo (a) pyrene	4300	543	U	639	755	639	U	615	U	590	U	599	U	649	U	618
Analyte: Total Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Mercury	0.544	0.067	U	0.082	U	0.077	U	0.080	U	0.074	U	0.076	U	0.075	U	0.079
Copper	18.9	2.1	8.2	2.5	7.6	2.4	6.6	2.3	4.9	2.3	7.6	2.3	18.0	2.4	4.1	2.3
Manganese	276	0.5	145	0.6	23.8	0.6	22.9	0.6	39.0	0.6	55.4	0.6	166	0.6	36.7	0.6
Nickel	10.4	2.1	4.7	2.5	4.1	2.4	4.8	2.3	6.6	2.3	10.7	2.3	18.0	2.4	8.2	2.3
Zinc	152	2.1	29.9	2.5	12.2	2.4	11.2	2.3	12.6	2.3	17.1	2.3	52.9	2.4	14.2	2.3
Barium	118	1.1	95.0	1.2	140	1.2	197	1.2	499	1.2	112	1.1	125	1.2	61.5	1.2
Beryllium	U	0.5	U	0.6	0.7	0.6	1.1	0.6	U	0.6	0.6	0.6	1.2	0.6	2.3	0.6
Cadmium	1.2	0.5	0.7	0.6	0.6	0.6	U	0.6	U	0.6	U	0.6	0.7	0.6	U	0.6
Cobalt	4.1	2.1	U	2.5	U	2.4	3.2	2.3	4.1	2.3	5.9	2.3	6.5	2.4	7.7	2.3
Lead	27.8	0.5	15.5	0.6	13.5	0.6	10.4	0.6	8.7	0.6	14.9	0.6	14.8	0.6	7.8	0.6
Arsenic	7.5	0.5	4.4	0.6	3.6	0.6	3.3	0.6	U	0.6	2.3	0.6	4.0	0.6	0.7	0.6
Analyte: PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor-1254	U	21.7	U	12.4	U	12.6	U	11.6	U	11.9	U	11.4	U	12.8	U	12.3
Analyte: VOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Cyclohexane	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Methylcyclohexane	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Ethylbenzene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
meta-/para-Xylene	U	8.5	U	8.2	U	7.8	U	8.3	U	7.8	U	7.8	U	8.3	U	41.9
ortho-Xylene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
cis-1,2-Dichloroethene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Benzene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Toluene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Tetrachloroethene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Styrene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
Isopropylbenzene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9
1,2-Dichlorobenzene	U	4.3	U	4.1	U	3.9	U	4.1	U	3.9	U	3.9	U	4.2	U	41.9

Key:

BKGD - Background
µg/kg = Concentrations in micrograms per kilograms

mg/kg = Concentrations in milligrams per kilogram

J - The identification of the analyte is acceptable; the reported value is an estimate (Ref. 4, p. 865). The reported values for carbazole in samples SBA-001-02 and SBA-001-46 are biased unknown (Ref. 4, p. 181).

RL - Reporting Limit
U - Undetected
* = The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document an Observed Release and Observed Contamination*" (Ref. 31. pp. 8 and 14). After adjusting the value for the qualified data, the adjusted value has increased significantly from the original value reported.

References

Chain of Custody:	Ref. 4, p. 167	Ref. 4, p. 168	Ref. 4, p. 170	Ref. 4, p. 168	Ref. 4, p. 167	Ref. 4, p. 167	Ref. 4, p. 167	Ref. 4, p. 167-168
Laboratory Results:	Ref. 4, pp. 426-433	Ref. 4, pp. 466-473	Ref. 4, pp. 538-545	Ref. 4, pp. 474-481	Ref. 4, pp. 434-441	Ref. 4, pp. 442-449	Ref. 4, pp. 450-457	Ref. 4, pp. 458-465
Data:	Ref. 4, pp. 181, 426, & 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, pp. 181, 466-473 & 865; Ref. 52	Ref. 4, pp. 181, 538-545 & 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, pp. 181, 474-481 & 865; Ref. 52	Ref. 4, pp. 181, 434-441 & 865; Ref. 52	Ref. 4, pp. 181, 442-449 & 865; Ref. 52	Ref. 4, pp. 181, 450-457 & 865; Ref. 52	Ref. 4, pp. 181, 458-465 & 865; Ref. 52

Table 4 – Source 2 - Former Oil Pit Samples

EPA/START Sample No.:	SBA-003-68			SBA-003-WT			SBA-009-02			SBA-009-WT		
EPA Lab. Sample No.:	1308020-18			1308020-19			1308020-23			1308020-24		
Depth of Sample:	6 to 8 feet interval			10 to 12 feet interval			0 to 2 feet interval			12 to 14 feet interval		
% Solids:	81.47%			77.74%			74.53%			82.42%		
Unit:	Result	RL	3x Bkgd or > Bkgd RL	Result	RL	3x Bkgd or > Bkgd RL	Result	RL	3x Bkgd or > Bkgd RL	Result	RL	3x Bkgd or > Bkgd RL
Analyte: SVOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Acenaphthene	**30400**	4760	246 (RL)	**141000**	11900	240 (RL)	**38900**	1230	1614 (3x)	**21500**	1140	259 (RL)
Benzo (b) fluoranthene	**6340**	1190	615 (RL)	**25600**	2970	599 (RL)	14200	3080	14370 (3x)	**6120**	2850	649 (RL)
Benzo (g,h,i) perylene	**3430**	1190	615 (RL)	**12000**	2970	599 (RL)	4210	3080	12510 (3x)	U	2850	649 (RL)
Benzo (k) fluoranthene	**5470**	1190	615 (RL)	**24500**	2970	599 (RL)	**13900**	3080	9,930 (3x)	**5430**	2850	649 (RL)
1,1'-Biphenyl	**7290**	1190	615 (RL)	**36600**	2970	599 (RL)	**5760**	3080	543 (RL)	**5830**	2850	649 (RL)
Acenaphthylene	**4270**	476	246 (RL)	**13600**	1190	240 (RL)	1240	1230	4860 (3x)	**2060**	1140	259 (RL)
Carbazole	**15400 J (1540.0)***	1190	615 (RL)	**49700 J (4970.0)***	2970	599 (RL)	14400 J (1440.0)*	3080	45,900 (3x)	7780 J (780.0)*	2850	649 (RL)
Chrysene	**14600**	1190	615 (RL)	**55000**	2970	599 (RL)	**22600**	3080	8970 (3x)	**10100**	2850	649 (RL)
Dibenzofuran	**28400**	11900	615 (RL)	**137000**	29700	599 (RL)	**31300**	3080	543 (RL)	**20800**	2850	649 (RL)
Dibenz (a,h) anthracene	**1320**	1190	615 (RL)	**4800**	2970	599 (RL)	U	3080	3600 (3x)	U	2850	649 (RL)
Anthracene	**35700**	4760	246 (RL)	**110000**	11900	240 (RL)	**36200**	1230	14460 (3x)	**15700**	1140	259 (RL)
Fluoranthene	**61700**	4760	246 (RL)	**263000**	11900	240 (RL)	**96600**	12300	16950 (3x)	**35600**	1140	259 (RL)
Fluorene	**39400**	4760	246 (RL)	**173000**	11900	240 (RL)	**51200**	1230	1173 (3x)	**29200**	1140	259 (RL)
Indeno (1,2,3-cd) pyrene	**3830**	1190	615 (RL)	**14000**	2970	599 (RL)	6010	3080	12870 (3x)	U	2850	649 (RL)
2-Methylnaphthalene	**27400**	4760	246 (RL)	**142000**	11900	240 (RL)	**24900**	1230	867 (3x)	**18800**	1140	259 (RL)
Naphthalene	**95400**	4760	246 (RL)	**493000**	11900	240 (RL)	**52900**	1230	6870 (3x)	**40600**	1140	259 (RL)
Phenanthrene	**131000**	4760	246 (RL)	**567000**	11900	240 (RL)	**179000**	12300	7740 (3x)	**88800**	11400	259 (RL)
Phenol	**1670**	1190	615 (RL)	U	2970	599 (RL)	U	3080	543 (RL)	U	2850	649 (RL)
Pyrene	**43400**	4760	246 (RL)	**180000**	11900	240 (RL)	**61200**	1230	17610 (3x)	**28600**	1140	259 (RL)
Benzo (a) anthracene	**12500**	1190	615 (RL)	**51000**	2970	599 (RL)	**21900**	3080	5520 (3x)	**10400**	2850	649 (RL)
Benzo (a) pyrene	**7050**	1190	615 (RL)	**28900**	2970	599 (RL)	**15300**	1230	12900 (3x)	**6280**	2850	649 (RL)
Analyte: Total Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Manganese	**177**	0.6	68.7 (3x)	**384**	0.6	166.2 (3x)	83.3	0.6	828 (3x)	315	0.6	498 (3x)
Cadmium	U	0.6	0.6 (RL)	**0.7**	0.6	0.6 (RL)	0.6	0.6	3.6 (3x)	U	0.6	2.1 (3x)
Analyte: VOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Cyclohexane	**295 J (29.5)***	4	4.1 (RL)	**656 L**	81.5	3.9 (RL)	28.5 J (2.85)*	3.8	4.3 (RL)	8.2 J (0.82)*	4.3	4.2 (RL)
Methylcyclohexane	**217****	99.6	4.1 (RL)	**990 L**	81.5	3.9 (RL)	**67.2 J (6.72)***	3.8	4.3 (RL)	17.7 J (1.77)*	4.3	4.2 (RL)
Ethylbenzene	**566****	99.6	4.1 (RL)	**3340 L**	81.5	3.9 (RL)	**27.8**	3.8	4.3 (RL)	U	4.3	4.2 (RL)
meta-/para-Xylene	**1920****	199	8.3 (RL)	**10700 L**	163	7.8 (RL)	**33.4**	7.5	8.5 (RL)	U	8.6	8.3 (RL)
ortho-Xylene	**674****	99.6	4.1 (RL)	**3760 L**	81.5	3.9 (RL)	**20.5**	3.8	4.3 (RL)	U	4.3	4.2 (RL)
cis-1,2-Dichloroethene	**169**	4	4.1 (RL)	**1370 L**	81.5	3.9 (RL)	**18.6**	3.8	4.3 (RL)	U	4.3	4.2 (RL)
Benzene	**229**	4	4.1 (RL)	**1580 L**	81.5	3.9 (RL)	**15.6**	3.8	4.3 (RL)	U	4.3	4.2 (RL)
Toluene	**864****	99.6	4.1 (RL)	**4380 L**	81.5	3.9 (RL)	**6.4**	3.8	4.3 (RL)	U	4.3	4.2 (RL)
Tetrachloroethene	**42.6**	4	4.1 (RL)	**121 L**	81.5	3.9 (RL)	U	3.8	4.3 (RL)	U	4.3	4.2 (RL)
Styrene	**64.8**	4	4.1 (RL)	**UJ**	81.5	3.9 (RL)	U	3.8	4.3 (RL)	U	4.3	4.2 (RL)
Isopropylbenzene	**385****	99.6	4.1 (RL)	**2430 L**	81.5	3.9 (RL)	U	3.8	4.3 (RL)	**5.1**	4.3	4.2 (RL)
1,2-Dichlorobenzene	**11.8**	4	4.1 (RL)	**163 L**	81.5	3.9 (RL)	U	3.8	4.3 (RL)	U	4.3	4.2 (RL)

Key:

Bkgd - Background Sample
RL - Reporting Limit
U - Undetected
WT - Above the Water Table
mg/kg = Concentrations in milligrams per kilogram
µg/kg = Concentrations in micrograms per kilograms

BOLD - concentration detected significantly above background concentration or above background reporting limit.

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported carbazole values for samples SBA-003-68, SBA-003-WT, SBA-009-02, and SBA-009-WT are biased unknown. The reported values for cyclohexane in samples SBA-003-68, SBA-009-02, and SBA-009-WT are biased unknown. The methylcyclohexane values for samples SBA-009-02 and SBA-009-WT are also biased unknown. While the bias is unknown, the presence of the substance is not in doubt.

L - The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value (Ref 4., p. 865). After the value for the qualified data had been adjusted to reflect the possible effect of the bias on the substance concentration, there was still a significant increase in concentration

* - The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document and Observed Release and Observed Contamination*" (Ref. 31, pp. 5-12 and 14). After adjusting the value for the qualified data to reflect the possible effect of the bias on the substance concentration, there is still a significant increase in contamination.

** - Initially, analyte was analyzed under Low concentration protocols for method 5035; however, due to very high detected concentrations, sample was re-analyzed using Medium concentration protocols (methanol extraction). Analytes that were outside the calibration range for 5035 (qualified with a CR) are re-reported under the medium level protocol.

References

Chain of Custody:	Ref. 4, p. 170	Ref. 4, pp. 170-171	Ref. 4, p. 171	Ref. 4, p. 171-172
Laboratory Results:	Ref. 4, pp. 564-572	Ref. 4, pp. 573-581	Ref. 4, pp. 608-615	Ref. 4, pp. 616-623
Data:	Ref. 4, pp. 181, 185, 474-481, 564, 567 & 865; Ref. 31, pp. 5-12 & 14: Ref. 52	Ref. 4, pp. 181, 442-449, 576, 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, pp. 181, 185, 426-433, 608, 610, and 865; Ref. 31, pp. 5-12 &14; Ref. 52	Ref. 4, pp. 181, 185, 450-457, 616, 618, 865; Ref. 31, pp. 5-12 & 14; Ref. 52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored; therefore, ground water containment was not evaluated.

Release via overland migration: There is no evidence to indicate the former source was lined since the Former Oil Pit consisted of a clay bottom (Ref. 24, p.107). The former source also had minimal containment when in operation in the form of a 5 foot berm above the surrounding ground surface on the north perimeter of the former oil pit (Ref. 24, p. 8). The containment factor value for Source No. 2 is 10 (Ref. 1, Table 4-2).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Pathways (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- 1,1'-Biphenyl
- Cadmium
- Carbazole
- Chrysene
- Cyclohexane
- Dibenz(a,h)anthracene
- Dibenzofuran
- Dichlorobenzene, 1,2-
- Dichloroethene, cis-1.2-
- Ethylbenzene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Isopropylbenzene
- Methylcyclohexane
- Methylnaphthalene, 2-
- Naphthalene
- Manganese
- Phenanthrene
- Phenol
- Pyrene
- Styrene
- Tetrachloroethene
- Toluene
- Xylene, -m, -p, -o

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 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, pp. 51590-51591, Section 2.4.2.1.1). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 2 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 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 for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, p. 51591, Section 2.4.2.1.2). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) are available to adequately calculate the total or partial mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity for Source 2 with reasonable confidence.

Hazardous Wastestream Quantity Value (W): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No.

2.4.2.1.3. Volume – Tier C

During the RCRA IM/RA Source 2, was excavated of an estimated 11,954 tons of oily material, and portions of the Former Oil Pit were backfilled with clean clay soil and fill material acquired onsite from unaffected areas (Ref. 5, pp. 15-16). Prior to the IM/RA the Oil Pit had approximate dimensions of 100 feet long, 75 feet wide and 18 feet deep in 1994 (Ref. 24, p. 8). In 1996 the Oil Pit dimensions was given as approximately 160 feet x 100 feet x 6 feet and was estimated to contain approximately 3,600 cubic yards of oily sludge (Ref. 4, p. 30; Ref. 6, p.7).

However, the information available is not sufficient to evaluate and score Tier C because the dimensions of the Oil Pit are approximate, there exists an inconsistency and conflict in the depth of the pit according to 1994 and 1996 site evidence, and the final depth of excavation may not have been uniform and unvarying throughout the source; therefore, it is not possible to adequately determine a source volume (Tier C) (Ref. 1, Sec. 2.4.2.1.3, p. 51591). As a result, the evaluation of source volume proceeds to the evaluation of Tier D, source area (Ref. 1, Sec. 2.4.2.1.4, p. 51591).

Volume of source (yd^3): Not Scored
Reference(s): Ref. 1, Table 2-5, p. 51591
Volume Assigned Value: 0

2.4.2.1.4. Area – Tier D

Historical maps and historical aerial photographs were used to estimate the size of the Former Oil Pit (Ref. 16, p. 2; Ref. 18, p. 2). Based on the scale of the figures in references 16, page 2 and 18, page 2, the Oil Pit approximate dimensions were 160 feet in length and approximately 100 feet in width; therefore, it occupied 16,000 square feet (ft^2).

The hazardous waste quantity evaluation equation for a buried/backfilled surface impoundment is A/13 (Ref. 1, Table 2-5). The area source will be assigned an area hazardous waste quantity value of 1,230.77.

$$16{,}000\ ft^2 / 13 = 1230.77$$

Area of source (ft^2): 16,000.00
References: Fig. 2; Ref. 1, Sec. 2.4.2.1.4
Area Assigned Value: 1,230.77

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 2, Former Oil Pit.

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	NS
Tier D	1,230.77
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	1,230.77

NS: Not Scored
NC: Not Calculated

The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 2 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier D.

Source No. 2 Hazardous Waste Quantity Value: 1,230.77

2.2.1 SOURCE IDENTIFICATION – SOURCE 3

The following information corresponds to the third source identified for this documentation record.

Name of source: Former Water Pit 1

Number of source: 3

Source Type: Surface Impoundment Buried/Backfilled

Description and Location of Source: Former Water Pit 1 was a surface impoundment located on the southeast portion of the property, northwest of a designated wetland area (Figure 2; Ref. 16, p. 2; Ref. 18, p. 2). The Former Water Pit 1 was used to treat and store wastewater and sludges generated during the barge cleaning activities (Ref. 24, p. 8). The Former Water Pit 1 was excavated to an approximate depth of 18 feet bgs around 1968, and the soils below the unlined impoundment consisted of clay to an approximately depth of 20 to 25 feet bgs (Ref. 24, pp. 8 & 107). During operation, Water Pit 1 received wastewater from the oil pit and the oil/water separator (Ref. 24, pp. 12-13). Oil was returned to the oil pit, and water was pumped to Water Pit 2 (Ref. 24, p.13). Three barge tanks used for oil/water/sludge separation and storage were located south of Water Pit 1 (Ref. 24, p. 12). The oil/water tanks consisted of three converted barge tanks (Ref. 24, p. 14). The three tanks were fabricated by cutting a barge into three sections, sealing the ends, and placing the barges upside next to Water Pit 1 (Ref. 24, p.14). The tanks had a total capacity of 9,500 barrels, were used to store and separate oil, water, and sludge (Ref. 24, p. 14). Subsequently, aboveground oil/water separators and storage tanks replaced the functions of Water Pit 1 prior to undergoing closure beginning in 1991(Ref. 6, p. 10; Ref. 16, pp. 2-5).

By 1994, Water Pit 1 was inactive and had undergone partial closure (Ref. 24, p. 13). In mid-1990 SBA began closure on Water Pit 1 by using an aerator to biologically treat the wastewater and sludges, and by early 1991 the process was deemed unsuccessful (Ref. 6, p. 10; Ref. 24, p. 13). Prior to closure activities in 1991, an estimated 2,542 cubic yards of sludge was present in Water Pit 1 (Ref. 24, p. 13). In 1992, SBA implemented a new closure technique, the free water and oil was pumped from Water Pit 1 to the storage tanks or into the oil pit (Ref. 6, p. 10; Ref. 24, p. 13). The remaining sludge in Water Pit 1 was then solidified by mixing with fly ash and lime (Ref. 6, p. 10). Approximately one third of the solidified/stabilized sludges was removed from Water Pit 1 and placed on the ground at the area formerly designated as the Land Treatment Unit (Ref. 6, p. 10; Ref. 24, p. 13). The remaining sludges in Water Pit 1 were piled in the southeast/east end of the impoundment, with accumulated rainwater periodically pumped to storage tanks (Ref. 6, p. 10; Ref. 24, p. 13). No information has been found mentioning or detailing the closure of Water Pit 1.

The impoundment formerly known as Water Pit 1 had dimensions of approximately 160 feet x 100 feet x 15 feet and was estimated to contain an approximate 6,900 cubic yards of solidified sludge piled in the east end of the impoundment in 1996 (Ref. 4, p. 30; Ref. 6, p. 7). Prior to closure activities in 1991, an estimated 2,542 cubic yards of sludge was present in the impoundment (Ref. 24, p. 13).

Soil borings were advanced using direct push technology at three (3) locations from the Former Water Pit 1 area during the August 2013 EPA SI (Ref. 4, pp. 57, 906 & 908; Figure 3). The borings were advanced to a maximum depth of 16 feet below ground surface (bgs) using the procedures in the EPA

Environmental Response Team (ERT) Standard Operating Procedure (SOP) 2050, modified for the actual unit used by the driller (Ref. 4, pp. 20 & 934-946). Grab soil samples were collected from each boring, from intervals of visual contamination or where PID readings for VOCs above background were detected (Ref. 4, pp. 20, 153, 893 & 934-946).

Soil samples were shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCBs by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 20, 47, 482-491, 546-563, 582-607).

Location SBA-002 was sampled north of the Former Water Pit 1 along the overland flow pathway for this source, Location SBA-004 was sampled along the approximate former east end of the Former Water Pit 1 where remaining solidified/stabilized sludge was piled, and Location SBA-005 was sampled in the area of the former oil/water separator associated with the former Water Pit 1(Figure 3). The following samples were collected (Ref. 4, pp. 30-31, 57, 149, 869 & 871):

- Sample SBA-002PD (6-8 feet bgs) – collected at highest PID reading; chemical odor; silty clay with gray and orange mottled coloring, and slightly plastic (Ref. 4, pp. 30, 57, 869 & 980);
- Sample SBA-002WT (10-12 feet bgs) – collected above water table; chemical odor; clay with silt seams, and visible product in seam (Ref. 4, pp. 30, 57& 981);
- Sample SBA-004-24 (2-4 feet bgs) – heavy chemical odor, staining with a sheen; clay-ey/silt, and moist stained, black (Ref. 4, pp. 30, 57, 871 & 984);
- Sample SBA -004 004WT (12-14 feet bgs) – collected above water table; chemical odor, sheen present; silty-clay, and moist stained, black (Ref. 4, p. 30, 57, 871& 985);
- Sample SBA-005PD (12-14 feet bgs) – collected at the highest PID reading; clay-ey/silt, tan stained dark grey coloring. (Ref. 4, pp. 31, 57, 872 & 986)
- Sample SBA-005WT (14-16 feet bgs) – collected above water table; clay-ey/silt, grey color with black staining odor. (Ref. 4, pp. 31, 57, 872 & 987)

The soil sample results from these source areas were compared to the concentrations in the corresponding foot intervals from the background soil sample (Table 3), while this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background. PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, 2,4-dimethylphenol, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, 2-methylphenol, 3 &/or 4-methylphenol, naphthalene, phenanthrene, and pyrene were detected greater than background levels. Constituents were detected at 2 to 4 feet bgs, 6 to 8 feet bgs, 10 to 12 feet bgs, 12 to 14 feet bgs and/or at between 14 to 16 feet bgs (Ref. 4, pp. 30-31, 482-491, 546-563 & 582-607; Tables 3 & 5).

VOCs were detected above background concentrations (See Table 3) in the 2 to 4 feet bgs, 6 to 8 feet bgs, 10 to 12 feet bgs, 12 to 14 feet bgs and/or at depths between 14 to 16 feet bgs for cyclohexane, methylcyclohexane, ethylbenzene, cis-1,2-dichloroethane, tetrachloroethene, styrene, isopropylbenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene toluene, benzene, xylene and toluene (Ref. 4, pp. 30-31, 482-491, 546-563 & 582-607; Tables 3 & 5). While this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background.

In addition, numerous metal concentrations from the 2 to 4 feet bgs, 6 to 8 feet bgs, 10 to 12 feet bgs, 12 to 14 feet bgs and/or between 14 to 16 feet bgs intervals were detected at concentrations above background levels. Metals concentrations detected above background levels include: copper, manganese, mercury, nickel, zinc, barium, cadmium, cobalt, lead and arsenic (Ref. 4, p. 30-31, 482-491, 546-563 & 582-607; Tables 3 & 5). Again, while this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the soil samples are significantly above background.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

Soil sample results from former source areas representing Source No. 3 included PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, 1,1'-biphenyl, bis(2-ethylhexyl)phthalate, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, 2,4-dimenthylphenol, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, 2-methylphenol, 3 &/or 4-methylphenol, naphthalene, phenanthrene, and pyrene (Table 5). This is consistent with identification of buried impoundments used in the barge cleaning operations (Ref. 4, p. 31). These constituents are also detected in other sources at SBA including the Dry Dock and Partially Buried Barge (Sources 6, and 1 respectively) (Ref. 4, p. 31; Ref. 7, p. 36).

In addition, numerous VOCs such as cyclohexane, methylcyclohexane, ethylbenzene, cis-1,2-dichloroethane, tetrachloroethene, styrene, isopropylbenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene toluene, benzene, xylene and toluene were detected. Metal concentrations were detected to include mercury, copper, manganese, nickel, zinc, barium, cadmium, chromium, cobalt, lead and arsenic (Ref. 4, pp. 30-31, 482-491, 546-563 & 582-606; Tables 3 & 5).

Table 5 – Source 3 – Former Water Pit 1 Samples

EPA/START Sample No.:	SBA-002-PD			SBA-002-WT			SBA-004-24		
EPA Laboratory Sample No.:	1308020-16			1308020-17			1308020-20		
Depth of Sample:	6 to 8 feet internal			10 to 12 feet internal			2 to 4 feet interval		
% Solids:	73.22%			73.83%			80.81%		
Unit:	Result	RL	> 3x Bkgd or > RL	Result	RL	> 3x Bkgd or > RL	Result	RL	> 3x Bkgd or > RL
Analyte: SVOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Acenaphthene	**70900**	6710	246 (RL)	**141000**	23900	240 (RL)	**1.12E6**	47300	256 (RL)
Benzo (b) fluoranthene	**24000**	1680	615 (RL)	**54900**	5970	599 (RL)	**481000**	118000	639 (RL)
Benzo (g,h,i) perylene	**9830**	1680	615 (RL)	**25000**	5970	599 (RL)	**303000**	118000	639 (RL)
Benzo (k) fluoranthene	**16300**	1680	615 (RL)	**44000**	5970	599 (RL)	**486000**	118000	639 (RL)
1,1'-Biphenyl	**22100**	1680	615 (RL)	**37300**	5970	599 (RL)	**257000**	118000	639 (RL)
Bis(2-ethylhexyl)phthalate	U	1680	615 (RL)	U	5970	599 (RL)	**13100 N**	11800	639 (RL)
Acenaphthylene	**4970**	671	246 (RL)	**6460**	2390	240 (RL)	**323000**	47300	256 (RL)
Carbazole	45200 J (4520)*	16800	615 (RL)	51600 J (5160)*	5970	599 (RL)	5.94E6 J (5.94E5)*	1.18E6	639 (RL)
Chrysene	**54700**	16800	615 (RL)	**93300**	5970	599 (RL)	**1.20E6**	118000	639 (RL)
Dibenzofuran	**74200**	16800	615 (RL)	**151000**	59700	599 (RL)	**1.55E6**	118000	639 (RL)
Dibenz (a,h) anthracene	**3540**	1680	615 (RL)	**8740**	5970	599 (RL)	**108000**	106000	639 (RL)
2,4-Dimethylphenol	**111000**	6710	615 (RL)	**115000**	2390	599 (RL)	U	11800	639 (RL)
Anthracene	**111000**	6710	246 (RL)	**115000**	2390	240 (RL)	**1.66E7**	473000	256 (RL)
Fluoranthene	**210000**	6710	246 (RL)	**495000**	23900	240 (RL)	**3.62E6**	473000	256 (RL)
Fluorene	**106000**	6710	246 (RL)	**208000**	23900	240 (RL)	**2.85E6**	473000	256 (RL)
Indeno (1,2,3-cd) pyrene	**11900**	1680	615 (RL)	**27700**	5970	599 (RL)	**343000**	118000	639 (RL)
2-Methylnaphthalene	**63300**	6710	246 (RL)	**86600**	2390	240 (RL)	**1.01E6**	47300	256 (RL)
2-Methylphenol	U	1680	615 (RL)	U	5970	599 (RL)	U	11800	639 (RL)
3 &/or 4-Methylphenol	**428000**	67100	615 (RL)	**946000**	23900	599 (RL)	**13500**	11800	639 (RL)
Naphthalene	**251000**	6710	246 (RL)	**191000**	23900	240 (RL)	**2.52E6**	473000	256 (RL)
Phenanthrene	**428000**	67100	246 (RL)	**946000**	23900	240 (RL)	**8.33E6**	473000	256 (RL)
Pyrene	**138000**	6710	246 (RL)	**333000**	23900	240 (RL)	**2.47E6**	473000	256 (RL)
Benzo (a) anthracene	**45500**	16800	615 (RL)	**98700**	5970	599 (RL)	**921000**	118000	639 (RL)
Benzo (a) pyrene	**23700**	1680	615 (RL)	**57600**	5970	599 (RL)	**610000**	118000	639 (RL)
Analyte: Total Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Mercury	U	0.075	0.08 (RL)	U	0.08	0.076 (RL)	**0.709**	0.075	0.082 (RL)
Copper	**39.8**	2.6	19.8 (3x)	**29.0**	2.5	22.8 (3x)	**75.5**	2.4	24.6 (3x)
Manganese	**10900**	0.6	68.7 (3x)	**587**	0.6	166.2 (3x)	156	0.6	435 (3x)
Nickel	**70.9**	2.6	14.4 (3x)	27.8	2.5	32.1 (3x)	**17.5**	2.4	14.1 (RL)
Zinc	**66.7**	2.6	33.6 (3x)	**70.4**	2.5	51.3 (3x)	**150**	2.4	89.7 (RL)
Barium	**3730**	1.3	591 (3x)	179	1.2	336 (3x)	246	1.2	285 (RL)
Cadmium	**2.3**	0.6	0.60 (RL)	**1.5**	0.6	0.60 (RL)	0.8	0.6	2.1 (3x)
Cobalt	**200**	2.6	9.6 (3x)	9.5	2.5	17.7 (3x)	**10.2**	2.4	2.5 (RL)
Lead	**39.9**	0.6	31.2 (3x)	20.7	0.6	44.7 (3x)	32.4	0.6	46.5 (3x)
Arsenic	**18.2**	0.6	9.9 (3x)	**11.9**	0.6	6.9 (3x)	3.5	0.6	13.2 (3x)
Analyte: VOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Cyclohexane	**229**	99.9	4.1 (RL)	**220 L**	89.0	3.9 (RL)	**735**	100	4.1 (RL)
Methylcyclohexane	**680**	99.9	4.1 (RL)	**566 L**	89.0	3.9 (RL)	**1350**	100	4.1 (RL)
Ethylbenzene	**498**	99.9	4.1 (RL)	**403 L**	89.0	3.9 (RL)	**2090**	100	4.1 (RL)
meta-/para-Xylene	**743**	200	8.3 (RL)	**908L**	178	7.8 (RL)	**12400**	200	8.2 (RL)
ortho-Xylene	**418**	99.9	4.1 (RL)	**343**	4.5	3.9 (RL)	**4830**	100	4.1 (RL)
cis-1,2-Dichloroethene	UJ	4.5	4.1 (RL)	**30.3**	4.5	3.9 (RL)	**36.7**	5.0	4.1 (RL)
Benzene	**295 L**	4.5	4.1 (RL)	**273**	4.5	3.9 (RL)	**5570**	100	4.1 (RL)
Toluene	**191 L**	4.5	4.1 (RL)	**560 L**	89.0	3.9 (RL)	**6270**	100	4.1 (RL)
Tetrachloroethene	UJ	4.5	4.1 (RL)	**9.7**	4.5	3.9 (RL)	**37.1**	5.0	4.1 (RL)
Styrene	UJ	4.5	4.1 (RL)	15.1 J (1.51)*	4.5	3.9 (RL)	**2560**	100	4.1 (RL)
Isopropylbenzene	**102 L**	4.5	4.1 (RL)	**73.2**	4.5	3.9 (RL)	**2250**	100	4.1 (RL)
1,4-Dichlorobenzene	**32.3 L**	4.5	4.1 (RL)	18.6	4.5	3.9 (RL)	U	5.0	4.1 (RL)
1,2-Dichlorobenzene	**312 L**	4.5	4.1 (RL)	**178**	4.5	3.9 (RL)	**5.8**	5.0	4.1 (RL)

Key:

µg/kg = Concentrations in micrograms per kilograms
mg/kg = Concentrations in milligrams per kilogram
WT - Above the Water Table
RL - Reporting Limit
PD - Highest PID Reading
U - Undetected

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported values for carbazole in samples SBA-002-PD, SBA-002-WT, SBA-004-24, SBA-004-WT, SBA-005-PD, and SBA-005-WT are biased unknown (Ref. 4, p. 181). The reported values for anthracene, fluoranthene, phenanthrene, cyclohexane, and methylcyclohexane in sample SBA-005-PD are biased unknown (Ref. 31, pp. 181 & 186). The reported value for styrene in sample SBA-002-WT is biased unknown (Ref. 31, p. 185). The reported value for tetrachloroethene in sample SBA-005-WT is biased unknown (Ref. 31, p. 185). The presence of these substances is not in doubt.

L - The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value (Ref. 4, 865).

N - There is a presumptive evidence that the analyte present; the analyte is reported as a tentative identification (Ref. 4, p. 865).

* - The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document and Observed Release and Observed Contamination*" (Ref. 31, pp. 8, 12, 14, & 15). After adjusting the value for the qualified data to reflect the possible effect of the bias on the substance concentration, there is still a significant increase in contamination.

BOLD - Concentration detected significantly above the background concentration or reporting limits.

References

Chain of Custody:	Ref. 4, p. 170	Ref. 4, p. 170	Ref. 4, p. 171
Laboratory Results:	Ref. 4, pp. 546-554	Ref. 4, pp. 555-563	Ref. 4, pp. 582-590
Data	Ref. 4, p. 181, 474-481, 549 & 865; Ref. 31, pp. 8 and 14; Ref. 52	Ref. 4, p. 181, 185, 442-479, 556, 558 & 865; Ref. 31, pp. 8, 12, and 14; Ref. 52	Ref. 4, p. 181, 466-473, 585 & 865; Ref. 31, pp. 8 and 14; Ref. 52

Table 5 (continued) – Source 3 – Former Water Pit 1 Samples

EPA/START Sample No.:	SBA-004-WT			SBA-005-PD			SBA-005-WT		
EPA Laboratory Sample No.:	1308020-21			1308020-22			1308020-08		
Depth of Sample:	12 to 14 feet interval			12 to 14 feet interval			14 to 16 feet interval		
% Solids:	81.66%			83.19%			76.84%		
Unit:	Result	RL	3x Bkgd or > RL	Result	RL	3x Bkgd or > RL	Result	RL	3x Bkgd or > RL
Analyte: SVOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Acenaphthene	**1.33E6**	48300	259 (RL)	**4590**	475	259 (RL)	**44000**	1250	247 (RL)
Benzo (b) fluoranthene	**552000**	121000	649 (RL)	**2610**	1190	649 (RL)	**18400**	3120	618 (RL)
Benzo (g,h,i) perylene	**317000**	121000	649 (RL)	**2510**	1190	649 (RL)	**11400**	3120	618 (RL)
Benzo (k) fluoranthene	**584000**	121000	649 (RL)	**2010**	1190	649 (RL)	**14700**	3120	618 (RL)
1,1'-Biphenyl	**455000**	121000	649 (RL)	**1480**	1190	649 (RL)	**15400**	3120	618 (RL)
Bis(2-ethylhexyl)phthalate	U	12100	649 (RL)	U	1190	649 (RL)	U	3120	618 (RL)
Acenaphthylene	**409000**	48300	259 (RL)	**542**	475	259 (RL)	**4060**	1250	247 (RL)
Carbazole	**1.40E7 J (1.40E6)***	1.21E6	649 (RL)	6420 J (642.0)*	1190	649 (RL)	25800 J (2580)*	3120	618 (RL)
Chrysene	**1.68E6**	121000	649 (RL)	**4510**	1190	649 (RL)	**31300**	3120	618 (RL)
Dibenzofuran	**2.38E6**	1.21E6	649 (RL)	**5220**	1190	649 (RL)	**52800**	3120	618 (RL)
Dibenz (a,h) anthracene	**113000**	112000	649 (RL)	U	1190	649 (RL)	**3210**	3120	618 (RL)
2,4-Dimethylphenol	**22500**	12100	649 (RL)	U	1190	649 (RL)	U	3120	618 (RL)
Anthracene	**3.87E7**	4.83E6	259 (RL)	**16700 J (1670)***	475	259 (RL)	**41100**	1250	247 (RL)
Fluoranthene	**4.23E6**	483000	259 (RL)	**16900 J (1690)***	475	259 (RL)	**133000**	12500	247 (RL)
Fluorene	**4.81E6**	483000	259 (RL)	**5760**	475	259 (RL)	**65300**	12500	247 (RL)
Indeno (1,2,3-cd) pyrene	**361000**	121000	649 (RL)	**1800**	1190	649 (RL)	**12000**	3120	618 (RL)
2-Methylnaphthalene	**1.89E6**	48300	259 (RL)	**4080**	475	259 (RL)	**44500**	1250	247 (RL)
2-Methylphenol	**16100**	12100	649 (RL)	U	1190	649 (RL)	U	3120	618 (RL)
3 &/or 4-Methylphenol	**36000**	12100	259 (RL)	U	1190	259 (RL)	U	3120	618 (RL)
Naphthalene	**4.46E6**	483000	259 (RL)	**12100**	475	259 (RL)	**170000**	12500	247 (RL)
Phenanthrene	**1.19E7**	483000	259 (RL)	32200 J (3220)*	4750	259 (RL)	**273000**	12500	247 (RL)
Pyrene	**2.58E6**	483000	259 (RL)	**12800**	475	259 (RL)	**98800**	12500	247 (RL)
Benzo (a) anthracene	**1.09E6**	121000	649 (RL)	**4090**	1190	649 (RL)	**29500**	3120	618 (RL)
Benzo (a) pyrene	**706000**	121000	649 (RL)	**2760**	1190	649 (RL)	**20200**	3120	618 (RL)
Analyte: Total Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Mercury	**1.75**	0.076	0.075 (RL)	U	0.071	0.075 (RL)	U	0.074	0.079 (RL)
Copper	**104**	2.3	54 (3x)	7.4	2.3	54 (3x)	**13.6**	2.5	12.3 (3x)
Manganese	161	0.6	498 (3x)	138	0.6	498 (3x)	**891**	0.6	110.1 (3x)
Nickel	16.8	2.3	54 (3x)	8.7	2.3	54 (3x)	**26.5**	2.5	24.6 (3x)
Zinc	**205**	2.3	158.7 (3x)	21.1	2.3	158.7 (3x)	**45.3**	2.5	42.6 (3x)
Barium	325	1.2	375 (3x)	87.4	1.1	375 (3x)	151	1.2	184.5 (3x)
Cadmium	0.8	0.6	2.1 (3x)	U	0.6	2.1 (3x)	**0.7**	0.6	0.6 (RL)
Cobalt	9.9	2.3	19.5 (3x)	3.0	2.3	19.5 (3x)	10.2	2.5	23.1 (3x)
Lead	**48.0**	0.6	44.4 (3x)	4.9	0.6	44.4 (3x)	14.0	0.6	23.4 (3x)
Arsenic	5.1	0.6	12 (3x)	0.7	0.6	12 (3x)	**8.3**	0.6	2.1 (3x)
Analyte: VOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Cyclohexane	**1140**	99.8	4.2 (RL)	**62.6 J (6.26)***	4.1	4.2 (RL)	**928 L**	83.5	41.9 (RL)
Methylcyclohexane	**1970**	99.8	4.2 (RL)	**172 J (17.2)***	4.1	4.2 (RL)	**4010 L**	83.5	41.9 (RL)
Ethylbenzene	**3020**	99.8	4.2 (RL)	**23.3**	4.1	4.2 (RL)	**8330 L**	83.5	41.9 (RL)
meta-/para-Xylene	**17200**	200	8.3 (RL)	**76.9**	8.1	8.3 (RL)	**18900 L**	167	41.9 (RL)
ortho-Xylene	**6820**	99.8	4.2 (RL)	**33.9**	4.1	4.2 (RL)	**6850 L**	83.5	41.9 (RL)
cis-1,2-Dichloroethene	**64.1**	4.9	4.2 (RL)	U	4.1	4.2 (RL)	**330 L**	83.5	41.9 (RL)
Benzene	**8320**	99.8	4.2 (RL)	**4.2**	4.1	4.2 (RL)	**2160 L**	83.5	41.9 (RL)
Toluene	**9220**	99.8	4.2 (RL)	**9.1**	4.1	4.2 (RL)	**8400 L**	83.5	41.9 (RL)
Tetrachloroethene	**252**	99.8	4.2 (RL)	**8.3**	4.1	4.2 (RL)	**60.3 J (6.03)***	4.1	41.9 (RL)
Styrene	**3900**	99.8	4.2 (RL)	**4.7**	4.1	4.2 (RL)	**1590 L**	83.5	41.9 (RL)
Isopropylbenzene	**3240**	99.8	4.2 (RL)	**13.1**	4.1	4.2 (RL)	**1000 L**	83.5	41.9 (RL)
1,4-Dichlorobenzene	U	4.9	4.2 (RL)	U	4.1	4.2 (RL)	**165 L**	83.5	41.9 (RL)
1,2-Dichlorobenzene	**152**	99.8	4.2 (RL)	**12.4**	4.1	4.2 (RL)	**1640 L**	83.5	41.9 (RL)

Key:

µg/kg = Concentrations in micrograms per kilograms
mg/kg = Concentrations in milligrams per kilogram
RL - Reporting Limit
U - Undetected
WT - Above the Water Table
PD - Highest PID Reading

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported values for carbazole in samples SBA-002-PD, SBA-002-WT, SBA-004-24, SBA-004-WT, SBA-005-PD, and SBA-005-WT are biased unknown (Ref. 4, p. 181). The reported values for anthracene, fluoranthene, phenanthrene, cyclohexane, and methylcyclohexane in sample SBA-005-PD are biased unknown (Ref. 31, pp. 181 & 186). The reported value for styrene in sample SBA-002-WT is biased unknown (Ref. 31, p. 185). The reported value for tetrachloroethene in sample SBA-005-WT is biased unknown (Ref. 31, p. 185). The presence of the substance is not in doubt.

L - The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value (Ref. 4, 865).

N - There is a presumptive evidence that the analyte present; the analyte is reported as a tentative identification (Ref. 4, p. 865).

* - The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document and Observed Release and Observed Contamination*" (Ref. 31, pp. 8, 12, 14, & 15). After adjusting the value for the qualified data to reflect the possible effect of the bias on the substance concentration, there is still a significant increase in contamination.

BOLD - Concentration detected significantly above the background concentration or the reporting limits.

References

Chain of Custody:	Ref. 4, p. 171	Ref. 4, p. 171	Ref. 4, p. 168
Laboratory Results:	Ref. 4, pp. 591-599	Ref. 4, pp. 600-607	Ref. 4, pp. 482-491
Data:	Ref. 4, p. 181, 450-457, 594 & 865; Ref. 31, pp. 8 and 14; Ref. 52	Ref. 4, p. 181, 186, 450-457, 600, 602-604 & 865; Ref. 31, pp. 8, 14 & 15; Ref. 52	Ref. 4, p. 181, 185, 458-465, 485- 486 & 865; Ref. 31, pp. 8, 12 and 14; Ref. 52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored; therefore, ground water containment was not evaluated.

Release via overland migration: There is no evidence to indicate the former source was lined since the Former Water Pit 1 consisted of a clay bottom (Ref. 24, p. 107). There is no evidence that the Former Water Pit had any containment features when in operation. The containment factor value for Source No. 3 is 10 (Ref. 1, Table 4-2).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Pathways (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthene
- Acenaphthylene
- Anthracene
- Arsenic
- Barium
- Benzene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Biphenyl, 1,1'-
- Bis(2-ethylhexyl)phthalate
- Cadmium
- Carbazole
- Cobalt
- Copper
- Chrysene
- Cyclohexane
- Dibenz(a,h)anthracene
- Dibenzofuran
- Dichlorobenzene, 1,2- & 1,4-
- Dichloroethene, cis-1,2-
- Dimethylphenol, 2,4-
- Ethylbenzene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Isopropylbenzene
- Lead
- Manganese
- Mercury
- Methylcyclohexane
- Methylnaphthalene, 2-
- Methylphenol, 2- & 3&/or4-
- Naphthalene
- Nickel
- Phenanthrene
- Pyrene
- Styrene
- Tetrachloroethene
- Toluene
- Xylene, -m, -p, -o
- Zinc

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 3 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, pp. 51590-51591, Section 2.4.2.1.1). Insufficient historical and current data (manifests, PRP] records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 3 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 3 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, p. 51591, Section 2.4.2.1.2). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) are available to adequately calculate the total or partial mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity for Source 3 with reasonable confidence.

Hazardous Wastestream Quantity Value (W): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.3. Volume – Tier C

Initially, the Former Water Pit 1 was excavated for active use to an approximate depth of 18 feet bgs around 1968 (Ref. 24, pp. 8 & 107). Prior to closure activities in 1991, an estimated 2,542 cubic yards of sludge was present in Water Pit 1 (Ref. 24, p. 13). By 1994, Water Pit 1 was inactive and had undergone partial closure (Ref. 24, p. 13). In 1996 dimensions were approximated at 160 feet x 100 feet x 15 feet and was estimated to contain an approximate 6,900 cubic yards of solidified sludge piled in the east end of the impoundment (Ref. 4, p. 30; Ref. 6, p. 7).

However, the information available is not sufficient to evaluate an score Tier C because details of closure activities on Water Pit 1 are incomplete, the dimensions of Water Pit 1 are approximate, there exists an inconsistency and conflict in the depth of the pit according to site evidence from 1968 and 1996, the depth of excavation is unknown and may not have been uniform and unvarying throughout the source, and closure details mention solidified/stabilized sludge being piled and remaining in the southeast/east end of the impoundment (Ref. 6, p. 10; Ref. 24, p. 13); therefore, it is not possible to

adequately determine a source volume (Tier C) (Ref. 1, Sec. 2.4.2.1.3, p. 51591). As a result, the evaluation of source volume proceeds to the evaluation of Tier D, source area (Ref. 1, Sec. 2.4.2.1.4, p. 51591).

Volume of source (yd^3): Not Scored
Reference(s): Ref. 1, Table 2-5, p. 51591
Volume Assigned Value: 0

2.4.2.1.4. Area – Tier D

Historical maps and historical aerial photographs were used to estimate the size of the former Water Pit 1 (Ref. 16, p. 2; Ref. 18, p. 2). Based on Figure 2, the scale of the figures in reference 16, page 2 and 18, page 2, the former Water Pit 1 dimensions were 135 feet in length and approximately 85 feet in width; therefore, it occupied 11,475 square feet (ft^2).

The hazardous waste quantity evaluation equation for a buried/backfilled surface impoundment is A/13 (Ref. 1, Table 2-5). The area source will be assigned an area hazardous waste quantity value of 882.69.

$$11{,}475\ ft^2/13 = 882.69$$

Area of source (ft^2): 11,475.00
Area Assigned Value: 882.69
References: Fig. 2; Ref. 1, Sec. 2.4.2.1.4

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 3, Former Water Pit 1.

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	NS
Tier D	882.69
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	882.69

NS: Not Scored
NC: Not Calculated

The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 3 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier D.

Source No. 3 Hazardous Waste Quantity Value: 882.69

2.2.1 SOURCE IDENTIFICATION – SOURCE 4

The following information corresponds to the fourth source identified for this documentation record.

Name of source: Former Land Treatment Unit (LTU)

Number of source: 4

Source Type: Land Treatment

Description and Location of Source: The Former Land Treatment Unit (LTU) was present west of the surface impoundments located on the southeast portion of the property (Figure 2). The land farm was a solid waste management unit on which sludge from the surface impoundments were dewatered and treated (Ref. 24, p. 5). The LTU was located approximately 200 feet northwest of Water Pit 1 and had approximate dimensions of 100 feet wide and 200 feet long (Ref. 24, pp. 15 & 107). The LTU is currently covered with soil (Ref. 4, p. 32). Surface water runoff from the LTU forms small puddles in the grass that is north of the unit (Ref. 24, pp. 15 & 107). The ground surface slopes to the northeast, and there is no surface water run-on or runoff control (Ref. 24, pp. 15 & 107). Runoff from the LTU area enters the drainage canal which discharges into the Mermentau River and adjacent wetlands (Ref. 24, pp. 5 & 107).

In early 1992, SBA began using a LTU to treat solidified sludges that had been removed from Water Pit 1 during closure of the impoundment (Ref. 24, pp. 15 & 107). The LTU was used to bio treat stabilized sludge that was removed from Water Pit 1 during bioremediation activities from 1990-1991 (Ref. 6, p. 10; Ref 24, pp. 13 & 107). The sludges in Water Pit 1 were solidified with fly ash and lime (Ref. 24, pp. 15 & 107). Approximately one third of Water Pit 1 sludges were placed directly on the ground surface of the LTU (Ref. 24, p. 15). The solidified material on the LTU was periodically disked to enhance bio treatment until approximately 1993 (Ref. 6, p.45). The LTU had dimensions of approximately 190 feet x 93 feet x 3 feet and was estimated to contain approximately 2,000 cubic yards of solidified sludge (Ref. 6, p. 8). As of October 26, 1994, no closure or post closure care measures have been enacted for the LTU (Ref. 24, p. 15). Documentation has not been obtained to indicate that closure or post-closure care measures have been enacted at the LTU from October 26, 1994 to the present.

Soil borings were advanced using direct push technology at two (2) locations in the former LTU area (Ref. 4, pp. 57, 906 & 908; Figure 3). The borings were advanced to a maximum depth of 16 feet bgs using the procedures in the EPA Environmental Response Team (ERT) Standard Operating Procedure (SOP) 2050, modified for the actual unit used by the driller (Ref. 4, pp. 20 & 934-946). Grab soil samples were collected from each boring, from intervals of visual contamination or where PID readings for VOCs above background were detected (Ref. 4, pp. 20, 874-875, 893, 934-946).

Location SBA-007 was sampled at the southwest corner of the former LTU, and Location SBA-008 was sampled in the approximate center of the former LTU (Figure 3). Three (3) soil samples were collected from the two (2) boring locations in the area of the Former Land Treatment Unit (Ref. 4, p. 32 & 908; Figure 3):

- Sample SBA-007WT (8-10 feet bgs) – collected above water table; chemical odor

- Sample SBA-008-24 (2-4 feet bgs) – no stains, no odor
- Sample SBA-008WT (10-12 feet bgs) – collected above water table; chemical odor

Soil samples was shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCB by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 20, 47, 316-324, & 333-343).

The soil sample results from this source area were compared to the concentrations in the corresponding foot intervals from the background soil sample (Tables 3 and 6). The hazardous substances associated with the former land treatment unit are polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and metals (Table 6).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

Elevated levels of PAHs were found to include: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, 1,1'-biphenyl, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, phenol and pyrene in concentrations greater than comparable background soils at these depths (Ref. 4, p. 32; Table 6). While this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the samples are significantly above background.

In addition, numerous VOCs such as cyclohexane, methylcyclohexane, ethylbenzene, xylene, cis-1,2-dichloroethene, benzene, toluene and vinyl chloride were detected. Metals concentrations of manganese, nickel, beryllium, cadmium, and arsenic were also detected (Table 6).

Table 6 – Source 4 - Land Treatment Unit (LTU) Samples

EPA/START Sample No.:	SBA-007-WT			SBA-008-WT		
EPA Laboratory Sample No.:	1308018-06			1308018-08		
Depth of Sample:	8 to 10 ft interval			10 to 12 ft interval		
% Solids:	76.78%			76.57%		
Units:	Result	RL	3x Bkgd. or > Bkgd. RL	Result	RL	3x Bkgd. or > Bkgd. RL
Analyte: SVOCs	**µg/kg**	**µg/kg**	**µg/g**	**µg/kg**	**µg/kg**	**µg/g**
Acenaphthene	**26300**	643	236 (RL)	**15300**	1100	240 (RL)
Benzo (b) fluoranthene	**7740**	1610	590 (RL)	**7240**	2760	599 (RL)
Benzo (g,h,i) perylene	**2890**	1610	590 (RL)	**5210**	2760	599 (RL)
Benzo (k) fluoranthene	**6130**	1610	590 (RL)	**7640**	2760	599 (RL)
1,1'-Biphenyl	**6760**	1610	590 (RL)	**5640**	2760	599 (RL)
Acenaphthylene	**2410**	643	236 (RL)	U	1100	240 (RL)
Carbazole	12600 J (1260)*	1610	590 (RL)	15000 J (1500)*	2760	599 (RL)
Chrysene	**13700**	1610	590 (RL)	**14400**	2760	599 (RL)
Dibenzofuran	**28300**	1610	590 (RL)	**21400**	2760	599 (RL)
Anthracene	**21700**	643	795 (3x)	**17800**	1100	240 (RL)
Fluoranthene	**48700**	12900	236 (RL)	**51600**	1100	240 (RL)
Fluorene	**35700**	12900	236 (RL)	**24500**	1100	240 (RL)
Indeno (1,2,3-cd) pyrene	**3560**	1610	590 (RL)	**5230**	2760	599 (RL)
2-Methylnaphthalene	**22400**	643	236 (RL)	**14100**	1100	240 (RL)
Naphthalene	**85800**	12900	236 (RL)	**54300**	1100	240 (RL)
Phenanthrene	**131000**	12900	236 (RL)	**113000**	11000	240 (RL)
Phenol	**2640**	1610	590 (RL)	U	2760	599 (RL)
Pyrene	**48100**	12900	236 (RL)	**42500**	1100	240 (RL)
Benzo (a) anthracene	**13900**	1610	590 (RL)	**13000**	2760	599 (RL)
Benzo (a) pyrene	**8110**	1610	590 (RL)	**9540**	2760	599 (RL)
Analyte: Total Metals	**mg/kg**	**mg/kg**	**mg/g**	**mg/kg**	**mg/kg**	**mg/g**
Manganese	**680**	0.6	117 (3x)	**501**	0.6	166.2 (3x)
Nickel	**25.2**	2.3	19.8 (3x)	20.8	2.3	32.1 (3x)
Beryllium	**1.0**	0.6	0.6 (RL)	0.9	0.6	1.8 (3x)
Cadmium	**0.8**	0.6	0.6 (RL)	**0.9**	0.6	0.6 (RL)
Arsenic	**10.1**	0.6	0.6 (RL)	10.3	0.6	6.9 (3x)
Analyte: VOCs	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Cyclohexane	**138 L**	89.7	3.9 (RL)	**75.7 J (7.57)***	4.3	3.9 (RL)
Methylcyclohexane	**168 L**	89.7	3.9 (RL)	**247 J (24.7)**	4.3	3.9 (RL)
Ethylbenzene	**159 L**	89.7	3.9 (RL)	**152**	99.9	3.9 (RL)
meta-/para-Xylene	**1070 L**	179	7.8 (RL)	**474**	200	7.8 (RL)
ortho-Xylene	**393 L**	89.7	3.9 (RL)	321 J (3.21)*	4.3	3.9 (RL)
cis-1,2-Dichloroethene	**252 L**	89.7	3.9 (RL)	**52.0 J (5.20)***	4.8	3.9 (RL)
Benzene	**218 L**	89.7	3.9 (RL)	**61.1**	4.3	3.9 (RL)
Toluene	**367 L**	89.7	3.9 (RL)	**222 J (22.2)***	4.3	3.9 (RL)
Vinyl chloride	UJ	89.7	3.9 (RL)	6.4 J (0.64)*	4.8	3.9 (RL)

Key:

µg/kg = Concentrations in micrograms per kilograms
mg/kg = Concentrations in milligrams per kilograms
U- Undetected
Bkgd. - Background
RL - Reporting Limit
WT - Above the Water Table

BOLD - Concentration detected significantly above background concentration or above background reporting limit

J - The identification of the analyte is acceptable; the reported value is an estimate (Ref. 4, p. 865). The reported values for carbazole in samples SBA-007-WT and SBA-008-WT are biased unknown (Ref. 31, p. 181). The reported values for cyclohexane, methylcyclohexane, o-xylene, cis-1,2-Dichloroethene, and toluene are biased unknown (Ref. 4, pp. 185 and 187). The presence of the substances is not in doubt.

L - The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value (Ref. 4, p. 865).

* - The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document an Observed Release and Observed Contamination*" (Ref. 31, pp. 5-14). After adjusting the reported value for the qualified data to reflect the possible effect of the bias on the substance concentration, there is still a significant increase in contamination.

References

Chain of Custody:	Ref. 4, p. 162	Ref. 4, p. 162
Laboratory Results:	Ref. 4, pp. 316-324	Ref. 4, pp. 333-343
Data:	Ref. 4, pp. 181, 316-324 & 865; Ref. 31, pp. 5-14; Ref. 52	Ref. 4, pp. 185 & 187, 333-343 & 865; Ref. 31, pp. 5-14; Ref.52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored, therefore, ground water containment was not evaluated.

Release via overland migration: There is was no functioning or maintained run-on or runoff management system (Ref. 24, p. 15). Surface water runoff from the LTU forms small puddles in the grass north of the unit (Ref. 24, p. 15). Runoff water flows into a drainage ditch that empties into the Mermentau River (Ref. 24, p. 107). The containment factor value for Source No. 4 is 10 (Ref. 1, Table 4-2).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Pathways (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthene
- Acenaphthylene
- Anthracene
- Arsenic
- Benzene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Beryllium
- Biphenyl, 1,1'-
- Cadmium
- Chrysene
- Cyclohexane
- Dibenzofuran
- Dichloroethene, cis-1,2-
- Ethylbenzene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Manganese
- Methylcyclohexane
- Methylnaphthalene, 2-
- Naphthalene
- Nickel
- Phenanthrene
- Phenol
- Pyrene
- Toluene
- Vinyl Chloride
- Xylene, -m, -p, -o

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 4 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, pp.

51590-51591, Section 2.4.2.1.1). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 4 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 4 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, pp. 51590-51591, Section 2.4.2.1.2). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 4 with reasonable confidence.

Hazardous Wastestream Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.3. Volume – Tier C

Volume was not calculated by reason of Source No. 4 being a land treatment source type and the depth of contamination in the soil is unknown; therefore, it is not possible to adequately determine a source volume (Tier C) in cubic yards (yd^3) (Ref. 1, Sec. 2.4.2.1.3, p. 51591). As a result, the evaluation of source volume proceeds to the evaluation of Tier D, source area (Ref. 1, Sec. 2.4.2.1.4, p. 51591).

Volume of Source (yd^3): Not Calculated
Volume Assigned Value: 0

2.4.2.1.4. Area – Tier D

The LTU was located approximately 200 feet northwest of water pit 1, and had approximate dimensions of 100 feet wide and 200 feet long when put into use (Ref. 24, pp. 15 & 107). In 1996 it was noted that the LTU had approximate surface dimensions of 190 feet x 93 feet (Ref. 6, p. 8). The LTU is currently covered with soil and no closure or post closure care measures have been enacted for the LTU (Ref. 4, p. 32; Ref. 24, p. 15).

Using the most conservative estimate for the source area of the former LTU of 190 feet x 93, it occupied approximately 17,670 square feet (ft^2) (Ref. 6, p. 8). The hazardous waste quantity evaluation equation for a land treatment unit is A/270 (Ref. 1, Table 2-5). The area source will be assigned an area hazardous waste quantity value of 65.44.

$$17{,}670\ ft^2/270 = 65.44$$

Area of source (ft^2): 17,670.00
Area Assigned Value: 65.44
References: Fig. 2; Ref. 1, Sec. 2.4.2.1.4

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 4, Former Land Treatment Unit (LTU).

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	NC
Tier D	65.44
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	65.44

NC: Not Calculated

The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 4 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier D.

Source No. 4 Hazardous Waste Quantity Value: 65.44

2.2.1 SOURCE IDENTIFICATION – SOURCE 5

The following information corresponds to the fifth source identified for this documentation record.

Name of source: Dry Dock

Number of source: 5

Source Type: Surface Impoundment (Not Buried/Backfilled)

Description and Location of Source: The Dry Dock is located on the eastern edge of the SBA property adjacent to the Mermentau River (Ref. 54, p. 3; Figure 2). The Dry Dock was commonly referred to as the graving dock (Ref. 54, p. 3). The graving dock was used for the building of new offshore and inland tank barges, and the repair and or conversion of tank barges and tug boats (Ref. 55, p. 1). The graving dock was a basin that was flooded by two 26 inch lines with river water, once a barge was in the dry dock the water was pumped out with two 26 inch pumps back to the river (Ref. 53, p. 1). Thus, each time water from the dry dock was discharged back to the river any waste that had settled and was not removed from the basin migrated from the source (Ref. 53, p. 1). The Dry Dock has dimensions of approximately 500 feet x 250 feet (Ref. 4, pp. 17 & 33). Currently, the Dry Dock contains water (Ref. 4, pp.33 & 114-115).

Sediment samples were collected by the Superfund Technical Assessment and Response Team (START) contractor, during a SI conducted in August 2013, using stainless steel spoons or a benthic dredge and transferred directly to the sample containers (Ref. 4, pp. 20-21).

During the SI, the background sediment sample, SBA-028SD, was collected off a private dock on the Mermentau River north of the facility, which is approximately 275 feet northeast of the SBA facility entrance (Ref. 4, pp. 27, 109 & 1011; Figure 3). The SI off-site background sediment sample was collected from similar medium as the characterization samples (i.e., sediment) (Ref. 4, pp. 20-21 & 1009-1011). The SI off-site background sediment sample collected, Location SBA-028D, was grayish in color, a silty-clay, with no odor, and collected at 0 to 3 inches below water surface using a benthic dredge (Ref. 4, p. 1011). The Soil Survey for Jefferson Davis Parish, Louisiana was reviewed along with observations made during the ESI, to determine the similarity of sediment types within the area of concern (Ref. 8, pp. 25-26; Ref. 40, pp. 1-2).

Two (2) sediment samples were collected at two separate locations within the Dry Dock (Ref. 4, pp. 34, 110, 114-115, 906 & 1009-1010). Location SBA-026 sediment sample was collected from the northwest corner of the Dry Dock slip, and Location SBA-027 sediment sample was collected from the south side of the loading dock (Figure 3; Ref. 4, p. 34). The following samples were collected:

- Sample SBA-026SD – brownish grey clayey silt; collected at 0 to 3 inches below water surface using a spoon and mixing bowl (Ref. 4, pp. 114 & 1009).
- Sample SBA-027SD – dark grey, silty sediment, with hydrocarbon sheen/odor; collected at 0 to 3 inches below water surface (10 to 15 feet in depth to bottom) using a benthic dredge (Ref. 4, pp. 115 & 1010).

Sediment samples SBA-026SD, SBA-027SD and SBA-028SD were sent to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCB by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 21-23, 47, 180, 244-251 & 389-404).

The sediment sample results from the source area were compared to the concentrations in the in the background sediment sample (Tables 7 and 8). Analysis of the sediments from the Dry Dock detected numerous PAHs, select metals and the chlorinated PCBs, Aroclor-1254 (Ref. 4, pp. 34 & 389-404; Table 7-8).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

Analysis of the sediments from within the Dry Dock detected various PAHs such as: acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo (k) fluoranthene. benzo(g,h,i)perylene, carbazole, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene above concentrations in background sediment levels (Tables 7-8). While the increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the sediment samples are significantly above background. The constituents detected in the dry dock sediment samples are the same or similar to those detected in the waste sample collected from the Partially Buried Barge (Source 1) used in the barge cleaning process (Ref. 4, p. 34 & 389-404; Table 1).

Metals detected included mercury, zinc, and arsenic while no volatile organic compounds (VOCs) were detected in the samples (Ref. 4, p. 70 & 389-404; Table 8). The chlorinated polychlorinated biphenyl (PCB), Aroclor-1254 was detected in sediment sample SBA-026SD (Ref. 4, pp. 70 & 396; Table 4).

Table 7 - Background Sediment Samples

EPA/START Sample No.:	**SBA-28SD**	
EPA Laboratory Sample No.:	**1308016-03**	
Matrix:	**Sediment Background**	
Unit:	**RL**	**Result**
% Solids	69.74	
Analyte: SVOCs	**µg/Kg**	**µg/Kg**
Acenaphthene	286	U
Benzo (b) fluoranthene	715	U
Benzo (g,h,i) perylene	715	U
Benzo (k) fluoranthene	715	U
Acenaphthylene	286	U
Carbazole	715	U
Chrysene	715	U
Dibenzofuran	715	U
Dibenz (a,h) anthracene	715	U
Anthracene	286	U
Fluoranthene	286	U
Fluorene	286	U
Indeno (1,2,3-cd) pyrene	715	U
2-Methylnaphthalene	286	U
Naphthalene	286	U
Phenanthrene	286	U
Pyrene	286	U
Benzo (a) anthracene	715	U
Benzo (a) pyrene	715	U
Analyte: Total Metals	**mg/kg**	**mg/kg**
Barium	1.3	**214**
Chromium	1.3	**8.1**
Cobalt	2.5	**6**
Copper	2.5	**6.1**
Manganese	0.6	**292**
Mercury	0.07	U
Nickel	2.5	**7.4**
Vanadium	2.5	**16.7**
Zinc	2.5	**21.2**
Lead	0.6	**11.7**
Arsenic	0.6	U
Analyte: PCBs	**µg/Kg**	**µg/Kg**
Aroclor-1254	23.4	U
Key:		
µg/Kg - Concentrations in micrograms per kilogram mg/Kg - Concentration in milligrams per kilogram PCBs - Polychlorinated biphenyls RL - Reporting Limit		U - Undetected SD- Sediment
References		
Chain of Custody: Laboratory Results:	Ref. 4, p. 160 Ref. 4, pp. 244-251	

Table 8 – Source 5 - Dry Dock Samples

EPA/START Sample No.:	**SBA-26SD**			**SBA-27SD**		
EPA Laboratory Sample No.:	**1308018-14**			**1308018-15**		
Location (Source 5):	**Dry Dock W**			**Dry Dock S**		
% Solids:	**45.52%**			**43.06%**		
	Result	**RL**	**3x Bkgd. or > Bkgd. RL**	**Result**	**RL**	**3x Bkgd. or > Bkgd. RL**
Unit:	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Analyte: SVOCs						
Benzo (b) fluoranthene	**12800 J (1280)***	1090	715 (RL)	**8030 J (803)***	1140	715 (RL)
Benzo (g,h,i) perylene	**8210 J (821)***	1090	715 (RL)	6660 J (666)*	1140	715 (RL)
Benzo (k) fluoranthene	**10100 J (1010)***	1090	715 (RL)	6290 J (629)*	1140	715 (RL)
Acenaphthylene	**1690**	438	286 (RL)	**1160**	458	286 (RL)
Carbazole	3460 J (346.0)*	1090	715 (RL)	**50400 J (5040.0)***	11400	715 (RL)
Chrysene	**10100**	1090	715 (RL)	**9090**	1140	715 (RL)
Dibenzofuran	U	1090	715 (RL)	**4270**	1140	715 (RL)
Dibenz (a,h) anthracene	1830 J (183)*	1090	715 (RL)	1320 J (132)*	1140	715 (RL)
Anthracene	**11000**	438	286 (RL)	**137000**	4580	286 (RL)
Fluoranthene	**11600**	438	286 (RL)	**7280**	4580	286 (RL)
Fluorene	**937**	438	286 (RL)	**12000**	458	286 (RL)
Indeno (1,2,3-cd) pyrene	**7610 J (716)***	1090	715 (RL)	5630 J (563)*	1140	715 (RL)
2-Methylnaphthalene	U	438	286 (RL)	**2710**	458	286 (RL)
Naphthalene	**1270**	438	286 (RL)	**3180**	458	286 (RL)
Phenanthrene	**6260**	438	286 (RL)	**24200**	4580	286 (RL)
Pyrene	**19000**	438	286 (RL)	**8210**	458	286 (RL)
Benzo (a) anthracene	**8650**	1090	715 (RL)	**4030**	1140	715 (RL)
Benzo (a) pyrene	**11000 J (1100)***	1090	715 (RL)	**7480 J (748)***	1140	715 (RL)
Analyte: Total Metals	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Mercury	**0.109**	0.095	0.07 (RL)	**0.203**	0.084	0.07 (RL)
Zinc	**73.8**	3.7	63.6 (3x)	**243**	3.7	63.6 (3x)
Arsenic	**5.2**	0.9	0.6 (RL)	**3.8**	0.9	0.6 (RL)
Analyte: PCBs	**µg/kg**	**µg/kg**	**µg/Kg**	**µg/kg**	**µg/kg**	**µg/kg**
Aroclor-1254	**39.6 J**	39.3	23.4 (RL)	U	154	23.4 (RL)

Key:

µg/kg - Concentrations in microgram per kilogram
mg/kg - Concentrations in milligrams per kilogram
S - South
Bkgd. - Background sample
U - Undetected
SD - Sediment
W - West
RL - Reporting Limit

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, 865). The reported values for benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k) fluoranthene, carbazole, dibenz (a,h) anthracene, indeno (1,2,3-cd) pyrene, and benzo (a) pyrene in samples SBA-026SD and SBA-027SD are biased unknown (Ref. 4, p. 181). The reported value for Arochlor-1254 in sample SBA-026SD is biased unknown (Ref. 4, p. 182). The presence of the substances is not in doubt.

( )* - The detected concentration was adjusted by using the guidance document "*Using Qualified Data to Document an Observed Release and Observed Contamination*" (Ref. 31, pp. 8, 14-16). After adjusting the reported value for the qualified data to reflect the possible effect of the bias on the substance concentration , there is still a significant increase in contamination.

Bold - Concentration detected is significantly above the background concentration or greater than the background reporting limit.

References

Chain of Custody:	Ref. 4, p. 163	Ref. 4, p. 163
Laboratory Results:	Ref. 4, pp. 389-396	Ref. 4, pp. 397-404
Data:	Ref. 4, pp. 181-182, 244-251, 391-392, 396, & 865; Ref. 31, pp. 8, 14-16; Ref.52	Ref. 4, pp. 181-182, 244-251, 399-400, & 865; Ref. 31, pp. 8, 14-15; Ref. 52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored, therefore, ground water containment was not evaluated.

Release via overland migration: There is no evidence that the Dry Dock had a liner. The Dry Dock appears to be an earthen berm enclosure reinforced with metal sheeting and bound with a 76 foot gate along the Mermentau River (Ref. 4, p.114; Ref. 7, p. 110; Ref. 54, p. 3). Contaminants were detected down gradient of the Dry Dock in the Mermentau River, due to seepage around or underneath the 76 ft gate in place or when the gate was opened. Also, Source No. 5 is designated by the Flood Insurance Rate Map (FIRM) as flood zones AE, and considered a Special Flood Hazard Area (SFHA). The SFHA is an area that would be inundated by flooding having a one (1) percent chance of being equaled or exceeded base flood level in any given year (Ref. 26, pp. 1-2). The containment factor value of 10 is assigned to Source No. 5 (Ref. 1, Table 4-2 & Table 4-9).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Pathways (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthylene
- Anthracene
- Aroclor-1254
- Arsenic
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo (k) fluoranthene
- Benzo(g,h,i)perylene
- Benzo(a)pyrene
- Carbazole
- Chrysene
- Copper
- Dibenzofuran
- Fluoranthene
- Fluorene
- Indeno (1,2,3-cd) pyrene
- Manganese
- Mercury
- Methylnaphthalene, 2-
- Naphthalene
- Phenanthrene
- Pyrene
- Zinc

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 5 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, pp. 51590-51591, Section 2.4.2.1.1). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 5 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 5 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, p. 51591, Section 2.4.2.1.2). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) are available to adequately calculate the total or partial mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity for Source 5 with reasonable confidence.

Hazardous Wastestream Quantity Value (W): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No.

2.4.2.1.3. Volume – Tier C

The information available is not sufficient to evaluate Tier C of the dry dock because the depth of contamination is not known throughout the source; therefore, it is not possible to adequately determine a source volume (Tier C) in cubic yards (yd^3) (Ref. 1, Sec. 2.4.2.1.3, p. 51591). For a more conservative volume estimate, the volume source will be assigned an area hazardous waste quantity value of >0. The value >0 reflects that the volume value is known to be greater than 0, but the exact area is unknown.

Volume of source (yd^3): Not calculated
Reference(s): Ref. 1, Table 2-5, p. 51591
Volume Assigned Value: 0

2.4.2.1.4. Area – Tier D

Historical maps and historical aerial photographs were used to estimate the size of the dry dock (Ref. 4, pp. 17 & 33). Based on aerial photographs the dry dock has approximate dimensions of 500 feet in length and 250 feet in width; therefore, it occupied approximately 125,000 square feet (ft^2) (Ref. 4, pp. 17 & 33; Ref. 18, p.3).

The hazardous waste quantity evaluation equation for a surface impoundment is A/13 (Ref. 1, Table 2-5). The area source will be assigned an area hazardous waste quantity value of 9,615.38.

$125{,}000\ ft^2 / 13 = 9{,}615.38$

Area of source (ft^2): 125,000.00
References: Fig. 2; Ref. 1, Sec. 2.4.2.1.4
Area Assigned Value: 9,615.38

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 5, Dry Dock.

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	NC
Tier D	9, 615.38
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	9, 615.38

NC: Not Calculated

The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 5 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier D.

Source No. 5 Hazardous Waste Quantity Value: 9,615.38

2.2.1 SOURCE IDENTIFICATION – SOURCE 6

The following information corresponds to the sixth source identified for this documentation record.

Name of source: Former Water Pit 3

Number of source: 6

Source Type: Surface Impoundment (Not Buried/Backfilled)

Description and Location of Source: Surface impoundment located in the southeast portion of the property, adjoining a designated wetland area (Figure 2). Former Water Pit 3 was originally excavated to an approximate depth of 6 feet bgs around 1968, and the soils below the unlined Water Pit 3 consisted of clay to an approximately depth of 20 to 25 feet bgs (Ref. 24, p. 14). Water pit 3 was approximately 150 feet long, 50 feet wide and 6 feet deep in 1996 (Ref. 24, p. 14). Water Pit 3 was used to treat and store wastewater and sludges generated during the barge cleaning activities, with Water Pit 3 receiving wastewater from Water Pit 2 (Ref. 24, pp. 8 & 12-14). Subsequently, aboveground oil/water separators and storage tanks replaced the functions of the surface impoundments (Ref. 4, p. 13).

In 1997, the inactive surface impoundment had approximately 600 cubic yards of sediment/sludge excavated and stacked alongside the surface impoundment (Ref. 6, p. 8). During storm events rainwater accumulates in the impoundment (Ref. 6, pp. 10). The impoundment formerly known as Water Pit 3 is located on the southeast portion of the property, bordering a designated wetland area (Figure 2). The dimensions were approximately 283 feet x 55 feet x 6 feet and contained water (Ref. 4, p. 30; Ref. 6, p. 8).

According to the December 2002 IM/RA agreed order 750,000 gallons of water was pumped from Former Water Pit 3 (former water pit) to the drainage ditch that drains to the Mermentau River (Ref. 5, pp. 8, 20-21 & 24). The emptied Water Pit 3 (former water pit) was then used to receive treated storm water from the Partially Buried Barge (Ref. 5, pp. 8, 20 & 24). Approximately 100,000 gallons of treated storm water was left in Water Pit 3 (former water pit) (Ref. 5, pp. 8 & 21). Water Pit 3 (former water pit) was later closed by using a hydraulic excavator to break a wide gap in the earthen berm separating it from the Mermentau River bottomland directly east of the water pit (Ref. 5, pp. 8, 21). Upon removal of the segment of the earthen berm, water from the Mermentau River flowed into the Former Water Pit 3 (former water pit), raising the level of the water in the pit to approximately four (4) feet deep (Ref. 5, pp. 8, 21). Thus, linking Former Water Pit 3 with the designated wetland area to the immediate west (Figure 2).

Two (2) wetland sediment grab samples were collected from the Former Water Pit 3 area, which is now part of the wetlands to the east (Figure 3). During the SI of August 2013 one (1) sediment sample, SBA-032D, was collected using a benthic dredge, and during the ESI of September 2014 one (1) wetland sediment sample, SBA-ESA-10 was collected using a metal retrieval pole with a beaker attachment to a depth of 1-6 inches bgs (Ref. 4, pp. 117-118 & 1018; Ref. 7, p. 35-36 & 135-136). All grab samples were transferred directly into sample containers (Ref. 4, pp. 20-21; Ref. 7, pp. 36).

Grab wetland sediment samples were collected from locations of visual contamination (Ref. 4, pp. 31 & 117-118; Ref. 7, pp. 36, 135-136 & 164).

Wetland sediment sample SBA-32SD was collected from the southwest corner of Former Water Pit 3 that is presently part of the wetland area, and sediment sample SBA-ESI-10SD was collected from approximately the southwest corner of Former Water Pit 3 that is currently part of the wetland area (Ref. 4, pp. 57, 117-118 & 1018; Ref. 7, pp. 50 & 135-136). The following samples were collected:

- Sample SBA-032SD –oily matrix; glades of oil; light gray; clayey; collected at 2 to 3 inches below ground surface (Ref. 4, pp. 117-118 & 1018).

- Sample SBA-ESI-10SD – noticeable hydrocarbon odor; contained a sizeable amount of organic debris; collected in the wetland near source 6 (Ref. 7, pp. 135-136, 164 & 976).

The wetland sediment sample results from Location SBA-032 were compared to the background sediment levels established from a wetland sediment sample collected south of the former facility operations, Location SBA-031 (Figure 3). Location SBA-031, Sample SBA-031SD was collected southwest of the source areas and is considered the background sample for the wetlands (Figure 3; Ref. 4, pp. 116 & 121-127).

The wetland sediment sample results from Location SBA-ESI-10 was compared to the higher of the four background sediment levels established from two wetland sediment samples collected north of the former facility operations (Location SBA-ESI-01 and SBA-ESI-02), and two wetland sediment samples collected downstream of the former facility operations (Location SBA-ESI-08 and SBA-ESI-09) (Figure 3; Ref. 7, pp. 97-98, 101-102, 126-127, 133 & 967-968).

Wetland sediment samples SBA-031SD and SBA-032SD was sent to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCB by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 21-23, 47, 632-647).

Wetland sediment samples SBA-ESI-01, SBA-ESI-02, SBA-ESI-08, SBA-ESI-09 and SBA-ESI-10SD were shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for TCL SVOAs by EPA method CLP OLM04.2 – GC/MS (Ref. 7, pp. 22 & 632-647).

Analysis of the background wetland sediment sample, SBA-031SD did not detect any organic or volatile organic constituents. Metals such as mercury, copper, manganese, nickel, vanadium, zinc, barium, chromium, lead and arsenic were detected above the reporting limits (Ref. 4, pp. 43 & 632-639; Table 9).

In wetland sediment sample SBA-032SD PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene,

naphthalene, phenanthrene, and pyrene were detected at greater than background levels (Ref. 4, pp. 70, 642-644; Table 9). In addition, metal concentrations were detected at greater than background levels for beryllium and cobalt (Ref. 4, pp. 646-647; Table 9). While this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the source sample is significantly above background.

Analysis of the background wetland sediment samples, SBA-ESI-01, SBA-ESI-02, SBA-ESI-08 and SBA-ESI-09 did not detect any semi-volatile organic constituents (Ref. 7, pp. 25, 34, 192-197 & 201-206; Table 10).

PAHs were detected in wetland sediment sample SBA-ESI-10SD. PAHs such as acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene were detected at greater than background sediment levels (Ref. 7, pp. 213-215; Table 10). While this increase in concentration is not required to associate the substances with the source, it does demonstrate the level in the waste sample is significantly above background.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

Analysis of the sediments from Former Water Pit 3 detected numerous PAHs such as: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene (Ref. 4, pp. 640-647; Ref. 7, pp. 213-215; Tables 9 and 10). Metals such as beryllium and cobalt were also detected (Ref. 4, pp. 646-647). These constituents are also detected in other sources on site including the Dry Dock and Partially Buried Barge (Sources 5 and 1 respectively).

Table 9 - Background and Source 6 (Former Water Pit 3) Wetland Samples From SI

EPA/START Sample No.:	SBA-31SD		SBA-32SD		
EPA Laboratory Sample No.:	1308020-26		1308020-27		
Matrix:	Background Sediment		Wetland Sediment		
% Solids:	53.54%		62.29%		
	Result	RL	Result	RL	3x Bkgd or > Bkgd RL
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Analyte: SVOC					
Acenaphthene	U	367	**7520**	311	367 (RL)
Benzo (b) fluoranthene	U	918	**12700**	3890	918 (RL)
Benzo (g,h,i) perylene	U	918	**7620**	3890	918 (RL)
Benzo (k) fluoranthene	U	918	**6900**	3890	918 (RL)
Acenaphthylene	U	367	**1150**	311	367 (RL)
Butyl benzyl phthalate	U	918	U	778	918
Carbazole	U	918	2540 J (254.0)*	778	918 (RL)
Chrysene	U	918	**12800**	3890	918 (RL)
Dibenzofuran	U	918	**3340**	778	918 (RL)
Dibenz (a,h) anthracene	U	918	2070 J (207.0)*	778	918 (RL)
Anthracene	U	367	**21400**	1560	367 (RL)
Fluoranthene	U	367	**20300**	1560	367 (RL)
Fluorene	U	367	**10500**	311	367 (RL)
Indeno (1,2,3-cd) pyrene	U	918	**8830**	3890	918 (RL)
2-Methylnaphthalene	U	367	**1880**	311	367 (RL)
Naphthalene	U	367	**786**	311	367 (RL)
Phenanthrene	U	367	**26600**	1560	367 (RL)
Pyrene	U	367	**21800**	1560	367 (RL)
Benzo (a) anthracene	U	918	**8910**	3890	918 (RL)
Benzo (a) pyrene	U	918	**13800**	3890	918 (RL)
Analyte: Total Metals	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Beryllium	U	0.7	**0.7**	0.7	0.7 (RL)
Cobalt	U	2.8	**6.0**	2.8	2.8 (RL)

Key:

µg/kg = Concentrations in micrograms per kilogram
mg/kg = Concentrations in milligrams per kilograms
Bkgd - Background
RL - Reporting Limit
SD - Sediment
U - Undetected

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported values for carbazole and dibenz (a,h) anthracene in sample SBA-32SD are biased unknown (Ref. 4, pp. 181, 642-643).
* - The detected concentration was adjusted by using the guidance document "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 31, pp. 8 and 14). After Adjusting the value for the qualified data to reflect the possible effect of the bias on the substance concentration, there is still a significant increase in contamination.
BOLD - concentration detected significantly above the background concentration or above the reporting limits.

References

Chain of Custody:	Ref. 4, p. 172	Ref. 4. p. 172
Laboratory Results:	Ref. 4, pp. 632-639	Ref. 4. pp. 640-647
Data:	Ref. 4, p. 181; 632-639 & 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, p. 181; 642-643 & 865; Ref. 31, pp. 8 & 14; Ref. 52

Table 10 - Background and Source 6 (Former Water Pit 3) Samples From ESI

EPA/START Sample No.:	SBA-ESI-01SD		SBA-ESI-02SD		SBA-ESI-08SD		SBA-ESI-09SD		SBA-ESI-10SD		
EPA Laboratory Sample No.:	1409034-01SD		1409034-02SD		1409028-04SD		1409028-05SD		1409034-05SD		
Sampling Location:	SBA-ESI-01		SBA-ESI-02		SBA-ESI-08		SBA-ESI-09		SBA-ESI-10		
Sample Description:	Background Wetland Sediment along the main shipping channel		Background Wetland Sediment along the original river channel		Background Sediment along wetland boundary on right descending bank of river		Background Sediment along wetland boundary on left descending bank of river		Wetland Sediment SE of Former Water Pit 3		
% Solids:	67.42%		41.91%		35.36%		60.85%		26.10%		
Units:	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	3x Bkgd or > Bkgd RL
	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Analyte: SVOCs											
2-Methylnaphthalene	277 U	277	476 U	476	543 U	543	307 U	307	**35,900**	5,490	543 U
Acenaphthene	277 U	277	476 U	476	543 U	543	307 U	307	**250,000**	5,490	543 U
Acenaphthylene	277 U	277	476 U	476	543 U	543	307 U	307	**46,400**	5,490	543 U
Anthracene	277 U	277	476 U	476	543 U	543	307 U	307	**1,040,000**	54,900	543 U
Benzo (a) anthracene	693 U	693	693 U	693	1360 U	1360	768 U	768	**664,000**	137,000	1360 U
Benzo (a) pyrene	693 U	693	693 U	693	1360 U	1360	768 U	768	**507,000**	137,000	1360 U
Benzo (b) fluoranthene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**484,000**	137,000	1360 U
Benzo (g,h,i) perylene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**150,000**	137,000	1360 U
Benzo (k) fluoranthene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**495,000**	137,000	1360 U
Carbazole	693 U	693	1190 U	1190	1360 U	1360	768 U	768	16100 J (1610)*	13,700	1360 U
Chrysene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**822,000**	137,000	1360 U
Dibenz (a,h) anthracene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**61,900**	54,900	1360 U
Dibenzofuran	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**157,000**	13,700	1360 U
Fluoranthene	277 U	277	476 U	476	543 U	543	307 U	307	**1,540,000**	54,900	543 U
Fluorene	277 U	277	476 U	476	543 U	543	307 U	307	**510,000**	54,900	543 U
Indeno (1,2,3-cd) pyrene	693 U	693	1190 U	1190	1360 U	1360	768 U	768	**167,000**	137,000	1360 U
Naphthalene	277 U	277	476 U	476	543 U	543	307 U	307	**9,140**	5,490	543 U
Phenanthrene	277 U	277	476 U	476	543 U	543	307 U	307	**1,590,000**	54,900	543 U
Pyrene	277 U	277	476 U	476	543 U	543	307 U	307	**1,380,000**	54,900	543 U

Key:

µg/kg - Concentrations in micrograms per kilogram
RL - Reporting Limit
Bkgd - Background
U - Undetected at Reporting Limit
J - The identification of the analyte is acceptable; the reported value is an estimate (Ref. 7, p. 251). The reported value for carbazole in sample SBA-ESI-10SD is biased unknown (Ref. 7, p. 179).
* - The detected concentration was adjusted by using the guidance "*Using Qualified Data to Document an Observed Release and Observed Contamination*" (Ref. 31, pp. 8 & 14). After adjusting the value for the qualified data to reflect possible bias, there is still a significant increase in contamination.
BOLD - Concentration detected is significantly above the background concentration or the Reporting Limits.

References:

Chain of Custody:	Ref. 7, p. 170	Ref. 7, p. 170	Ref 7, p .169	Ref. 7, p. 169	Ref. 7, p. 170
Laboratory Results:	Ref. 7, pp. 201-203	Ref. 7, pp. 204-206	Ref. 7, pp. 192-194	Ref. 7, pp. 195-197	Ref. 7, pp. 213-215
Data:	Ref. 7, pp. 201-203; Ref. 52	Ref. 7, pp. 204-206; Ref. 52	Ref. 7, pp. 192-194; Ref. 52	Ref. 7, pp. 195-197; Ref. 52	Ref. 7, pp. 179, 213, & 251; Ref. 31, pp. 8 & 14; Ref. 52

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment

Gas release to air: The air migration pathway was not scored; therefore, gas release to air containment was not evaluated.

Particulate release to air: The air migration pathway was not scored; therefore, particulate containment was not evaluated.

Release to ground water: The ground water pathway was not scored, therefore, ground water containment was not evaluated.

Release via overland migration: Upon removal of the segment of the earthen berm, water from the Mermentau River flowed into the Former Water Pit 3, raising the level of the pit to approximately four (4) feet deep (Ref. 5, pp. 8, 20-21 & 24). Thus, making the former surface impoundment combined with the designated wetland area to the immediate west (Figure 2). In addition, there is no evidence to indicate the former source had an artificial liner since Water Pit 3 consisted of a local (native) clay bottom (Ref. 24, pp. 8 & 107). Also, Source No. 6 is designated by the Flood Insurance Rate Map (FIRM) as flood zones AE, and considered a Special Flood Hazard Area (SFHA). The SFHA is an area that would be inundated by flooding having a one (1) percent chance of being equaled or exceeded base flood level in any given year (Ref. 26, pp. 1-2). The containment factor value of 10 is assigned to Source No. 6 (Ref. 1, Table 4-2).

Because containment for this source is greater than zero, the following substances associated with the source can migrate via the Surface Water Pathways (Ref. 1, Sec. 4.1.2.1.2.1.1):

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Beryllium
- Chrysene
- Cobalt
- Dibenz(a,h)anthracene
- Dibenzofuran
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Methylnaphthalene, 2-
- Naphthalene
- Phenanthrene
- Pyrene

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Tier A

The total Hazardous Constituent Quantity for Source 6 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, pp.

51590-51591, Section 2.4.2.1.1). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) are 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 calculate a total or partial Hazardous Constituent Quantity estimate for Source 6 with reasonable confidence.

Hazardous Constituent Quantity Value (S): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No

2.4.2.1.2. Hazardous Wastestream Quantity – Tier B

The total Hazardous Wastestream Quantity for Source 6 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, p. 51591, Section 2.4.2.1.2). Insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, annual reports, etc.) are available to adequately calculate the total or partial mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity for Source 6 with reasonable confidence.

Hazardous Wastestream Quantity Value (W): Not Calculated
Are the data complete for hazardous constituent quantity for this area? No.

2.4.2.1.3. Volume – Tier C

The volume of Source 6 can be adequately determined based on a one time capacity volume, and not the actual contents of the source (Ref 1, Sec. 2.4.2.1.3).

According to the December 2002 IM/RA agreed order the Former Water Pit 3 was closed by using a hydraulic excavator to break a wide gap in the earthen berm separating it from the Mermentau River bottomland directly east of the water pit (Ref. 5, p. 21). Upon removal of the segment of the earthen berm, water from the Mermentau River flowed into Water Pit 3, raising the level of the water in the pit to approximately four (4) feet deep (Ref. 5, pp. 8, 21). Thus, linking the Former Water Pit 3 with the designated wetland area to the immediate west (Figure 2). In addition, there is no evidence to indicate Former Water Pit 3 (former water pit) was lined with an artificial liner, since the impoundment consisted of a local (native) clay bottom (Ref. 24, pp. 8 & 107).

Based on the IM/RA information available the one time volume capacity volume can be determined for Former Water Pit 3 (surface impoundment). The dimensions for Former Water Pit 3 are approximately 283 feet x 55 feet x 6 feet; therefore, it occupied approximately 93,390 cubic feet (ft^3) (Ref. 4, pp. 16 & 30; Ref. 6, p. 8; Figure 2).

The most common value used for cubic yards to cubic feet volume conversion is 1 yd^3 = 27 ft^3. The estimated source volume of Former Water Pit 3 is 3,458.89 yd^3.

93,390 ft^3 / 27 ft^3 per 1 yd^3 = 3,458.89 yd^3

The hazardous waste quantity evaluation equation for a surface impoundment is V/2.5 (Ref. 1, Table 2-5). The volume source will be assigned a volume hazardous waste quantity value of 1,383.56.

3,458.89 yd^3 / 2.5 = 1,383.56

Volume of Source (yd^3): 3,458.89
Reference(s): Ref. 1, Table 2-5, p. 51591
Volume Assigned Value: 1,383.56

2.4.2.1.4. Area – Tier D

Area was not calculated by reason of Source 6 yielding a volume that can be assigned a value. Therefore, area is assigned a value of 0 and scoring will be based on the evaluation of volume according to the HRS (Ref. 1, Sec. 2.4.2.1.3).

Area of source (ft^2): Not calculated
Area Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

Source No. 6, Water Pit 3.

Measures	Surface Water, Ground Water and Air Pathways
Tier A	NC
Tier B	NC
Tier C	1,383.56
Tier D	NC
Assigned Source Hazardous Waste Quantity Value (Ref. 1, Sec. 2.4.2.1.5)	1,383.56

NC: Not Calculated
The highest value assigned to either Tier A, Tier B, Tier C, or Tier D is assigned as the Source No. 6 Hazardous Waste Quantity Value (Ref. 1, Section 2.4.2.1.5). The highest value assigned is Tier C.

Source No. 6 Hazardous Waste Quantity Value: 1,383.56
2.4.2.2.5 Calculation of Hazardous Waste Quantity Factor Value

SITE SUMMARY OF SOURCE DESCRIPTIONS

			Containment			
	Source Hazardous Waste Quantity Value				Air	
Source No.	Surface Water Migration Pathway	Soil Exposure Pathway	Ground Water	Surface Water	Gas	Air Particulate
1	1,827.79	NS	NS	10	NS	NS
2	1,230.77	NS	NS	10	NS	NS
3	882.69	NS	NS	10	NS	NS
4	65.44	NS	NS	10	NS	NS
5	9,615.38	NS	NS	10	NS	NS
6	1,383.56	NS	NS	10	NS	NS
Total	15,005.63					

NS: Not Scored

Other Possible Sources

Other possible sources at SBA include a buried barge/associated alkyne storage tank pump house and stained soils (Figure 2). The buried barge and associated alkyne storage tank pump house are located on the eastern portion of the property, south of the barge slip and west of the partially buried barge (Figure 2). The tank and equipment were used in the barge cleaning process, but not part of the RCRA facility investigation study performed in 1996. Contents of the alkyne storage pump house have been observed leaking into the wetlands located to the southwest and are evident by the stained soils west of the buried barge (Ref. 4, pp. 34-35 & 135-140; Ref. 7, pp. 27, 40-41 & 94-95).

During the 2013 SI one sludge sample Location SBA-038, was collected from southwest corner of the tank area (Ref .4, pp. 34, 57, 135-139 & 1024). Again in 2014, during the ESI another sample was collected from the stained soil observed near the alkyne storage tank building, Location SBA-ESI-14 (Ref. 7, pp. 27, 50, 94-95 & 980). Hazardous substances related to the buried barge and associated alkyne storage tank pump house are numerous PAHs and the chlorinated PCB, Aroclor-1254 (Ref. 4, p. 35, 70-71 & 218-225). Hazardous substances related to the stained soils originating from the buried barge and alkyne storage tank pump house are Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) (Ref. 7, pp. 27, 40-41, 57 & 279-282). In October 2014, two samples were collected to assess the contents of the buried barge, the threat posed to the nearby wetland and the Mermentau River, and the necessary steps to mitigate that threat (Ref. 38, p. 2). Samples collected from the barge indicated results of elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH) in the form of diesel (DRO) and motor oil range organics (ORO). Sample results confirmed that the removal should be funded as an Oil Pollution Act (OPA) removal action (Ref. 38, p. 2).

In May and June of 2015 an OPA removal was performed on the buried barged and associated alkyne storage tank pump house to remove the oily water waste that had been observed leaking (Ref. 38, p. 2). In June 2015, a composite sample of sludge was taken from three hatch openings on the north side of the buried barge, and a grab sample was taken from the diesel tank inside the barge for laboratory analysis and characterization of contents. Removal and offsite disposal of sludge contents that remained in the buried barge was postponed until sample characterization was complete (Ref. 38, p. 3). CERCLA wastes were identified in the analytical results of the sludge taken from the barge and diesel tank inside the barge (Ref. 38, pp. 3 & 5; Ref. 39, pp. 6-17). Thus, additional CERCLA wastes identified at the site will be addressed using CERCLA funding and authority (Ref. 38, p. 5).

Another potential source at SBA include contaminated soil located in an area south of Source No. 3 (water pit 1) and west of Source No. 2 (oil pit) (Figure 2). The contaminated soil, as delineated by samples SBA-005, SBA-006, SBA-010, and SBA-011, is located south of where wastes from the barge cleaning operations were managed in a waste management area that included the former Oil Pit. Water Pit 2, a land treatment unit (LTU) and storage tanks (Figure 3). Six soil samples were collected from three locations in this locale during the 2014 SI, Location SBA-006, SBA-010 and SBA-011(Figure 3; Ref. 4, pp. 31, 57, 988-989 & 995-998). The following samples were collected:

- Location SBA-006, Sample SBA-006-24: Collected approximately 2-4 feet bgs; clay; grey-ish tan with dark streaks; PID: 0.4 ppm; Visible hydrocarbon, oil material (Ref. 4, p. 988)
- Location SBA-006, Sample SBA-006-WT: Collected approximately 14-16 feet bgs and above the water table; clay with some silt, tan, orange mottled; PID: 7.8 ppm; no visible hydrocarbon, oil material (Ref. 4, p. 989).
- Location SBA-010, Sample SBA-010-PD: Collected approximately 6-8 feet bgs at the highest PID reading, 2.9 parts per million (ppm); silty clay; reddish brown; no visible hydrocarbon, oil material (Ref. 4, p.995).
- Location SBA-010, Sample SBA-010-WT: Collected approximately 8-10 feet bgs above the water table; sand-silt and clay; reddish-brown; no visible hydrocarbon, oil material (Ref. 4, p.996).
- Location SBA-011,Sample SBA-011-PD: Collected approximately 8-10 feet bgs at the highest PID reading; silt; tan; loose soft dry; no visible hydrocarbon, oil material (Ref. 4, p, 997)
- Location SBA-011, Sample SBA-011-WT: Collected approximately 8-10 feet bgs above the water table; clay; orange/tan mottled; dense plastic; no visible hydrocarbon, oil material (Ref. 4, p. 998).

Hazardous substances associated with the soil samples collected south of the former Oil Pit, Water Pit 2, a land treatment unit (LTU) and storage tanks are PAHs, VOCs and various metals at depths ranging from 2 to 4 feet, 6 to 8 feet, 8 to 10 feet and 14 to 16 feet bgs (Ref. 4, pp. 74-79, 344-359 & 492-526). Although there is no evidence to indicate that this area was used in the management of waste during barge cleaning operations at SBA, these constituents are also detected in surrounding sources that were used as waste management areas at SBA during operations including the Oil Pit, Water Pit 1 and the Land Treatment Unit (LTU) (Sources 2, 3 and 4 respectively).

SURFACE WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

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

General Considerations:

Four probable points of entries (PPEs) have been identified:

- PPE 1 is a zone located on the eastern portion of the SBA property along the man-made structure between the dry dock and Mermentau River (Figure 4).
- PPE 2, located directly north of the partially buried barge is a zone where the overland flow meets the barge slip, is also located on the eastern portion of the property and a probable entry point from Source No. 1. (Figure 4).
- PPE 3 is a segment along where the partially buried barge and former water pit 3 (Sources No.1 & 6), have been reported to have discharged into the adjacent wetlands along a perennial drainage ditch which runs on the property from the northwest, through the wetlands and drains to the Mermentau River (Ref. 6, p. 13; Ref. 20, pp. 4 & 5; Ref. 24, pp. 5, 10 & 128; Figure 4). Surface run-off from Sources No. 2, 3, & 4 eventually flow into a segment of PPE-3 , the depressed area of the drainage ditch that flows through the wetland that drains to the Mermentau River (Ref. 24, p. 5,107 & 128; Ref. 20, pp. 4-5; Figure 5).
- PPE 4 is a zone located along the eastern edge of former water pit 3 (Source No. 6) (Figure 4). The former water pit 3 was closed by using a hydraulic excavator to break a wide gap in the earthen berm separating it from the Mermentau River bottomland directly east of the water pit (Ref. 5, pp. 8 & 21). Upon removal of the segment of the earthen berm, water from the Mermentau River flowed into the former water pit 3, raising the level of the water in the pit to approximately four (4) feet deep (Ref. 5, pp. 8, 21 & 24). Thus, linking the former surface impoundment with the designated wetland area to the immediate west (Figure 2).

Contamination could have entered the Mermentau River anywhere along the boundary of the perennial drainage ditch, wetlands, barge slip or dry dock and PPE 1 releases directly to the Mermentau River from the dry dock (Source No. 5). The migration route of all sources and PPEs eventually flow toward and into the Mermentau River (Figure 5). From this point, PPE 1, the Mermentau River flows for approximately 10.2 miles until it enters Lake Arthur. The remainder of the 15-mile Target Distance Limit (TDL) for the surface water migration pathway is located in Lake Arthur (Figure 6).

Surface Water Pathway Description for Each Source		
Source No	**Pathway Description**	**PPE**
1	A Partially Buried Barge located on the southeast portion of the property, north of a designated wetland area. Distance to the PPE-2 is approximately 25 feet and distance to PPE-3 is approximately 35 feet (Ref. 5, p . 24; Figure 2 & 4)	PPE 2 Zone adjacent to the Barge Slip that is part of the Mermentau River. PPE 3: A segment of the drainage ditch that flows through the Palustrine Forested Wetlands contiguous with Mermentau River.
2	Former Oil Pit located on the southeast portion of the property, northwest of a designated wetland area. Distance to the PPE is approximately 60 feet (Ref. 5, p.	PPE 3: A segment of the drainage ditch that flows through the Palustrine Forested Wetlands contiguous with Mermentau River.

Surface Water Pathway Description for Each Source		
	24: Ref. 24, p. 12; Figure 2 & 4)	
3	Former Water Pit 1 located on the southeast portion of the property, northwest of a designated wetland area. Distance to the PPE is approximately 122 feet (Ref. 24, p. 12; Figure 2 & 4)	PPE 3: A segment of the drainage ditch that flows through the Palustrine Forested Wetlands contiguous with Mermentau River.
4	A former LTU located west of Source No. 3 on the southeast portion of the property, northwest of a designated wetland. Distance to the PPE is approximately 261 feet (Ref. 24, p. 12; Figure 2 & 4)	PPE 3: A segment of the drainage ditch that flows through the Palustrine Forested Wetlands contiguous with Mermentau River.
5	A Dry (Graving) Dock is located on the eastern edge of the property adjacent to the Mermentau River (Ref. 5, p. 24; Figure 2 & 4)	PPE 1: A zone of water flow around/under the man-made structure along the east side of the dry dock.
6	Former Water Pit 3 located on the southeast portion of the property, bordering a designated wetland area to the east. Distance to the PPE-3 is approximately 71 feet. (Ref. 24, p. 12; Figure 2 & 4)	PPE 3: A segment of the drainage ditch that flows through the Palustrine Forested Wetlands contiguous with Mermentau River. PPE 4 A zone along the Palustrine Forested Wetlands contiguous with Mermentau River.

Definition of In-Water Segments

The in-water segment of the 15 mile TDL consists of the most upstream point of PPE 1 and the most downstream point of PPE 4, from which the 15 mile TDL starts. The Mermentau River flows for approximately 10.2 miles of the 15 mile TDL until it enters Lake Arthur (Figure 6).

Segment 1

Mermentau River, consisting of the branch segments which include PPE 1, the barge slip and the wetlands to sample location SBA-030, flows for approximately a quarter mile of the 15 TDL (Figure 5). PPEs 2, 3 and 4 flow into this segment. A United States Geological Survey (USGS) gauging station 08012150, located in Jefferson Davis Parish in Mermentau, Louisiana has an average annual flow rate of the Mermentau River as measured for water years 1990 through 2015 of 1,976 cubic feet per second (cfs) (Ref. 11, pp. 1-2). USGS gauging station, 08012150, is located approximately 3.0 miles upstream of site on the Mermentau River at latitude 30^{o} 11'24.00" North and longitude 92^{o} 35' 26.00" West (Ref. 11, p. 1). A large stream to river with an average stream flow greater than 1,000 cfs to 10,000 cfs receives a dilution value of 0.001 (Ref. 1, Table 4-13).

The Mermentau consists of an upper and lower portion. The Mermentau at the upper end of Lake Arthur is considered the upper Mermentau River and the lower Mermentau River is located at the lower end of Grand Lake (Ref. 17, pp. 3 & 8). During low flows the hydraulic system of the lower Mermentau River is affected by water levels in the Gulf of Mexico and by operation of several Corp of Engineer control structures in the lower Mermentau Basin (Ref. 17, p. 10). The lower Mermentau River is tidal downstream of the Catfish Point Control Structure, at the outlet of Grand Lake into the lower Mermentau River (Ref. 27, p. 11). During low river flows the system upstream of the closed control structures can be viewed as a large storage basin with no tidal influence, and at higher river flows when the structures are opened tidal effects are temporarily reduced in a local portion of the system (Ref. 27, p. 11). When Gulf water levels are abnormally high tidal influences and salinity intrude through the myriad of small bayous and canals, this intrusion has a minor influence on the primary lakes and inland

waterways (Ref. 27, p.11). The upper Mermentau River lies north of the designated Louisiana saltwater line definition provided by Louisiana Department of Wildlife and Fisheries (LDWF) (Ref. 14, p. 16).

Segment 2

The remainder of the 15-mile TDL surface water migration pathway starts at and continues into Lake Arthur. No published average flow data is available for Lake Arthur. The flow rate at the target location was assigned a dilution weight based on the sum of the average annual flows for the headwaters of Bayou Lacassine near Lake Arthur and the Mermentau River (Ref. 11, pp. 1-2; Ref. 12, pp. 1-2). According to gauging station 08012470 located at Bayou Lacassine near Lake Arthur, Louisiana the average annual flow rate of Bayou Lacassine as measured for water year 1988 through 2005 is 594 cfs.

Lake Arthur will be assigned the average flow rate of 2,570 cfs, based on Bayou Lacassine average annual flow rate and the Mermentau River average flow rate. Thus, this segment will be considered to be a large stream to river and will be assigned a dilution value of 0.001 (Ref. 1, Table 4-13).

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Direct Observation:

Two (2) sediment samples were collected, one during the August 2013 SI and the other during the September 2014 ESI, to identify and assess the migration and observed release by direct observation of contamination in the surface water pathway from Former Water Pit 3 (Source No. 6) and associated with PPE 4 (Figures 3 & 4). Former Water Pit 3 was closed according to the December 2002 IM/RA by using a hydraulic excavator to break a wide gap in the earthen berm separating it from the Mermentau River bottomland directly east of the water pit (Ref. 5, pp. 8 & 21). Upon removal of the segment of the earthen berm, water from the Mermentau River flowed into Former Water Pit 3 (former water pit), raising the level of water in the pit to approximately four (4) feet deep (Ref. 5, pp. 8, 21 & 24). Thus, making Former Water Pit 3 combined with the designated wetland area to the immediate west and being designated not only as a source but an observed release by direct observation to the wetlands based on prior documentation of contamination in Water Pit 3 (Ref. 4, pp. 642-644). The following samples were collected:

- Sample SBA-032SD –oily matrix; glades of oil; light gray; clayey; collected at 2 to 3 inches below ground surface (Ref. 4, pp. 117-118 & 1018). See Table 11 for observed release sample concentrations.

- Sample SBA-ESI-10SD – noticeable hydrocarbon odor; contained a sizeable amount of organic debris (Ref. 7, pp. 135-136, 164 & 976). See Table 12 for observed release sample concentrations.

The release sediment samples along PPE 4 contained concentrations of PAHs that met observed release by direct observation criteria (Ref. 1, Table 2-3) were: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene,

chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene (Tables 11 & 12).

Chemical Analyses:

Sediment samples (SBA-24SD, SBA-25SD, SBA-029SD and SBA-30SD) and wetland samples (SBA-32SD, SBA-33SD and SBA-39SD) collected during the August 2013 SI, were compared to the representative background samples (sediment sample SBA-28SD and wetland sediment sample SBA-31SD) also collected during that specific sampling event (Table 11). Background sediment sample SBA-28SD was collected off-site, from the bank of the Mermentau River located approximately 275 feet northeast of the facility entrance (Ref. 4, p. 27; Figure 5). SBA-28SD was designated as a background sediment sample since no organic or volatile organic compounds were detected (Ref. 4, p. 28 & 246-250). SBA-31SD was collected southwest of the source areas and is considered the background sample for the wetlands as analysis of the sample did not detect any organic or volatile organic constituents (Ref. 4, pp. 43 & 634-639; Figure 5). See Table 11 for background sediment and wetland samples, and observed release sample concentrations.

Respectively, sediment samples (SBA-ESI-04, SBA-ESI-05 and SBA-ESI-06) and wetland samples (SBA-ESI-10 and SBA-ESI-11) collected during the September 2014 ESI were compared to the representative background samples (sediment samples SBA-ESI-01 and SBA-ESI-02 and wetland sediment samples SBA-ESI-08 and SBA-ESI-09) also collected during that specific sampling event (Table 12). Background sediment samples SBA-ESI-01 and SBA-ESI-02 were collected off-site along the Mermentau River approximately 500 to 600 feet upstream from the shoreline of the site (Ref. 7, p. 25; Figures 5). Sample location SBA-ESI-01 is located northeast of the site approximately 600 feet upstream and along the main/shipping channel of the Mermentau River (Ref. 7, p. 25; Figure 5). SBA-ESI-02 is located northwest and approximately 500 feet upstream and along the original river channel (Ref. 7, p. 25; Figure 5). No semi-volatile organics analytes were detected in either background sediment sample, SBA-ESI-01SD or SBA-ESI-02SD (Ref. 7, pp. 26 & 201-206). Background sediment samples, SBA-ESI-08 and SBA-ESI-09, were collected along the downstream wetland boundary of the site (Ref. 7, p. 34; Figure 5). Sediment sample SBA-ESI-08 was collected along the west bank of the Mermentau River along the wetland boundary in an area subject to sediment build up, and sediment sample SBA-ESI-09 was collected off-site long the east bank of the Mermentau River along the wetland boundary (Ref. 7, p. 34; Figure 5). Given no semi-volatiles constituents were detected in either sediment sample collected along the wetland boundary of the Mermentau River, SBA-ESI-08 and SBA-ESI-09 were defined as background sediment samples (Ref. 7 p. 34 & 192-197; Figure 5). See Table 12 for background sediment and wetland samples, and observed release sample concentrations.

Two (2) sediment samples were collected, one during the August 2013 SI and the other during the September 2014 ESI, to identify and assess the migration of contamination in the surface water pathway from the Dry Dock (Source 5) and associated with PPE 1 (Figures 3 & 4). The following samples were collected:

- Sample SBA-029SD – sediment sample from north of Dry Dock Slip (Ref .4, p. 41)
- Sample SBA-ESI-04SD – collected down gradient of the Dry Dock (Ref. 7, p. 33)

The release sediment samples associated with the Dry Dock and PPE 1 contained concentrations of

PAHs that met observed release criteria (Ref. 1, Table 2-3) were: chrysene, fluoranthene, fluorene, phenanthrene and pyrene (Table 12).

Three (3) sediment samples collected during the August 2013 SI and two (2) sediment samples collected during the September 2014 ESI were collected from within the barge slip from five separate locations upstream and downstream of PPE 2 to assess the migration of contamination in the surface water pathway from former SBA (Ref. 19, p. 9). The following samples were collected:

- Sample SBA-024SD – collected at the NW corner of the Barge Slip (Ref. 4, pp. 33 & 112)
- Sample SBA-025SD – hydrocarbon sheen (Ref. 4, pp. 33 & 113)
- Sample SBA-030SD – near the Barge Slip on the Mermentau River (Ref. 4, p. 111)
- Sample SBA-ESI-05SD – collected in the western section of the barge slip (Ref. 7, pp. 33 & 114-117)
- Sample SBA-ESI-06SD – collected in the eastern section of the barge slip (Ref. 7, pp. 33 & 118-121)

The release sediment sediments from the barge slip, PPE 2, detected numerous PAHs that met observed release criteria (Ref. 1, Table 2-3) were: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene above three times the concentration in background sediment levels (Tables 11 & 12).

Three (3) sediment samples were collected, two during the August 2013 SI (SBA-033 and SBA-039) and one during the September 2014 ESI (SBA-ESI-11SD) from the wetlands located south and northeast of SBA former operations to identify and assess the migration of contamination in the surface water pathway from the Partially Buried Barge (Source 1) and former surface impoundments (Sources No. 2, 3, 4 and 6), and associated with PPE 3 (Ref. 4, p. 57; Ref. 7, p. 50; Figures 3 & 5). The following samples were collected:

- Sample SBA-033 – collected east of the impoundment areas and south of the Partially Buried Barge (Ref. 4, p. 119)
- Sample SBA-039 – collected east of the Partially Buried Barge (Ref. 4, pp. 120)
- Sample SBA-ESI-11SD – collected northeast of former Water Pit 3 in wetland; noticeable hydrocarbon odor; hydrocarbon sheen observed on surface of water (Ref. 7, pp. 137-138 & 164).

The release sediment samples along PPE 3 contained concentrations of PAHs that met observed release criteria (Ref. 1, Table 2-3) were: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene (Tables 11 & 12).

During a 1994 compliance evaluation and sampling inspection tasked by the EPA, two samples were collected from the Former Water Pit 3 and analyzed for volatiles, semi-volatiles, total metals, TCLP volatiles, semi-volatiles and metals, and ignitability (Ref. 24, pp. 18 & 114). VOCs such as benzene, ethylbenzene, methylene chloride, toluene, 1,1,2 –trichloroethane and xylene were detected (Ref. 24, p.

135). In, addition PAHs such as acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene were detected in Water Pit 3(Ref. 24, p. 136). Total metals detected in the sludge/sediment samples collected from Water Pit 3 included silver, arsenic, cadmium, chromium, copper, mercury, nickel, lead, antimony, selenium, thallium and zinc (Ref. 24, p. 137).

Samples SBA-24SD, SBA-025SD, SBA-029SD, SBA-030SD, SBA-033 and SBA-039 were sent to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for Target Compound List (TCL) Volatile Organic Analysis (VOAs) by EPA method CLP SOW SOM01.2(method used -CLP OLM04.2 – GC/MS), TCL Semi-Volatile Organic Analysis (SVOAs) by EPA method CLP SOW SOM01.2 (method used - CLP OLM04.2 – GC/MS), TCL Pesticide/PCBs by EPA method CLP SOW SOM01.2 (method used – CLP OLM04.2 – GC/ECD), TAL Cyanides by EPA method CLP SOW ILM05.4 (method used 335.4 – Colorimetric), and TAL Total Metals + Mercury by EPA method CLP SOW ILM05.4 (methods used - CLP ILM05.3 – ICP, CLP ILM05.3 – ICP/MS, CLP ILM05.3 – CVAAS) (Ref. 4, pp. 22-23, 47, 230-243, 262-275, 640-647, 648-655, 658-660,).

Samples SBA-ESI-04SD, SBA-ESI-05SD, SBA-ESI-06SD, and SBA-ESI-11SD were shipped to the U.S. EPA Laboratory in Houston for analysis, data review and data validation for TCL SVOAs by EPA method CLP OLM04.2 – GC/MS (Ref. 7, pp. 22, 183-189, 210-218,).

An observed release by chemical analysis of the sediment samples collected at and down gradient of PPE 1, within the barge slip for PPE 2, along the drainage ditch of PPE 3 that flows through the wetland and finally into the Mermentau River is analytical evidence of a hazardous substance in the media significantly above background and attribution of at least part of the increase to the site.

Table 11 – Site Inspection Background and Release Samples

EPA/START Sample No.:	SBA-28SD			SBA-029SD		SBA-24SD		SBA-25SD		SBA-30SD		SBA-31SD			SBA-33SD		SBA-39SD		SBA-32SD	
EPA Laboratory Sample No.:	1308016-03			1308016-05		1308016-01		1308016-02		1308016-06		1308020-26			1308020-28		1308020-29		1308020-27	
Sample Location:	Sediment Background			(PPE 1) Sediment		(PPE 2) Barge Slip NW Sediment		(PPE 2) Barge Slip N Sediment		(PPE 2) Sediment		Wetland Background			(PPE 3) Wetland		(PPE 3) Wetland		(PPE 4) Wetland	
% Solids:	69.74%			70.49%		71.26%		56.39%		69.98%		53.54%			73.91%		17.25%		62.29%	
Units:	Result	RL	3x Bkgd. or > RL	Result	RL	Result	RL	Result	RL	Result	RL	RL	Result	3x Bkgd. or > RL	Result	RL	Result	RL	Result	RL
Analyte: SVOCs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/Kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Acenaphthene	U	286	286 (RL)	U	283	**1270**	279	U	346	U	278	367	U	367 (RL)	U	2410	U	1130	**7520**	311
Benzo (b) fluoranthene	U	715	715 (RL)	1510 J (151)*	707	**4100**	697	**22500**	8660	**4450**	695	918	U	918 (RL)	**53,200**	30100	U	2820	**12700**	3890
Benzo (g,h,i) perylene	U	715	715 (RL)	1750 J (175)*	707	**2860**	697	**11000**	866	**2990**	695	918	U	918 (RL)	**32,900**	30100	U	2820	**7620**	3890
Benzo (k) fluoranthene	U	715	715 (RL)	976 J (97.6)*	707	**2950**	697	**16300**	8660	**2640**	695	918	U	918 (RL)	**38,600**	30100	U	2820	**6900**	3890
Acenaphthylene	U	286	286 (RL)	U	283	**621**	279	**3000**	346	**376**	278	367	U	367 (RL)	**3,980**	2410	U	1130	**6900**	3890
Carbazole	U	715	715 (RL)	U	707	U	697	2880 J (288)*	866	U	695	918	U	918 (RL)	**119000 J (11900)***	6010	U	2820	2540 J (254)*	778
Chrysene	U	715	715 (RL)	1040 J (104)*	707	**5240**	697	**19200**	8660	**9130**	695	918	U	918 (RL)	**44400**	6010	U	2820	**12800**	3890
Dibenzofuran	U	715	715 (RL)	U	707	U	697	**1860**	866	U	695	918	U	918 (RL)	**9960**	6010	U	2820	**3340**	778
Dibenz (a,h) anthracene	U	715	715 (RL)	U	707	**712**	697	**3780**	866	**852**	695	918	U	918 (RL)	6720 J (672)*	6010	U	2820	2070 J (207)*	778
Anthracene	U	286	286 (RL)	873 J (87.3)*	283	**1030**	279	**4750**	3460	278 J (27.8)*	278	367	U	367 (RL)	**353000**	12000	U	1130	**21400**	1560
Fluoranthene	U	286	286 (RL)	418 J (41.8)*	283	**8440**	279	**33600**	3460	2110 J (211)*	278	367	U	367 (RL)	**52200**	2410	U	1130	**20300**	1560
Fluorene	U	286	286 (RL)	U	283	**395**	279	**2330**	346	U	278	367	U	367 (RL)	**32000**	2410	U	1130	**10500**	311
Indeno (1,2,3-cd) pyrene	U	715	715 (RL)	1630 J (163)*	707	**3090**	697	**12900**	866	**3490**	695	918	U	918 (RL)	**38300**	30100	U	2820	**8830**	3890
2-Methylnaphthalene	U	286	286 (RL)	U	707	U	279	**700**	346	U	278	367	U	367 (RL)	**5970**	2410	U	1130	**1880**	311
Naphthalene	U	286	286 (RL)	U	283	U	279	**4170**	346	U	278	367	U	367 (RL)	**10600**	2410	U	1130	**786**	311
Phenanthrene	U	286	286 (RL)	U	283	**404**	279	**21400**	3460	285 J (28.5)*	278	367	U	367 (RL)	**61000**	2410	U	1130	**26600**	1560
Pyrene	U	286	286 (RL)	903 J (90.3)*	283	**12600**	279	**33700**	3460	**4780**	278	367	U	367 (RL)	**62000**	2410	U	1130	**21800**	1560
Benzo (a) anthracene	U	715	715 (RL)	U	707	**3470**	697	**16000**	866	**3680**	695	918	U	918 (RL)	**27500**	6010	U	2820	**8910**	3890
Benzo (a) pyrene	U	715	715 (RL)	1630 J (163)*	707	**5500**	697	**21000**	8660	**5120**	695	918	U	918 (RL)	**50800**	30100	U	2820	**13800**	3890

Key:

µg/kg = Concentrations in microgram per kilogram
Bkgd - Background
N - North
NW - Northwest
PPE - Probable Point of Entry
RL - Reporting Limit
SD - Sediment
U - Undetected

tification of the analyte is acceptable; The reported value is an estimate (Ref. 4, p. 865). The reported values for the SVOCs detected in sample SBA-029SD are biased unknown (Ref. 4, pp. 181, 262-265). The reported values for carbazole in samples SBA-35SD, SBA-32SD, and SBA-33SD are sed unknown (Ref. 4, pp. 181, 238, 642 & 650). The reported value for Dibenz (a,h) anthracene in samples SBA-32D and SBA-33SD are biased unknown (Ref.4, pp. 181, 251 & 643).
ected concentration was adjusted by using the guidance document "*Using Qualified Data to Document an Observed Release and Observed Contamination*" (Ref. 31, pp. 8, 14-15). After adjusting the value for the qualified data to reflect he possible bias, the concentration of the analyte still meets th uirement for an observed release by chemical analysis.

References

Chain of Custody:	Ref. 4, p. 160	Ref. 4, p. 160	Ref. 4, p. 160	Ref. 4, p. 160	Ref. 4, p. 160 - 161	Ref. 4, p. 172	Ref. 4, p. 172	Ref. 4, p. 172	Ref. 4. p. 172
Laboratory Results:	Ref. 4, pp. 246-251	Ref. 4, pp. 262-267	Ref. 4, pp. 230-235	Ref. 4, pp. 238-243	Ref. 4, pp. 270-275	Ref. 4, pp. 634-639	Ref. 4, pp. 650-655	Ref. 4, pp. 658-663	Ref. 4. pp. 642-647
Data:	Ref. 4, pp. 246-250; Ref. 52	Ref. 4, p. 181, 262-264, & 865; Ref. 31, pp. 8, 14-15; Ref. 52	Ref. 4, pp. 230-235; Ref. 52	Ref. 4, pp. 181, 238 & 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, pp. 270-275; Ref. 52	Ref. 4, pp. 634-639; Ref. 52	Ref. 4, pp. 181, 650-651 & 865; Ref. 31, pp. 8 & 14; Ref. 52	Ref. 4, pp. 658-660 & 662; Ref. 52	Ref. 4, pp. 181, 642-643, 865; Ref. 31, pp. 8 & 14: Ref. 52

Table 12 – Expanded Site Inspection Background and Release Samples

EPA/START Sample Number:	**SBA-ESI-01SD**			**SBA-ESI-02SD**			**SBA-ESI-04SD**			**SBA-ESI-05SD**			**SBA-ESI-06SD**		
EPA Laboratory Sample No.:	**1409034-01**			**1409034-02**			**1409034-04**			**1409028-01**			**1409028-02**		
Sampling Location:	**SBA-ESI-01**			**SBA-ESI-02**			**SBA-ESI-04**			**SBA-ESI-05**			**SBA-ESI-06**		
Sample Description:	**Sediment Background along the main shipping channel**			**Sediment Background along the original river channel**			**(PPE 1) Sediment downstream from Dry dock**			**(PPE 2) Sediment in Barge Slip**			**(PPE 2) Sediment in Barge Slip**		
% Solids:	**67.42%**			**41.91%**			**64.21%**			**40.04%**			**45.14%**		
Units:	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Analyte: SVOCs	Result	Flag	RL	Result	Flag	RL	Result	Flag	RL	Result	Flag	RL	Result	Flag	RL
2-Methylnaphthalene	277	U	277	476	U	476	293	U	293	486	U	486	430	U	430
Acenaphthene	277	U	277	476	U	476	293	U	293	**1110**	U	486	430	U	430
Acenaphthylene	277	U	277	476	U	476	293	U	293	486	U	486	430	U	430
Anthracene	277	U	277	476	U	476	293	U	293	486	U	486	430	U	430
Benzo (a) anthracene	693	U	693	1190	U	1190	732	U	732	**2120**		1210	**1390**		1080
Benzo (a) pyrene	693	U	693	1190	U	1190	732	U	732	**1830**		1210	**1460**		1080
Benzo (b) fluoranthene	693	U	693	1190	U	1190	732	U	732	**1940**		1210	**1740**		1080
Benzo (g,h,i) perylene	693	U	693	1190	U	1190	732	U	732	1210	U	1210	1080	U	1080
Benzo (k) fluoranthene	693	U	693	1190	U	1190	732	U	732	**1560**		1210	**1350**		1080
Carbazole	693	U	693	1190	U	1190	732	U	732	1210	U	1210	1080	U	1080
Chrysene	693	U	693	1190	U	1190	**760**		732	**3840**		1210	**2260**		1080
Dibenz (a,h) anthracene	693	U	693	1190	U	1190	732	U	732	1210	U	1210	1080	U	1080
Dibenzofuran	693	U	693	1190	U	1190	732	U	732	1210	U	1210	1080	U	1080
Fluoranthene	277	U	277	476	U	476	**1040**		293	**4630**		486	**2890**		430
Fluorene	277	U	277	476	U	476	**381**		293	**1480**		486	430	U	430
Indeno (1,2,3-cd) pyrene	693	U	693	1190	U	1190	732	U	732	1210	U	1210	1080	U	1080
Naphthalene	277	U	277	476	U	476	293	U	293	486	U	486	430	U	430
Phenanthrene	277	U	277	476	U	476	**1200**		293	**4850**		486	**1530**		430
Pyrene	277	U	277	476	U	476	**808**		293	**3990**		486	**2430**		430

Key:

BOLD - Concentration detected is significantly above the background concentration or the Reporting Limits
PPE -Probable Point of Entry into Surface Water
U - Undetected at Reporting Limit
RL - Reporting Limit

References					
Chain of Custody:	Ref. 7, p. 170	Ref. 7, p. 170	Ref. 7, p. 170	Ref. 7, p. 169	Ref. 7, p. 169
Laboratory Results:	Ref. 7, pp. 201-203	Ref. 7, pp. 204-206	Ref. 7, pp. 210-212	Ref. 7, pp. 183-185	Ref. 7, pp. 186-189
Data:	Ref. 7, pp. 201-203; Ref. 52	Ref. 7, pp. 204-206; Ref. 52	Ref. 7, pp. 210-212; Ref. 52	Ref. 7, pp. 183-185; Ref. 52	Ref. 7, pp. 186-189; Ref. 52

Table 12 (continued) – Expanded Site Inspection Background and Release Samples

EPA/START Sample Number:	**SBA-ESI-08SD**			**SBA-ESI-09SD**			**SBA-ESI-11SD**			**SBA-ESI-10SD**		
EPA Laboratory Sample No.:	**1409028-04**			**1409028-05**			**1409034-06**			**1409034-05**		
Sampling Location:	**SBA-ESI-08**			**SBA-ESI-09**			**SBA-ESI-11**			**SBA-ESI-10**		
Sample Description:	**Sediment Background along wetland boundary on right descending bank of river**			**Sediment Background along wetland boundary on left descending bank of river**			**(PPE 3) Wetland Sediment NE of Former Water Pit 3**			**(PPE 4) Wetland Sediment SE of Former Water Pit 3**		
% Solids:	**35.36%**			**60.85%**			**57.57%**			**26.10%**		
Units:	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Analyte: SVOCs	Result	Flag	RL	Result	Flag	RL	Result	Flag	RL	Result	Flag	RL
2-Methylnaphthalene	543	U	543	307	U	307	**32,400**		1,520	**35,900**		5,490
Acenaphthene	543	U	543	307	U	307	**51,100**		1,520	**250,000**		5,490
Acenaphthylene	543	U	543	307	U	307	**8,820**		1,520	**46,400**		5,490
Anthracene	543	U	543	307	U	307	**1,190,000**		152,000	**1,040,000**		54,900
Benzo (a) anthracene	1360	U	1360	768	U	768	**114,000**		38,000	**664,000**		137,000
Benzo (a) pyrene	1360	U	1360	768	U	768	**92,100**		38,000	**507,000**		137,000
Benzo (b) fluoranthene	1360	U	1360	768	U	768	**107,000**		38,000	**484,000**		137,000
Benzo (g,h,i) perylene	1360	U	1360	768	U	768	**35,600**		34,200	**150,000**		137,000
Benzo (k) fluoranthene	1360	U	1360	768	U	768	**98,200**		38,000	**495,000**		137,000
Carbazole	1360	U	1360	768	U	768	308000 (30,800)*	J	38,000	16100 (1619)*	J	13,700
Chrysene	1360	U	1360	768	U	768	**177,000**		38,000	**822,000**		137,000
Dibenz (a,h) anthracene	1360	U	1360	768	U	768	10100 (1,010)*	J	3,800	**61,900**		54,900
Dibenzofuran	1360	U	1360	768	U	768	**57,600**		3,800	**157,000**		13,700
Fluoranthene	543	U	543	307	U	307	**413,000**		15,200	**1,540,000**		54,900
Fluorene	543	U	543	307	U	307	**173,000**		15,200	**510,000**		54,900
Indeno (1,2,3-cd) pyrene	1360	U	1360	768	U	768	**44,300**		38,000	**167,000**		137,000
Naphthalene	543	U	543	307	U	307	**15,000**		1,520	**9,140**		5,490
Phenanthrene	543	U	543	307	U	307	**477,000**		15,200	**1,590,000**		54,900
Pyrene	543	U	543	307	U	307	**297,000**		15,200	**1,380,000**		54,900

Key:

BOLD - Concentration detected is significantly above the background concentration or the Reporting Limits

µg/kg = micrograms per kilogram

RL - Reporting Limit

PPE -Probable Point of Entry into Surface Water

U - Undetected at Reporting Limit

J - The identification of the analyte is acceptable; The reported value is an estimate (Ref. 7, p. 251). The reported values for carbazole in samples SBA-ESI-10SD and ESI-11SD are biased unknown (Ref. 7, pp. 179, 213 and 216). The reported value for Dibenz (a,h) anthracene in sample SBA-ESI-11SD is biased unknown (Ref. 7, pp. 179 and 217).

* - The detected concentration was adjusted by using the guidance document "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 31, pp. 8 and 14). After adjusting the value for the qualified data to reflect the possible bias, the concentration of the analyte still meets the requirement for an observed release by chemical analysis.

References

Chain of Custody:	Ref 7, p .169	Ref. 7, p. 169	Ref. 7, p. 170	Ref. 7, p. 170
Laboratory Results:	Ref. 7, pp. 192-194	Ref. 7, pp. 195-197	Ref. 7, pp. 216-218	Ref. 7, pp. 213-215
Data:	Ref. 7, pp. 192-194; Ref. 52	Ref. 7, pp. 195-197; Ref. 52	Ref. 7, pp. 179, 216-217 & 251; Ref. 31, pp. 8 and 14; Ref. 52	Ref. 7, pp. 179, 213 and 251; Ref. 31, pp. 8 and 14; Ref. 52

Attribution:

SBA Shipyard previously used the property for construction, repair, retrofitting and cleaning of barges since the mid-1960's (Ref. 6, p.7). Three barge slips and a dry dock are located off the Mermentau River (Figure 2; Ref. 5, pp. 38-39; Ref. 6, p. 7). The slips were used to dock barges during cleaning or repair (Ref. 7, p. 13). Barges serviced by SBA typically held diesel, coal tar, crude oil, gasoline and asphalt (Ref. 6, p. 10). Mr. Smailhall stated that the facility had in the past cleaned barges which previously contained coal tar, and acknowledged in another statement that chlorinated solvents were used in the cleaning process in the past (Ref. 22, p. 3: Ref. 33, pp. 1-2). Also, Mr. Smailhall provided MSDS's for paints used on the barges for the previous two years (Ref. 34, pp. 2 & 80-235). Review of the MSDS revealed that the material was hazardous when discarded due to ignitability, and also the material exhibited the characteristic for methyl ethyl ketone (Ref. 34, p. 2). During the painting of barges, solvents used for cleaning painting equipment were saved and used to thin coatings applied to barges (Ref. 33, p. 2). Some barges held coal tar, creosote, miscellaneous chemicals or agricultural related materials such as tallow, corn oil or soybean (Ref. 32, p. 46).
SBA was an industrial location for waste and fuel storage associated with past barge cleaning operations (Ref. 6, p. 17). Wastes from the barge cleaning, for the most part, consisted of hydrocarbons (Ref. 6, p. 10). In addition to the hydrocarbons other waste streams on site included asphalt, creosote, methyl-methacrylate, methanol, caustic soda, styrene, coal tar, vinyl acetate, carbon tetra chloride, ethyl acrylate and acrylates (Ref. 41, p. 11; Ref. 44, pp. 162, 226, 232, 254, 274 & 379; Ref. 45, pp. 115 & 197; Ref. 46, pp. 9 & 203; Ref. 47, pp. 4, 15, 40, 50, 76, 78, 79, 125, 126, 236 & 241; Ref. 48, pp. 14, 16 & 388; Ref. 49, pp. 3, 33, 34, 38, 39, 110 & 236; Ref. 50, pp. 25, 130 & 133: Ref. 51, pp. 1-3 & 36-39). Waste samples taken from Water Pits 1, 2, and 3 were found to contain vinyl chloride, 1,2-dichloroethane, tetrachloroethylene, trichloroethylene, methylene chloride, methyl ethyl ketone, carbon tetrachloride, acetone and styrene (Ref. 35, pp. 6 -7; Ref. 37, pp .1, 4-12 & 19-41). Since approximately 1970, benzene, vinyl chloride, and carbon tetrachloride toxicity characteristic wastes were placed in Water Pit 1 and 2 (Ref. 35, p.10). Waste in some of the tanks were found to be characteristically hazardous based on benzene, 1,2-dichloroethane, tetrachloroethane, vinyl chloride or ignitability (Ref. 32, p. 46).

COCs at the site that are being scored are not normally found in petroleum products, or can be associated with non-petroleum excluded products historically associated with the site. CERLCA hazardous substances are subject to CERCLA response authority and responsibility. Invoices and manifests from customers that had barges repaired, retrofitted or cleaned and painted during the operational period of SBA contained CERLCA eligible waste to include: asphalt, creosote, methyl-methacrylate, methanol, caustic soda, styrene, coal tar, vinyl acetate, carbon tetra chloride, ethyl acrylate and acrylates (Ref. 41, p. 11; Ref. 44, pp. 162, 226, 232, 254, 274 & 379; Ref. 45, pp. 115 & 197; Ref. 46, pp. 9 & 203; Ref. 47, pp. 4, 15, 40, 50, 76, 78, 79, 125, 126, 236 & 241; Ref. 48, pp. 14, 16 & 388; Ref. 49, pp. 3, 33, 34, 38, 39, 110 & 236; Ref. 50, pp. 25, 130 & 133: Ref. 51, pp. 1-3 & 36-39). Potential chemical hazards at this site included: chloroform, 1,2-dichloroethane, tetrachloroethene, trichloroethene, vinyl chloride, ortho-cresol, meta-cresol and pyridine (Ref. 32, p. 49; Ref. 34, p. 1). Additional, possible constituents of concern at the site identified include 1,1,1-trichloroethane, vinyl chloride, 1,2-dichloroethene, benzene, tetrachloroethylene, toluene, ethylbenzene, xylene, styrene, chloroform, creosol, pyridine, arsenic, barium, mercury and lead (Ref. 32, pp. 49-52 & 75-94; Ref. 34, p. 1). Wastes from the barge cleaning operations were managed in a waste management area that included impoundments (Oil Pit, Water Pit 1, Water Pit 2, and Water Pit 3), a land treatment unit (LTU) and storage tanks (Ref. 6, p. 5). All wastes managed on site consisted of non-petroleum and petroleum

products that were comingled within the waste management units and not segregated during the operations or processing (Ref. 24, pp. 5 & 7; Ref. 30, pp. 5, 21-26).

Two sediment samples were collected from two separate locations in the vicinity of the Dry Dock (PPE 1) (Figure 5). Location SBA-029, Sample SBA-029SD from the north of the dry dock , and Location SBA-ESI-04, Sample SBA-ESI-04SD down gradient of the dry dock (Ref. 4, p. 41: Ref. 7, p. 33).

In the release sediment samples from the Dry Dock, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene were detected and met observed release criteria (Ref. 4, pp. 260-267; Ref. 7, pp. 210-212; Tables 11 & 12).

Five (5) sediment samples (SBA-024SD, SBA-025SD, SBA-030SD, SBA-ESI-05SD, SBA-ESI-06SD) were collected from within the barge slip from four separate locations upstream and at PPE 2 to determine the migration of contamination in the surface water pathway from former SBA operations (Figure 5). The samples had the same constituents as the other sediment samples collected from the Partially Buried Barge scored as Source 1, and which receives drainage from Source 1(Ref. 4, pp. 228-243 & 268-275; Ref. 7, pp. 183-188; Tables 11 & 12).

Three (3) sediment samples (Sample SBA-33, Sample SBA-39 and SBA-ESI-11SD) were collected from the wetland located south and northeast of SBA former operations to identify and assess the migration of contamination in the surface water pathway from the partially buried barge (Source 1) and former surface impoundments (Sources No. 2, 3, 4 and 6) and associated with PPE 3 (Figure 5). The wetland sediment samples had the same constituents as the other samples collected from the Partially Buried Barge (Source 1), the two former surface impoundments (Sources 2 and 3), LTU (Source 4) and surface impoundment that is now part of the wetland (Source 6) (Tables 11 & 12). The wetland located south and northeast of former SBA operation receives drainage from all site sources (Figures 4 & 5).

Two (2) wetland sediment samples (SBA-032 and SBA-ESI-10) were collected from the location of Former Water Pit 3 that is currently a part of the wetland and document an observed release by direct observation associated with PPE 4 (Figure 5). The wetland sediment samples had the same constituents as the other samples collected from the Partially Buried Barge (Source No. 1), the two former surface impoundments (Sources No. 2 and 3) and the LTU (Source 4) (Tables 11 & 12). Former Water Pit 3, that is presently part of the wetlands and PPE 4, is along the surface water migration pathway and receives drainage from the Former Oil Pit (Source No. 2), Former Water Pit 1 (Source No. 3) and the former LTU (Source No. 4)

Alternative sites that could potentially be contributing releases of hazardous substances to those found at the SBA facility were identified. A former terminal is located north of the site, which consists of two storage tanks (Ref. 6, p. 17; Ref. 28, p. 1). Little information is known about the dates of operation at this facility. Available information indicates that the property north of the SBA facility was occupied by Citgo (Ref. 28). There are no other industries located within a 2-mile radius of the property that might be responsible for the contamination in the PPE or the wetlands. Background sediment samples collected upstream from the site indicate the former terminal is unlikely to be impacting sediments at, or downstream of, SBA shipyard. Residential areas are located north of the property, wetlands to the south and west, and the Mermentau River to the east (Ref. 4, pp.12-13). The area west of the property includes agricultural use such as pastures (Ref. 6, p. 17). The frontage along highway 3166 includes a

number of residential structures, some residences may be used as recreational properties, others may be year round residences (Ref. 6, p. 17).

Background sediment samples collected did not detect any contaminants of concern that have been associated with the site (Tables 11 & 12). The background sediment samples SBA-28SD, SBA-ESI-01 and SBA-ESI-02 were collected upstream of the site while SBA-31SD, SBA-ESI-08 and SBA-ESI-09 were collected downstream from the site. The background sediment sample results indicate that the significant increase in the concentration of the hazardous substances in the observed release is not due to other sites. The sources contained the same constituents in the observed release and in the drainage pathway to the wetlands and Mermentau River (Tables 1, 4, 5, 6, 7, 8, 9 & 10).

Observed Release Factor Value: 550

4.1.3.2 HUMAN FOOD CHAIN THREAT - WASTE CHARACTERISTICS

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

The human food chain waste characteristics section provides the toxicity, persistence and bioaccumulation factor values for hazardous substances that are available to migrate from sources at the site to surface water in the watershed via the overland/flood hazardous substances migration path for the watershed (Ref. 1, Section 4.1.3.2.1), the hazardous waste quantity value for the watershed (Ref. 1, Section 4.1.3.2.2), and the calculation of the human food chain threat-waste characteristics factor category value (Ref. 1, Section 4.1.3.2.3). The highest combined toxicity, persistence and bioaccumulation factor is used to determine the waste characteristics factor value for the human food chain threat of the surface water migration pathway (Ref. 1, Section 4.1.3.2.1.4).

Hazardous substances that meet the criteria for an observed release to surface water and all hazardous substances associated with the sources that have a surface water containment factor value greater than 0 for the watershed are presented in Table 13 below. Each hazardous substance eligible to be evaluated is assigned a toxicity/persistence/bioaccumulation factor value. The hazardous substance with the highest toxicity/persistence/bioaccumulation

Table 13 – Human Food Chain Threat - Toxicity/Persistence/Bioaccumulation Summary

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Toxicity/ Persistence Factor Value (Table 4-12)	Bioaccumulation Factor Value **	Toxicity/Persistence / Bioaccumulation Factor Value (Table 4-16)	Reference
Acenaphthene	1-4, 6 , OR	10	0.4	4	500	2,000	Ref. 1, Table 4-12, 4-16; Ref. 2, Appendix B, pp. 1-10
Acenaphthylene	1-6, OR	1	0.4	0.4	500	200	
Anthracene	1-6, OR	10	0.4	4	50,000	200,000	
Aroclor-1254[1]	5	10,000	1	10,000	50,000	500,000,000	
Arsenic	1, 3 - 5	10,000	1	10,000	5	50,000	
Barium	3	10,000	1	10,000	500	5,000,000	
Benzene	1, 2, 3, 4	1,000	0.4	400	5,000	2,000,000	
Benzo(a)anthracene	1-6, OR	1,000	1	1,000	50,000	50,000,000	
Benzo(a)pyrene	1-6, OR	10,000	1	10,000	50,000	500,000,000	
Benzo(g,h,i)perylene	1-6, OR	0	1	0	50,000	0	
Benzo(b)fluoranthene	1-6, OR						
Benzo(k)fluoranthene	1-6, OR	100	1	100	50,000	5,000,000	
Beryllium	4, 6	10,000	1	10,000	50	500,000	
Biphenyl, 1,1'-	1, 2, 3, 4						
Bis (2-ethylhexyl) phthalate	3	100	1	100	50,000	5,000,000	
Cadmium	2, 3, 4	10,000	1	10,000	50,000	500,000,000	
Carbazole	1-6, OR	10	1	10	500	5,000	
Chromium	1	10,000	1	10,000	5	50,000	
Chrysene	1-6, OR	10	1	10	5	50	
Cobalt	1-3, 5,6	10,000	1	10,000	50	500,000	
Copper	3 – 5	100	1	100	50,000	5,000,000	
Cyclohexane	1-4						
Dibenz(a,h)anthracene	1-3, 5, 6, OR	10,000	1	10,000	50,000	500,000,000	
Dibenzofuran	1-6,OR	1,000	0.4	400	500	200,000	
Dichlorobenzene, 1,2-	1-3						
Dichlorobenzene, 1,4-	3	10	0.4	4	5,000	20,000	
Dichloroethene, 1,2-cis-[2]	2-4	1,000	0.4	400	50	20,000	
Dimethyl phenol, 2,4-	3	100	1	100	500	50,000	
Ethylbenzene	1,2,3,4	10	0.4	4	50	200	
Fluoranthene[3]	1-6,OR	100	1	100	5,000	500,000	
Fluorene	1-6,OR	100	0.4	40	500	20,000	
Hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-	1	10,000	1	10,000	50,000	500,000,000	
Hexachlorodibenzofuran 1,2,3,4,7,8-	1	10,000	1	10,000	50,000	500,000,000	
Hexachlorodibenzofuran 1,2,3,6,7,8-	1	10,000	1	10,000	50,000	500,000,000	
Hexachlorodibenzofuran 2,3,4,6,7,8-	1	10,000	1	10,000	50,000	500,000,000	
Indeno (1,2,3-cd) pyrene	1-6,OR	1,000	1	1,000	50,000	50,000,000	
Isopropylbenzene[4]	1-3	10	0.4	4	500	2,000	
Lead	1, 3	10,000	1	10,000	5,000	50,000,000	
Manganese	2-5	10,000	1	10,000	500	5,000,000	
Mercury	1, 3, 5	10,000	1	10,000	50,000	500,000,000	
Methylphenol, 2-	3						
Methyl phenol, 4-	3	10	0.0007	0.007	50	0.35	
Methylcyclohexane	1-4						
2-Methylnaphthalene	1-6, OR	1,000	0.4	400	50,000	20,000,000	
Naphthalene	1-6, OR	1,000	0.4	400	50,000	20,000,000	
Nickel	3, 4, 6	10,000	1	10,000	5	50,000	
Octachlorodibenzo-p-dioxin (OCDD)	1	10,000	1	10,000	5,000	50,000,000	
Pentachlorodibenzofuran 2,3,4,7,8-	1	10,000	1	10,000	50,000	500,000,000	
Phenanthrene	1-6,OR	1	0.4	0.4	5,000	2,000	
Phenol	2, 4	10	1	10	50	500	
Pyrene	1-6,OR	100	1	100	50,000	5,000,000	
Styrene	2, 3	10	0.4	4	50	200	
Tetrachloroethene[5]	1-3	100	0.4	40	50	2,000	
Toluene	1-4	10	0.4	4	50	200	
Vanadium	4	10,000	1	10,000	500	5,000,000	
Vinyl Chloride	1, 4	10,000	0.0007	7	5	35	
Xylene, m- & p-	1-4	100	0.4	40	50	2,000	
Xylene, o-	1-4	100	0.4	40	50	2,000	
Zinc	3, 5	10	1	10	500	5,000	

* Persistence values assigned are based on Mermentau River, which is a perennially flowing water classified as a River.
** Bioaccumulation values are food chain values assigned based on the surface water category of fresh water (Ref. 27, p.1).
[1]Aroclor-1254 is listed as polychlorinated biphenyls (PCBs) in the Superfund Chemical Data Matrix (SCDM) and given a general value (Ref. 2, p. 8).
[2]Dichloroethene, 1, 2- cis- is listed as dichloroethylene, 1,2-cis- in the SCDM (Ref. 2, p. 4).
[3] Fluoranthene is listed as benzo(j,k)fluoranthene in the SCDM (Ref. 2, p. 2).
[4]Isopropylbenzene is listed as cumene in the SCDM (Ref. 2, p. 3).
[5]Tetrachloroethene is listed as tetrachloroethylene in the SCDM (Ref. 2, p. 9).
OR – Substance documented in the observed release

The hazardous substances with the highest Toxicity/Persistence/Bioaccumulation Factor Values are aroclor-1254, benzo(a)pyrene, cadmium, dibenz(a,h)anthracene, hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-, hexachlorodibenzofuran 1,2,3,4,7,8-, hexachlorodibenzofuran 1,2,3,6,7,8-, hexachlorodibenzofuran 2,3,4,6,7,8-, mercury, and pentachlorodibenzofuran 2,3,4,7,8-.

Toxicity/Persistence/Bioaccumulation Factor Value: 500,000,000

4.1.3.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1	1,827.79	No
2	1,230.77	No
3	882.69	No
4	65.44	No
5	9,615.38	No
6	1,383.56	No
TOTAL	15,005.63	

The sum of the source hazardous waste quantity values is assigned as the Hazardous Waste Quantity Factor Value (Ref.1, Sec. 2.4.2.2 and Table 2-6). The sum of the source hazardous waste quantity values for Surface Water Pathway, rounded to the nearest integer, is 15,006.

Sum of Values: 15,006
Hazardous Waste Quantity Assigned: 10,000 (Ref. 1 Table 2-6)

4.1.3.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor category value is assigned based on the Waste Characteristics Product. The Waste Characteristics Product is the product of the Toxicity/Persistence Factor Value and the Hazardous Waste Quantity Factor Value subject to a maximum of 1×10^8. This product is multiplied by the Bioaccumulation Potential Factor Value subject to a maximum value of 1×10^{12}. The hazardous substances with the highest Toxicity/Persistence/Bioaccumulation factor values for the watershed Aroclor-1254, benzo(a)pyrene, cadmium, dibenz(a,h)anthracene, hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-, hexachlorodibenzofuran 1,2,3,4,7,8-, hexachlorodibenzofuran 1,2,3,6,7,8-, hexachlorodibenzofuran 2,3,4,6,7,8-, mercury, and pentachlorodibenzofuran 2,3,4,7,8- (Ref. 1, Section 4.1.3.2.1.4).

Toxicity/Persistence Factor Value: 10,000
x Hazardous Waste Quantity Factor Value: 10,000

(Toxicity/Persistence x Hazardous Waste Quantity):
$10{,}000 \text{ X } 10{,}000 = 1 \text{ X } 10^8$
(Subject to a maximum product of 1.0×10^8

Bioaccumulation Potential Factor Value: 50,000
(Toxicity/Persistence x Hazardous Waste Quantity) x
Bioaccumulation Potential Factor Value:

$(1 \text{ X } 10^8) \text{ X } (50{,}000) = 5.0 \text{ X } 10^{12}$
(Subject to a maximum product of 1.0×10^{12})

A Waste Characteristics Product value of $1.0 \text{ X } 10^{12}$ receives a waste characteristics factor value of 1,000 (Ref. 1, Table 2-7).

Hazardous Waste Quantity Assigned Value: 10,000
Waste Characteristics Factor Category Value: 1,000

4.1.3.3 HUMAN FOOD CHAIN THREAT-TARGETS

Largemouth bass, crappie, bream, bluegill, catfish, gar, bullhead, carp, striped bass and sunfish are caught from Lake Arthur (Ref. 15, p. 1). Mermentau River is also fished recreational as was observed and documented during the September 2014 ESI (Ref. 7, pp. 34 & 89-90). During the September 2014 ESI, a family of five was observed fishing in the Barge Slip (PPE 2) adjacent to the Mermentau River (near sample location SBA-ESI-05 and PPE 2). The family stated that they do not fish in the barge slip often, but when they do, they only catch catfish for consumption (Ref. 7, pp. 34 & 984-992). The Mermentau River is fished recreationally, as is evident by the fishermen observed during the ESI during sediment sample collection along the Mermentau River (Ref. 7, pp. 89-91).

4.1.3.3.1 Food Chain Individual

A food chain individual factor value of 45 is assigned based on an observed release by chemical analyses of acenaphthene , anthracene, barium, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, cadmium, carbazole, copper, dibenz(a,h)anthracene, dibenzofuran, fluoranthene (benzo(j,k) fluoranthene), fluorene, indeno (1,2,3-cd) pyrene, lead, manganese, mercury, 2-methylnaphthalene, naphthalene, nickel, phenanthrene, pyrene, vanadium and zinc sediments within the fishery present in the barge slip, a branch of the Mermentau River (Sec. 4.1.3.2.3)(Ref.1, Sec. 4.1.3.3.1; Ref. 2, pp. 1-5, 7-8 & 10; Ref. 7, pp. 984-992; Figure 6; Tables 11 & 12).

Food Chain Individual Factor Value: 45 (Ref. 1, Section 4.1.3.3.1)

4.1.3.3.2 Population

The Population Factor for the watershed is based on three factors: Level I concentrations, Level II concentrations, and potential human food chain contamination.

4.1.3.3.2.1 Level I Concentrations

There are no Level I concentrations established because there were no tissue samples collected (Ref. 1, Sec. 4.1.3.3.2.1).

4.1.3.3.2.2 Level II Concentrations

Level II concentrations have been established for approximately 1,300 feet of the Mermentau River (Figure 5). During the September 2014 ESI, a family of five was observed fishing in the Barge Slip (PPE 2) adjacent to the Mermentau River (near sample location SBA-ESI-05). The family stated that they do not fish in the barge slip often, but when they do, they only catch catfish for consumption (Ref. 7, pp. 984 & 987). Recreation fishing is common, and conducted within the Mermentau River (Ref. 7, pp. 34 & 988-991). The Louisiana Department of Wildlife and Fisheries (LDWF) does not keep records on pounds of fish caught and consumed annually per water body; however, fishing for consumption is known to occur within the zone of Level II contamination as discussed above. Therefore, a human food chain population value of 0.03 is assigned for production greater than zero (>0) and less than 100 (<100) pounds per year of annual human consumption (Ref. 1, Table 4-18; Ref. 7, pp. 34, 89-91, 149 & 984-992).

Level II Human Food Chain Contamination Factor Value: 0.03 (Ref 1, Table 4-18)

4.1.3.3.2.3 Potential Human Food Chain Contamination

Recreation fishing is common in the Mermentau River and Lake Arthur. Recreational fishing is conducted within Mermentau River (Ref. 7, pp. 34, 984 & 988-981). The Louisiana Department of Wildlife and Fisheries (LDWF) does not keep records on pounds (lbs) of fish caught and consumed annually per water body; therefore the most conservative estimate of fish caught and consumed annually (0 lbs < 100 lbs) from the Mermentau River and Lake Arthur will be used (Ref. 7, pp. 34, 89-91, 149 & 984-992).

According to gauging station 08012150, located in Jefferson Davis Parish in Mermentau, Louisiana, approximately 3.0 miles upstream of site, the average annual flow rate of the Mermentau River as measured for water year 1990 through 2015 is 1,975.82 cfs (Ref. 11, pp. 1-2). The flow rate for the Mermentau river falls into the large stream to river category which has an assigned dilution value of 0.001 (Ref. 1, Table 4-13).

No gauging stations are located in Lake Arthur. The flow rate at that target location was extrapolated using the flow data for Mermentau River and for the headwaters of Bayou Lacassine near Lake Arthur (Ref. 11, pp. 1-2; Ref. 12, pp. 1-2). According to gauging station 08012470 located at Bayou Lacassine near Lake Arthur, Louisiana the average annual flow rate of Bayou Lacassine as measured for water year 1988 through 2005 is 594.18 cfs. Lake Arthur will set to the average flow rate of 2,570 cfs based

on Bayou Lacassine and Mermentau River average annual flow rate. Therefore, Lake Arthur will be considered to be a large stream to river and will be assigned a dilution value of 0.001 (Ref. 1, Table 4-13).

Table 14 – Fishery Identification Study

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow	Population Value (P_i)	Dilution Weight (D_i)	$P_i x D_i$	Reference
Mermentau River	>0-100	Large stream to River	1,975.82 cfs	0.03	0.001	0.00003	Ref.1, Tables 4-13; Ref. 11, pp. 1-2
Lake Arthur	>0-100	Large stream to River	2,570 cfs	0.03	0.001	0.00003	Ref.1, Tables 4-13; Ref. 12, p. 1-2

Sum: 0.00006
(Sum of P1 x 01)/10: 0.000006

Potential Human Food Chain Contamination
Factor Value: 6.0×10^{-6}

4.1.3.3.2.4 Calculation of Population Factor Value

The population factor value is equal to:

Level I Concentrations (0) + Level II Concentrations (0.03) + Potential Human Food Chain Contamination (0.000006) = 0.030006.

A value of 3.0006×10^{-2} is assigned as the Population Factor Value.

Population Factor Value: 3.0006×10^{-2}

4.1.3.3.3 Calculation of Human Food Chain Threat- Targets Factor Category Value

The Human Food Chain Threat - Targets Factor Category value is calculated by summing the food chain individual and population factor values for the watershed:

Food Chain Individual + Population Factor = 45 + 0.030006 = 45.030006

Target Factor Category Value: 45.030006

4.1.3.4 Calculation of Human Food Chain Threat Score for a Watershed

The Human Food Chain Threat score is calculated by multiplying the human food chain threat factor category values for likelihood of release, waste characteristics, and targets for the watershed (Ref. 1, Section 4.1.3.4).

Likelihood of Release (550) x Waste Characteristics (1,000) x Targets (45.030006) = 24,766,503 (rounded to the nearest integer).

This product is then divided by 82,500:

$$24{,}766{,}503 \div 82{,}500 = 300.20$$

The resulting value, subject to a maximum of 100, is assigned as the Human Food Chain Threat Score.

Human Food Chain Threat Score= 100

4.1.4.2 ENVIRONMENTAL THREAT - WASTE CHARACTERISTICS

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

The environmental threat waste characteristics section provides the ecosystem toxicity, persistence and bioaccumulation factor values for hazardous substances that are available to migrate from sources at the site to surface water in the watershed via the overland/flood hazardous substances migration path for the watershed (Ref. 1, Section 4.1.4.2.1), the hazardous waste quantity value for the watershed (Ref. 1, Section 4.1.4.2.2), and the calculation of the environmental threat-waste characteristics factor category value. The highest combined ecosystem toxicity, persistence and ecobioaccumulation factor is used to determine the waste characteristics factor value for the environmental threat of the surface water migration pathway (Ref. 1, Section 4.1.4.2.3)

Hazardous substances that meet the criteria for an observed release to surface water and all hazardous substances associated with the sources that have a surface water containment factor value greater than 0 for the watershed are presented in Table 15 below. Each hazardous substance eligible to be evaluated is assigned an ecosystem toxicity/persistence/bioaccumulation factor value. The hazardous substance with the highest ecosystem toxicity/persistence/ecobioaccumulation factor value for the watershed is used to assign the value to this factor (Ref. 1, Section 4.1.4.2.1.4).

Table 15- Ecosystem Toxicity/Persistence/EcoBioaccumulation Factor Summary

Hazardous Substance	Source No.	Eco Toxicity Factor Value	Persistence Factor Value*	Eco Toxicity/ Persistence Factor Value (Table 4-12)	Bioaccumulation Factor Value **	Eco Toxicity/Persistence/ Bioaccumulation Factor Value (Table 4-16)	Reference
Acenaphthene	1-4, 6 , OR	500	0.4	200	500	10,000	Ref. 1, Table 4-12, 4-16; Ref. 2, pp. 1-10
Acenaphthylene	1-6, OR	0	0.4	0	500	0	
Anthracene	1-6, OR	10,000	0.4	4,000	50,000	200,000,000	
Aroclor-1254[1]	5	10,000	1	10,000	50,000	500,000,000	
Arsenic	1, 3 - 5	10	1	10	50,000	500,000	
Barium	3	1	1	1	500	500	
Benzene	1, 2, 3, 4	1,000	0.4	400	5,000	2,000,000	
Benzo(a)anthracene	1-6, OR	10,000	1	10,000	50,000	500,000,000	
Benzo(a)pyrene	1-6, OR	10,000	1	10,000	50,000	500,000,000	
Benzo(g,h,i)perylene	1-6, OR	0	1	0	50,000	0	
Benzo(b)fluoranthene	1-6, OR	-	-	-	-	-	
Benzo(k)fluoranthene	1-6, OR	0	1	0	50,000	0	
Beryllium	4, 6	1,000	1	1,000	50	50,000	
Biphenyl, 1,1'-	1, 2, 3, 4						
Bis (2-ethylhexyl) phthalate	3	1,000	1	1,000	50,000	50,000,000	
Cadmium	2, 3, 4	10,000	1	10,000	50,000	500,000,000	
Carbazole	1-6, OR	1,000	1	1,000	500	500,000	
Chromium	1	10,000	1	10,000	500	5,000,000	
Chrysene	1-6, OR	1,000	1	1,000	5,000	5,000,000	
Cobalt	1-3, 5,6	0	1	0	50	0	
Copper	3 – 5	1,000	1	1,000	50,000	50,000,000	
Cyclohexane	1-4						
Dibenz(a,h)anthracene	1-3, 5, 6, OR	0	1	0	50,000	0	
Dibenzofuran	1-6,OR	1,000	0.4	400	500	200,000	
Dichlorobenzene, 1,2-	1-3						
Dichlorobenzene, 1,4-	3	1,000	0.4	400	5,000	200,000	
Dichloroethene, 1,2-cis-[2]	2-4	0	1	0	50	0	
Dimethyl phenol, 2,4-	3	100	1	100	500	50,000	
Ethylbenzene	1,2,3,4	100	0.4	40	50	2,000	
Fluoranthene[3]	1-6,OR	10,000	1	10,000	5,000	50,000,000	
Fluorene	1-6,OR	1,000	0.4	400	5,000	2,000,000	
Hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-	1	0	1	0	50,000	0	
Hexachlorodibenzofuran 1,2,3,4,7,8-	1	0	1	0	50,000	0	
Hexachlorodibenzofuran 1,2,3,6,7,8-	1	0	1	0	50,000	0	
Hexachlorodibenzofuran 2,3,4,6,7,8-	1	0	1	0	50,000	0	
Indeno (1,2,3-cd) pyrene	1-6,OR	0	1	0	50	0	
Isopropylbenzene[4]	1-3	100	0.4	4	500	20,000	
Lead	1, 3	1,000	1	1,000	50,000	50,000,000	
Manganese	2-5	100	1	100	50,000	5,000,000	
Mercury	1, 3, 5	10,000	1	10,000	50,000	500,000,000	
Methyl phenol, 2-	3						
Methyl phenol, 4-	3	100	0.0007	0.07	50	3.5	
Methylcyclohexane	1-4						
2-Methylnaphthalene	1-6, OR	1000	0.4	400	50,000	2,000,000	
Naphthalene	1-6, OR	1,000	0.4	400	50,000	20,000,000	
Nickel	3, 4, 6	100	1	100	50	5,000	
Octachlorodibenzo-p-dioxin (OCDD)	1	0	1	0	50,000	0	
Pentachlorodibenzofuran 2,3,4,7,8-	1	0	1	0	50,000	0	
Phenanthrene	1-6,OR	10,000	0.4	4,000	50,000	200,000,000	
Phenol	2, 4	10,000	1	10,000	50,000	500	
Pyrene	1-6,OR	100	1	100	50,000	500,000,000	
Styrene	2, 3	100	0.4	40	50	2,000	
Tetrachloroethene[5]	1-3	100	0.4	40	50	2,000	
Toluene	1-4	100	0.4	40	5,000	200,000	
Vanadium	4	100	1	100	50,000	5,000,000	
Vinyl Chloride	1, 4	0	0.0007	0	5	0	
Xylene, m- & p-	1-4						
Xylene, o-	1-4	100	0.4	40	50	2,000	
Zinc	3, 5	10	1	10	50,000	500,000	

* Persistence values assigned are based on Mermentau River, which is a perennially flowing water classified as a River.
** Bioaccumulation values are assigned based on the surface water category of fresh water (Ref. 27, p.1).
[1]Aroclor-1254 is listed as polychlorinated biphenyls (PCBs) in the Superfund Chemical Data Matrix (SCDM) and given a general value (Ref. 2, p. 8).
[2]Dichloroethene, 1, 2- cis- is listed as dichloroethylene, 1,2-cis- in the SCDM (Ref. 2, p. 4).

[3]Fluoranthene is listed as benzo(j,k) fluoranthene in the SCDM (Ref. 2, p. 2).
[4]Isopropylbenzene is listed as cumene in the SCDM (Ref. 2, p. 3).
[5]Tetrachloroethene is listed as tetrachloroethylene in the SCDM (Ref. 2, p. 9).
OR – Substance documented in the observed release

The contaminant with the highest Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value are Aroclor-1254, benzo(a)anthracene, benzo(a)pyrene, cadmium, mercury and pyrene (Ref. 1, Table 4-21; Ref. 2, pp. 2, 6-8 & 10).

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 500,000,000

4.1.4.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1	1,827.79	No
2	1,230.77	No
3	882.69	No
4	65.44	No
5	9,615.38	No
6	1,383.56	No
TOTAL	15,005.63	

The sum of the source hazardous waste quantity values is assigned as the Hazardous Waste Quantity Factor Value (Ref. 1, Sec. 2.4.2.2 and Table 2-6). The sum of the source hazardous waste quantity values for Surface Water Pathway, rounded to the nearest integer, is 15,006. For a Hazardous Waste Quantity range of greater than 10,000 to 1,000,000, a value of 10,000 is assigned from Ref. 1, Table 2-6 for the migration pathway (Ref. 1, Sec. 2.4.2.2, Table 2-6).

Sum of Values: 15,006
Hazardous Waste Quantity Factor Value: 10,000 (Ref. 1 Table 2-6)

4.1.4.2.3 Waste Characteristics Factor Category Value

A Waste Characteristics Factor Category Value is assigned based on the Waste Characteristic Product. The hazardous substances with the highest ecosystem toxicity/persistence/bioaccumulation factor value for the watershed are aroclor-1254, benzo(a)pyrene, cadmium, dibenz(a,h)anthracene, hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-, hexachlorodibenzofuran 1,2,3,4,7,8-, hexachlorodibenzofuran 1,2,3,6,7,8-, hexachlorodibenzofuran 2,3,4,6,7,8-, mercury, pentachlorodibenzofuran 2,3,4,7,8-, and vanadium (Ref. 1, Section 4.1.4.2.3). These values are used to determine the water characteristic product. The Waste Characteristic Product is the product of the Ecosystem Toxicity/Persistence/ Factor Value and the Hazardous Waste Quantity Factor Value subject to a maximum product of 1×10^8. This product is multiplied by the Ecosystem Bioaccumulation Potential Factor Value Subject to a maximum product of 1×10^{12}.

Using HRS Table 4-20 and Table 15 of this HRS documentation record, the Ecosystem Toxicity/Persistence value for Aroclor-1254, benzo(a)anthracene, benzo(a)pyrene, cadmium, mercury, and pyrene is 10,000.

A Hazardous Waste Quantity Factor Value of 10,000 is assigned from the sum of Source Hazardous Waste Quantity Value and the documented observed release (Ref. 1, Section 2.4.2.2, Table 2-6).

Ecosystem Toxicity/Persistence Factor Value= 10,000
Hazardous Waste Quantity Factor Value = 10,000
10,000 X 100 =1.0×10^8
(Subject to a maximum product of 1.0×10^8

The Ecosystem Bioaccumulation Value for Aroclor-1254, benzo(a)anthracene, benzo(a)pyrene, cadmium, mercury and pyrene is 50,000 (Ref. 2, pp. 2, 6-8 & 10).

Ecosystem Bioaccumulation Value = 50,000

(Ecosystem Toxicity/Persistence x Hazardous Waste Quantity) x Bioaccumulation Factor Value:

$(1 \times 10^8) \times (50{,}000) = 5 \times 10^{12}$

(Subject to a maximum product of 1×10^{12})

A Waste Characteristics Product Value of 1×10^{12} receives a Waste Characteristic Factor Value of 1,000 (Ref. 1, Table 2-7).

(Ecosystem Toxicity/Persistence Factor Value
x Hazardous Waste Quantity Factor Value) x Bioaccumulation Factor Value: 1×10^{12}
Waste Characteristics Factor Value: 1,000

4.1.4.3 ENVIRONMENTAL THREAT- TARGETS

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1 Level I Concentrations

No water, benthic, or tissue samples have been collected within the Surface Water Pathway; therefore, Level l concentrations are not being scored (Ref. 1, Sec. 4.1.4.3.1.1).

Level I Concentrations Factor Value: 0

4.1.4.3.1.2 Level II Concentrations

Wetlands, as identified on National Wetland Inventory (NWI) as a PFO2/1F designation, palustrine forested needle-leaved deciduous/broad leaved deciduous wetland, meets the 40 CFR 230.3 definition of a wetland, are located on the southeast side of SBA and along the east bank of the Mermentau River, across from PPE 1 and PPE 2, and are contiguous with the Mermentau River (Ref. 4, pp. 116-127; Ref. 7, pp. 135 & 139-142; Ref. 10, pp. 1-4; Ref. 40, pp. 1-2).

Level II concentrations have been established in the wetlands by chemical analysis of wetland samples that met observed release criteria (Tables 11 & 12). The total frontage of wetlands subject to Level II contamination is approximately 2,823 feet (Figure 5). The frontage of Wetland 1 is determined by the distance, approximately 1,380 feet, measured from PPE 1 (Sample SBA-029SD) to PPE 3 (SBA-030SD) along the left descending bank of the Mermentau River and the continuous wetland (Figure 5). The frontage for Wetland 2 is determined by the distance, approximately 1,160 feet, measured from the northwest corner of the wetlands (SBA-033SD) to the Mermentau River (Figure 5). The frontage of Wetland 3 is determined to by the length of the Former Water Pit 3, approximately 283 feet (Ref. 6, p. 8). A value of 25 is assigned from Table 4-24 of the HRS for the approximate 2,823 feet of wetland subject to Level II contamination (Ref. 1, sec. 4.1.4.3.1.2).

Threatened and endangered species have been reported within the general area; however, it is not known if their habitats overlap the zone of Level II contamination therefore, these other sensitive environments will not be evaluated. The Level II concentration factor value is the sum of the wetlands value (25) and sensitive environments value (0):

$$25 + 0 = 25$$

Level II Concentrations Factor Value: 25
(Ref. 1, Sec. 4.1.4.3.1.2 and Table 4-24)

4.1.4.3.1.3 Potential Contamination

Wetlands

Palustrine forested needle-leaved deciduous/broad leaved deciduous wetlands, as identified on NWI that are semi-permanently flooded are located on the frontage along the Mermentau River and Lake Arthur (Ref. 4, pp. 116 & 119-127; Ref. 7, pp. 140-141; Ref. 10, pp. 1-4; Ref. 40, pp. 1-2). These wetlands meet the criteria as defined in 40 CFR 230.3, classified in the palustrine system and subcategory of a forested wetland (Ref. 10, pp. 1 - 4). The wetland frontage along the Mermentau River was measured from National Wetland Inventory (NWI) maps (Ref. 10, p. 5).

Type of Surface Water Body	Wetland Frontage (miles)	Reference	Wetland Value (Ref. 1, Table 4-24)
Mermentau River	20.4	Ref. 10, p. 2; Figure 6	500
Lake Arthur	4.05	Ref. 10, p. 2; Figure 6	150

To obtain the Potential Contamination Factor Value, the sum of the sensitive environments value is added to the wetland value, which is then multiplied by the assigned dilution for each in-water segment. This value is then divided by 10 to obtain the Potential Contamination Factor Value (Ref. 1, Section 4.1.4.3.1.3).

Type of Surface Water Body	Sum of Sensitive Environment Values (Sj)	Wetland Frontage Value (Wj)	Adjusted Dilution Weight (Dj)	(Wj + Sj)Dj
Mermentau River	0	500	.001	0.5
Lake Arthur	0	150	.001	0.15

Potential Contamination Factor Value
0.65/10 = 0.065

Sum of Sensitive Environments Value+ Wetland Value: 0
Potential Contamination Factor Value: 0.065

4.1.4.3.1.4 Environmental Threat- Targets Factor Category Value

The environmental threat target factor category value for the watershed is the sum of the values for the Level l (0), Level II (25), and Potential Contamination factors (0.065) (Ref. 1, Section 4.1.4.3.1.4).

0 + 25 + 0.065 = 25.065

4.1.4.4 Calculation of Environmental Threat Score

The environmental threat score is calculated by multiplying the environmental threat factor category values for likelihood of release (550), waste characteristics (1,000), and targets (25.07) for the watershed; rounding the product to the nearest integer; and dividing by 82,500. The resulting value (167.13), subject to a maximum of 60, is assigned as the environmental threat score for the watershed (Ref. 1, Sections 4.1.4.4 and 4.1.4.3.1.4).

Calculations:

550 X 1,000 X 25.065 = 13,785,750/82,500 = 167.1
(subject to a maximum of 60)

4.1.5 Calculation of Overland/Flood Migration Component Score for a Watershed

The overland/flood migration component score for the watershed is calculated by summing the scores for the drinking water threat (0), human food chain threat (100), and environmental threat (60) assigned as the surface water overland/flood migration component score for a watershed (Ref. 1, Section 4.1.5).

Calculations:

0 + 100 + 60 = 160
(subject to a maximum value of 100)

4.1.6 Calculation of Overland/Flood Migration Component Score

The highest surface water overland/flood migration component score from the watersheds evaluated (in this case, only one watershed was evaluated) is selected and assigned as the surface water overland/flood migration component score for the site, subject to a maximum of 100. The overland/flood migration component score is assigned a value of 100 (Ref. 1, Section 4.1.6).

4.2 GROUND WATER TO SURFACE WATER MIGRATION COMPONENT

This component was not scored because an observed release was documented for the overland flow/flood component.

4.3 CALCULATION OF SURFACE WATER MIGRATION PATHWAY SCORE

The overland/flood migration component was scored and this value (100) is assigned to the surface water migration pathway score.

Ground Water to Surface Water Factor Value: NS
Surface Water Migration Pathway Score: 100