

PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



Appendix 1-D

SHUSTER AUTO SALVAGE WILMINGTON, DELAWARE

SIRB ID: DE-1178

GENERAL SITE INFORMATION

Site Name: Shuster Auto Salvage

SIRB ID Number: DE-1178

Site Location and Description: The Shuster Auto Salvage property is located in the vicinity of the south side of the Christina River in Wilmington, Delaware (Figure 1). The property has most recently been operated as a salvage yard and is bordered by commercial properties to the north and south, Christina River to the west, and Market Street to the east. Surrounding land is generally commercial and/or industrial. The Shuster Property is an approximately 6.0-acre property consisting of two tax parcels (Tax Parcel #26-057.00-048 and #26-057.00-001); however, during the collection of historical data for the assessment BrightFields only found data pertaining to tax parcel #26-057.00-048. In an effort to provide a more accurate report, BrightFields only completed the assessment on the tax parcel that was previously investigated.

Previous Site Uses: Historical maps dating from 1876 through 1901 the area of the Shuster Auto Salvage property was mostly open land with a few small buildings such as houses or farm/out buildings. By 1936 the area was mostly open land, some of which is identified as marsh. According to area property owners, most of the land between Garasches Lane and the railroad tracks has been used for auto salvage since at least the early 1960s. In addition, many owners indicated that the land had been heavily filled prior to their purchase of the parcels.

It is possible that PCBs were introduced to the site as a result of the use of the property from past filling operations and/or as a salvage yard.

Site Regulatory Status: This section briefly summarizes previous investigations performed on the site through the SIRB program. A current SIRB regulatory status is also included.

South Wilmington Environmental Assessment Quadrants 3 and 4 (DNREC, 1996)

DNREC completed the South Wilmington Environmental Assessment, Quadrant 3 and 4 (DE-286) in 1996 which consisted of a large investigation effort performed by DNREC-SIRB to collect samples from various properties encompassing 85-acres in South Wilmington. Quadrant 3 is the area between South Market Street and the Christina River. Quadrant 4 is located between South Market and South Walnut Streets, and south of B Street.

The Environmental Assessment investigation took place from July through August 1995. A total of 38 soil samples were collected through shallow and deep test pit excavation and surface



Soil Analytical Results

On the Shuster Auto Salvage property, four shallow soil samples (SS-15, SS-16, TP-18S and TP-19S) and five deep soil samples (TP18D, TP-19D, MW-7A, MW-7B and MW-7C) were collected. Samples were screened for select parameters.

Soil samples SS-15, TP-18D and TP-19D were sent for confirmation analysis for select parameters. Several metals were detected in TP-18D, TP-19D and SS-15 at concentrations which exceed either three times the background concentration or RBC criteria. Arsenic and lead were detected at concentrations 8.5 mg/kg and 6,300 mg/kg, respectively in sample TP-18D which are either above three times the background concentration or RBC criteria. Arsenic and lead were detected at concentrations 5.4 mg/kg and 11,700 mg/kg in TP-19D, respectively which are either above three times the background concentration or RBC criteria. Arsenic and lead were detected at concentrations of 2.6 mg/kg and 569 mg/kg in SS-15, respectively which are above either three times the background concentration or RBC criteria. Several SVOCs including pyrene, benzo(a)pyrene, benzo(a)anthracene, and dibenz(a,h)anthracene were detected at concentrations of 1.4 mg/kg, .92 mg/kg, .93 mg/kg and .31 mg/kg respectively, which exceed either three times background concentration or their respective RBC criteria.

Groundwater Analytical Results

No groundwater samples were collected from the Shuster's Auto Salvage Property.

Surface Water Analytical Results

No surface water samples were collected from the Shuster's Auto Salvage Property.

Sediment Analytical Results

No sediment samples were collected from the Shuster's Auto Salvage Property.

Remedial Investigation Report South Wilmington Salvage Yards (Environmental Alliance, 2001)

In November 2000, Environmental Alliance completed a Remedial Investigation (RI) on behalf of the South Wilmington Salvage Yards (SWSY). The SWSY RI involves eight properties (approximately 26 acres) in the vicinity of the Christina River in South Wilmington. The eight properties addressed by this RI include:

- A-1 Auto Parts
- Don Wilson's Auto Parts
- Merkin Auto Spring Co., Inc.

- Junior's Auto Parts
- Two Guys Auto Parts
- American Tank Trailer Cleaning Co.
- Casper's Auto Parts
- Shuster's Auto Salvage

During this investigation, a total of 30 surface soil samples and 4 deep soil samples were collected across the study area. The samples were field screened using a Photo Ionization Detector (PID); submitted for screening at DNREC's laboratory for VOCs, SVOCs, metals, PCBs and pesticides; and select samples were submitted for confirmatory analysis at Lancaster Laboratories. The samples selected for confirmatory analysis were analyzed for VOCs, SVOCs, metals, PCBs/pesticides, ethylene glycol, tetraethyl lead, total petroleum hydrocarbons diesel range organics (TPH-DRO), volatile petroleum hydrocarbons (VPH), and/or extractable petroleum hydrocarbons (EPH). Additionally, synthetic precipitation leaching procedure (SPLP) and toxicity characteristic leaching procedure (TCLP) metal analysis was performed on select soil samples.

Groundwater samples were collected from four soil borings locations (GP02 at Two Guy's Auto Parts, GP-11 at Merkin Auto Springs Co., Inc., GP-14 at American Tank Trailer Cleaning Co., and GP-15 at Casper's Auto Parts. In addition, groundwater samples were collected from three of the four previously existing monitoring wells in the study region. The wells incorporated into this RI include MW-4 (A-1 Auto Parts), MW-5 (across the street from Don Wilson's Auto) and MW-7 (Shuster's Auto Salvage).

A total of 7 sediment samples were collected from the potential tributary that transects Garasches Lane and the drainage ditch south of the A.M. Domino, A-1 Auto Parts, and Two Guys Auto Parts properties.

A total of 5 surface water samples were collected where surface water was present. The following is a summary of analytical results that were collected from the Shuster's Auto Salvage property as part of this investigation.

Soil Analytical Results

Three surface soil samples were collected from locations EX-13, EX-14, and EX-15. No PID screening readings or DNREC screening analysis was completed for these samples. Soil sample EX-14 was analyzed for TCL VOCs, TCL SVOCs, VPH, EPH, TPH-DRO and total metals analyses at Lancaster Laboratories. In addition samples EX-13 and EX-15 were analyzed for total metals and TPH-DRO at Lancaster Laboratories. Arsenic was detected above its restricted

use URS at one of the three locations, EX-13. The TPH-DRO analysis for all three sample locations (EX-13, EX-14, and EX-15) reported high concentrations of 7,100 mg/kg, 25,000 mg/kg, and 1,300 mg/kg respectively. All other parameters were either not detected or were below their respective URS criteria.

Groundwater Analytical Results

A groundwater sample was collected from the MW-7 location and was analyzed for solely dissolved metals. Iron was detected above the URS level of 0.3 mg/l. All other parameters analyzed for were not detected or were below URS criteria.

Sediment Analytical Results

No sediment samples were collected at Shuster Auto Salvage Property.

Surface Water Analytical Results

No surface water samples were collected at Shuster Auto Salvage Property.

Summary and Conclusions

The following conclusions were reached for the Shuster Auto Salvage Property portion of the RI:

- The cumulative risk for the property Constituent of Concern (arsenic only) is 2.0×10^{-6} , which is below the HSCA target value of 1×10^{-5} risk.
- The groundwater aquifer sampled is not a potable source of water and public water is available to the SWSY area, therefore, exposure to groundwater is eliminated and not considered a concern.
- Visual observations of petroleum soil staining expected from salvage yard operations are not reflected in the Lancaster Laboratories analytical data above the HSCA URS levels. Continued use of the property as a salvage yard would not appear to significantly effect the soil or cause harm to workers, but a change in property use may require additional studies to determine potential hazards to human health and the environment.

Current Regulatory Status:

A Remedial Investigation Report was submitted to DNREC SIRB on June 13, 2001. On May 10, 2002 DNREC issued a response letter requesting that Environmental Alliance analyze more samples at the laboratory. Environmental Alliance attempted to negotiate with the property



owners concerning additional laboratory fees, but no owners agreed. In 2001 DNREC issued a Memorandum of Agreement. This document stated that a groundwater management zone shall be established in this area, no new public or domestic water supply wells shall be allowed or permitted, monitoring/observation/containment recovery wells may be installed in the GMZ area after review and approval, and permits may only be issued by the DWR and DAWM.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

PCBs were detected in three surface samples (TP19S, SS-15, and SS-16) at a maximum concentration of 0.100 mg/kg, which is below the unrestricted URS value of 1 mg/kg for total PCBs. One sample was identified in the subsurface unsaturated zone to contain PCBs. The value was from a screening result which indicated that there was greater than 0.5 but less than 1.0 mg/kg at sample location TP19-D. PCBs were detected in three sample locations (TP18-D, MW7B, and MW7C) in the subsurface saturated soil. Of those three samples only one was a quantitative result, 0.140 mg/kg (TP18-D), which is below the total PCBs unrestricted URS criteria of 1 mg/kg.

Due to the fact that there was only one quantitative detection reported in the surface soil and in the subsurface saturated soil these detected values were used in the calculations instead of calculating the 95% UCL of the mean across the site. There were no PCBs detected in groundwater but there are PCBs in the subsurface that are in contact with the groundwater (saturated soil). The saturated soil detection was evaluated through the equilibrium partitioning equation to approximate a groundwater concentration.

Concentrations of PCBs on Site			
Sample Matrix	Corresponding Figure	Analytical Methods	Range of Total PCBs
Surface Soil	Figure 2	Method 8082	Not detected to 0.10 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Immunoassay Kits	>0.5 mg/kg to <1.0 mg/kg
Subsurface Soil (saturated)	Figure 4	Method 8082	Not detected to 0.14 mg/kg
Ground Water	Figure 5	None	Not Analyzed

A summary of all samples collected for PCBs are presented in the attached Tables 1 and 2.

Acreage where PCBs detected:

The estimated surface soil area impacted by PCBs is 2.92 acres (Figure 2). The estimated subsurface non-saturated area impacted by PCBs is 2.23 acres in the vicinity of TP19 (Figure 3). The estimated area of saturated soils impacted by PCBs is 0.95 acres in the vicinity of TP18 (Figure 4).

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PCB Remediation Status:

The Shuster's Auto Salvage Property has not been required to perform any remediation activities as of September 30, 2008. A Memorandum of Agreement has been established by DNREC to restrict the use of groundwater in the area.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow and via groundwater transport were estimated for the Shuster's Auto Salvage property. A summary of the results is included below and the details of the calculations are included as attachments to this Appendix.

OVERLAND FLOW:

Overland flow has been determined on this site by using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE predicts the long term average annual rate of erosion on an area based on rainfall patterns, soil type, topography, cover/canopy factors and support management practices. These factors are site-specific and require information pertaining directly to the site. A breakdown of the individual factors is presented below with a brief explanation of their selection.

Ground Cover and Canopy:

A site inspection was performed to estimate the current site ground cover and canopy on August 28, 2008. The evaluation incorporated the use of aerial photography as well as the site visit due to the limited access to the site. The cover/management factor (C) assigned to the site and associated flow path is 0.45 from the USGS RUSLE2 model, which corresponds to bare ground. Photographs were unable to be taken because the site is a private property.

Site Sediment and Erosion Control Practices:

There are currently no erosion and sediment controls in place at the Shuster Auto Salvage property.

Input Factors and Results:

A breakdown of the individual factors is presented below with a brief explanation of their choice.

RUSLE Factors	Values	Explanation of Selection
R = rainfall-runoff erosivity index (10 ² ft-tonf-in/ac-hr)	170	An appropriate value for R for the site was determined from plots of Rainfall patterns for the Eastern U.S. (Wischmeier and Smith, 1978).
K = soil erodibility (0.01 tonf acre hr/acre ft-ton in)	0.316	The soil erodibility factor was chosen based on the information provided on the native soils. This information was collected from the boring logs of the South Wilmington Environmental Assessment Quadrants 3 and 4 Report (DNREC, 1996). The USGS model selected the value based on generalized soil type.

RUSLE Factors	Values	Explanation of Selection
LS = topographic factor (dimensionless)	0.093	The slope length was estimated to be 786 feet, which is the distance between the centroid and the Christina River along the overland flow path. The assumed slope (0.5 %) and slope length were used to calculate a topographic factor of 0.093.
C = cover/management factor (dimensionless)	0.450	The cover/management factor C was assigned to the site and associated flow path by the USGS windows based application was 0.450, which corresponds to bare ground.
P = support practice factor (dimensionless)	1.0	There are currently no sediment and erosion controls in place at the Shuster's Auto Salvage property.

The average annual erosion rate is based on the windows based RUSLE2 program (RUSLE2 License, version 2006-Jul-24).

Based on the calculations performed, the total PCB loading from the Shuster's Auto Salvage property to the Christina River via overland flow under current site conditions is 0.4 grams per year.

Uncertainty Analysis Associated with Overland Flow:

Specific Areas and Degree of Uncertainty for the Shuster's Auto Salvage Property

	Samples Per Acre (site)	Chemical Data Quality*	Topography	Soil Type	Site Coverage	Map Quality	Distance to Discharge Points
Site Specific Information	1.1	Immunoassay Kits	Estimated using topography	Logs that are located on-site	Based on a limited site assessment and through aerial photography	Sketched Drawings	786 feet
Degree of Uncertainty	Moderate to High	High	Moderate	Moderate	Moderate to High	High	High

* Primary analysis used in the historical samples

Sources of uncertainty for the Shuster Auto Salvage Property include the following: due restricted access to the site a thorough assessment of the property could not be conducted. Assumptions were taken from the aerial photography to assess the land cover. Sample coverage of the site was not extensive, so areas of concern could not be confined to smaller areas because of large data gaps. Reporting limits for all samples could not be found for all samples. Based on

these evaluations the overall level of uncertainty associated with PCB mass loading via overland flow from the Shuster's Auto Salvage Property is **moderate to high**.

GROUNDWATER DISCHARGE ANALYSIS

Groundwater discharge is based on the hydraulic conductivity of the soil, the groundwater gradient, and the cross-sectional area of the aquifer. A breakdown of the individual factors used in the Darcy equation is presented below.

Because PCBs were detected in saturated soil, but not in groundwater, the calculated concentration of PCBs in pore water, based on partitioning, was used to calculate the mass loading. The calculated PCB concentration in the pore water ranges from 0.03 to 0.15 µg/L. The calculations are presented in Table B in the groundwater transport calculations attachment.

Input Factors:

A breakdown of the individual factors is presented below with a brief explanation of their choice.

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	5.67	14.2	Drilling logs and test pit logs from the South Wilmington Environmental Assessment Quadrants 3 and 4 Report were used to evaluate the lithology beneath the site. The logs show that the groundwater being monitored is within a moderately coarse-grained fill unit that overlies the marsh deposit clay. The fill unit lithology ranges from sandy silt to silty sand. The hydraulic conductivity for sandy silt to fine-grained sand ranges from approximately 2×10^{-3} to 5×10^{-3} cm/sec (Cernica, 1995).
I = Horizontal Groundwater Gradient	0.021	0.029	Only one groundwater monitoring well was installed at Shuster's Auto Salvage; therefore, direct measurement of the horizontal hydraulic gradient was not possible. However, because the groundwater surface frequently mimics topography, an estimate of the gradient can be made based on surface slope. Based on measurements, the ground surface elevation decreases approximately 5 to 5.6 feet over the course of approximately 190 to 235 feet.
Saturated Thickness (ft)	1	3	Based on the logs, the saturated thickness was approximately 1 to at least 3 feet.
Lateral Discharge Distance (ft)	150	150	The lateral discharge distance was estimated to be equal to the length of the PCB impacted area (site width) measured perpendicular to the Christina River.
A = Cross-Sectional Area (ft ²)	150	450	Calculated from the saturated thickness and lateral discharge distance.

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
Groundwater PCB Concentration (ug/L)	0.03	0.15	The maximum concentration observed in the saturated subsurface soil (0.140 mg/kg) was used to determine the estimated concentration in groundwater.
Distance to Discharge point (ft)	Directly adjacent		Approximate distance from property boundary to closest surface water location.

Mass Loading Via Groundwater Transport Result:

The groundwater discharge is 506 to 5,200 L/day (attached Table A). The maximum detected PCB concentration (0.140 mg/kg) was used to calculate the groundwater concentrations for the loading estimate. The estimated minimum and maximum contaminant mass loading contributions are shown in the Table C in the groundwater transport calculations attachment, assuming that there are no contaminant losses due to degradation, dispersion, sorption, volatilization, etc.

The total PCB loading via groundwater discharge is between 0.03 and 0.3 grams per year (attached Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for the Shuster Auto Salvage

	Groundwater PCB Concentration	Hydraulic Conductivity	Horizontal Groundwater Gradient	Saturated Thickness	Lateral Discharge Distance	Distance to Discharge point
Site Specific Information	Partitioning based on maximum concentration observed in saturated soil	Based on site logs	Based on surface topography	Few detailed logs	Poor gradient defined and very limited data available	Directly adjacent
Degree of Uncertainty	High	Moderate	High	Moderate to High	High	Low

Based on this evaluation the overall uncertainty associated with groundwater discharge for the Shuster Auto Salvage is **moderate to high**.



Site References:

Environmental Alliance, 2001, Remedial Investigation Report, South Wilmington Salvage Yards
June 13, 2001.

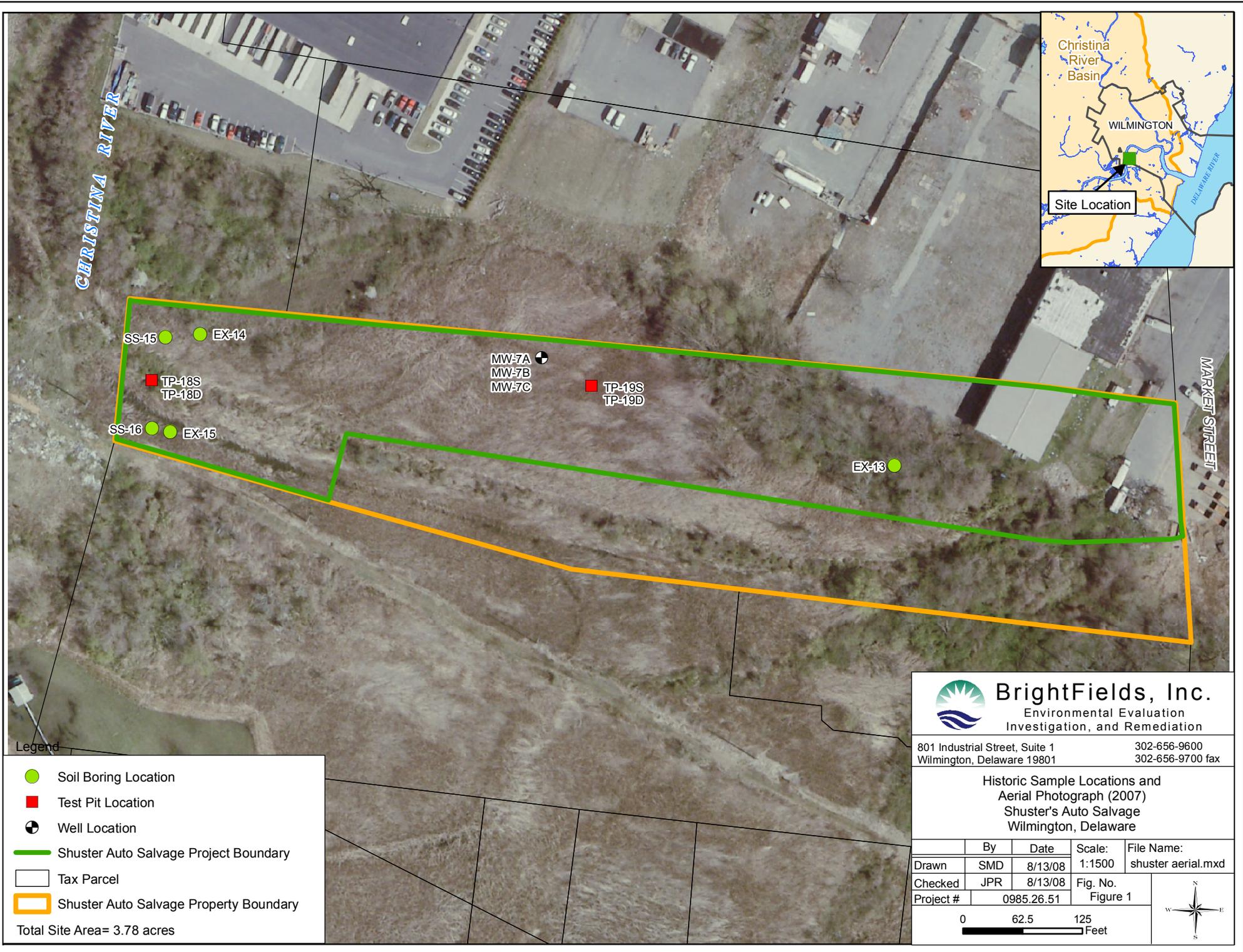
Delaware Department of Natural Resources and Environmental Control (DNREC) – Superfund
Branch, 1996, Environmental Assessment of the South Wilmington (East) Quadrants 3 and 4
Study Area, April 1996.

PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



BrightFields, Inc.

Figures



Legend

- Soil Boring Location
 - Test Pit Location
 - Well Location
 - Shuster Auto Salvage Project Boundary
 - Tax Parcel
 - Shuster Auto Salvage Property Boundary
- Total Site Area= 3.78 acres



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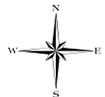
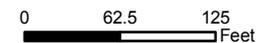
Environmental Evaluation
Investigation, and Remediation

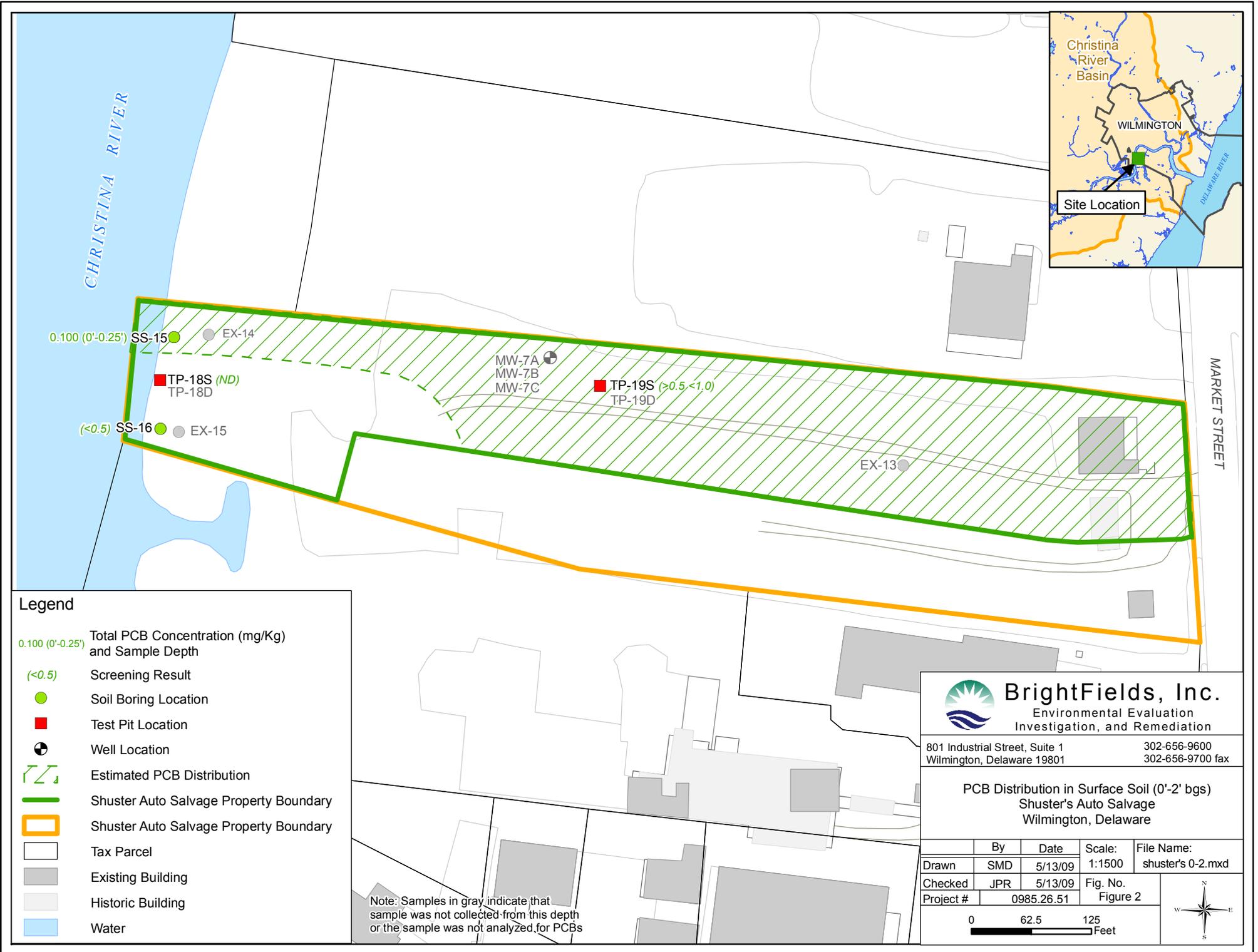
801 Industrial Street, Suite 1
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Historic Sample Locations and
Aerial Photograph (2007)
Shuster's Auto Salvage
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	8/13/08	1:1500	shuster aerial.mxd
Checked	JPR	8/13/08	Fig. No.	Figure 1
Project #	0985.26.51			





Legend

- 0.100 (0'-0.25') Total PCB Concentration (mg/Kg) and Sample Depth
- (<0.5) Screening Result
- Soil Boring Location
- Test Pit Location
- ⊙ Well Location
- ▨ Estimated PCB Distribution
- Shuster Auto Salvage Property Boundary
- ▭ Shuster Auto Salvage Property Boundary
- ▭ Tax Parcel
- Existing Building
- Historic Building
- Water

Note: Samples in gray indicate that sample was not collected from this depth or the sample was not analyzed for PCBs



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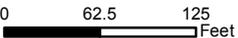
Environmental Evaluation
Investigation, and Remediation

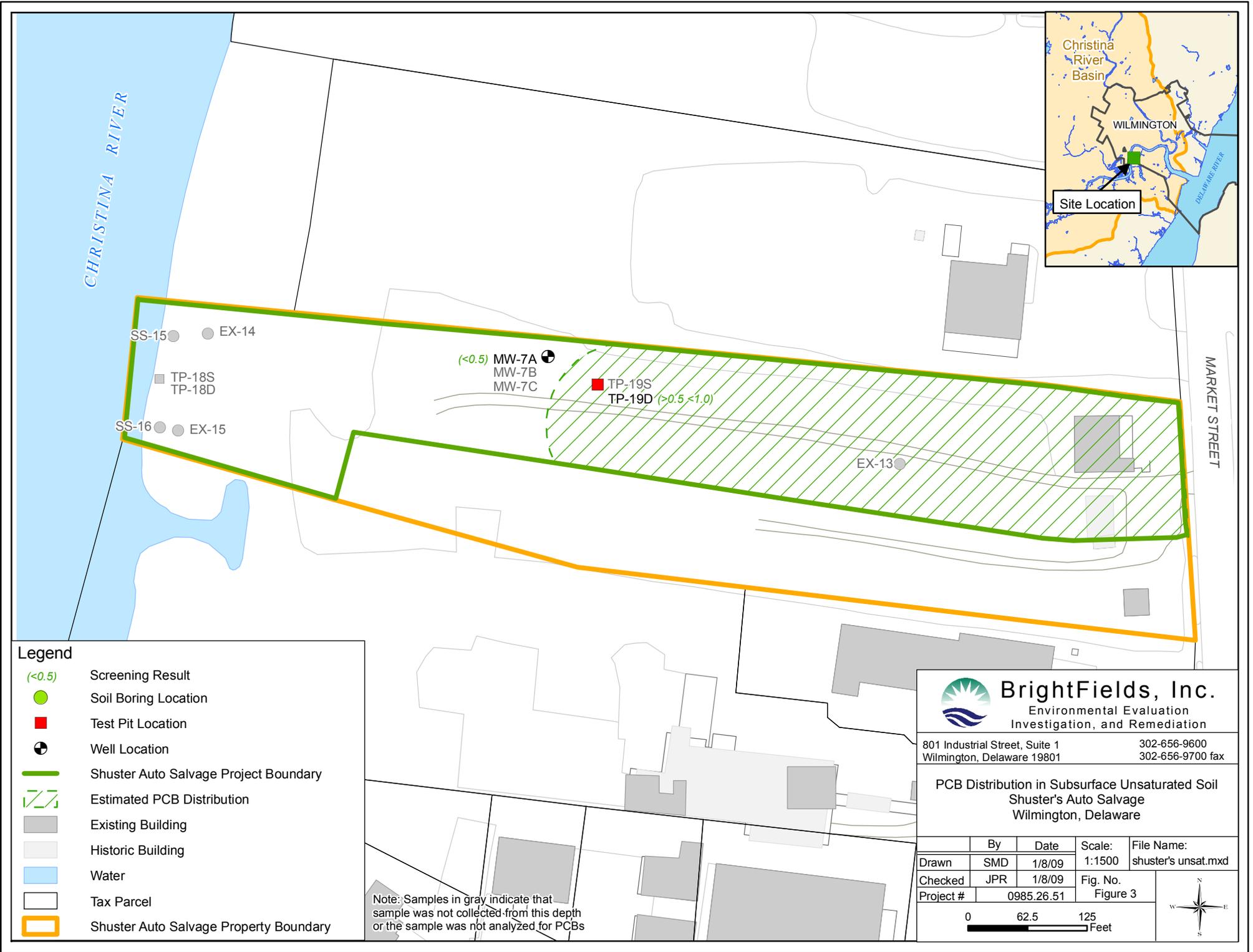
801 Industrial Street, Suite 1
Wilmington, Delaware 19801

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**PCB Distribution in Surface Soil (0'-2' bgs)
Shuster's Auto Salvage
Wilmington, Delaware**

	By	Date	Scale:	File Name:
Drawn	SMD	5/13/09	1:1500	shuster's 0-2.mxd
Checked	JPR	5/13/09	Fig. No.	Figure 2
Project #	0985.26.51			





Legend

- (<0.5) Screening Result
- Soil Boring Location
- Test Pit Location
- ⊕ Well Location
- Shuster Auto Salvage Project Boundary
- ▨ Estimated PCB Distribution
- Existing Building
- Historic Building
- Water
- Tax Parcel
- ▭ Shuster Auto Salvage Property Boundary

Note: Samples in gray indicate that sample was not collected from this depth or the sample was not analyzed for PCBs

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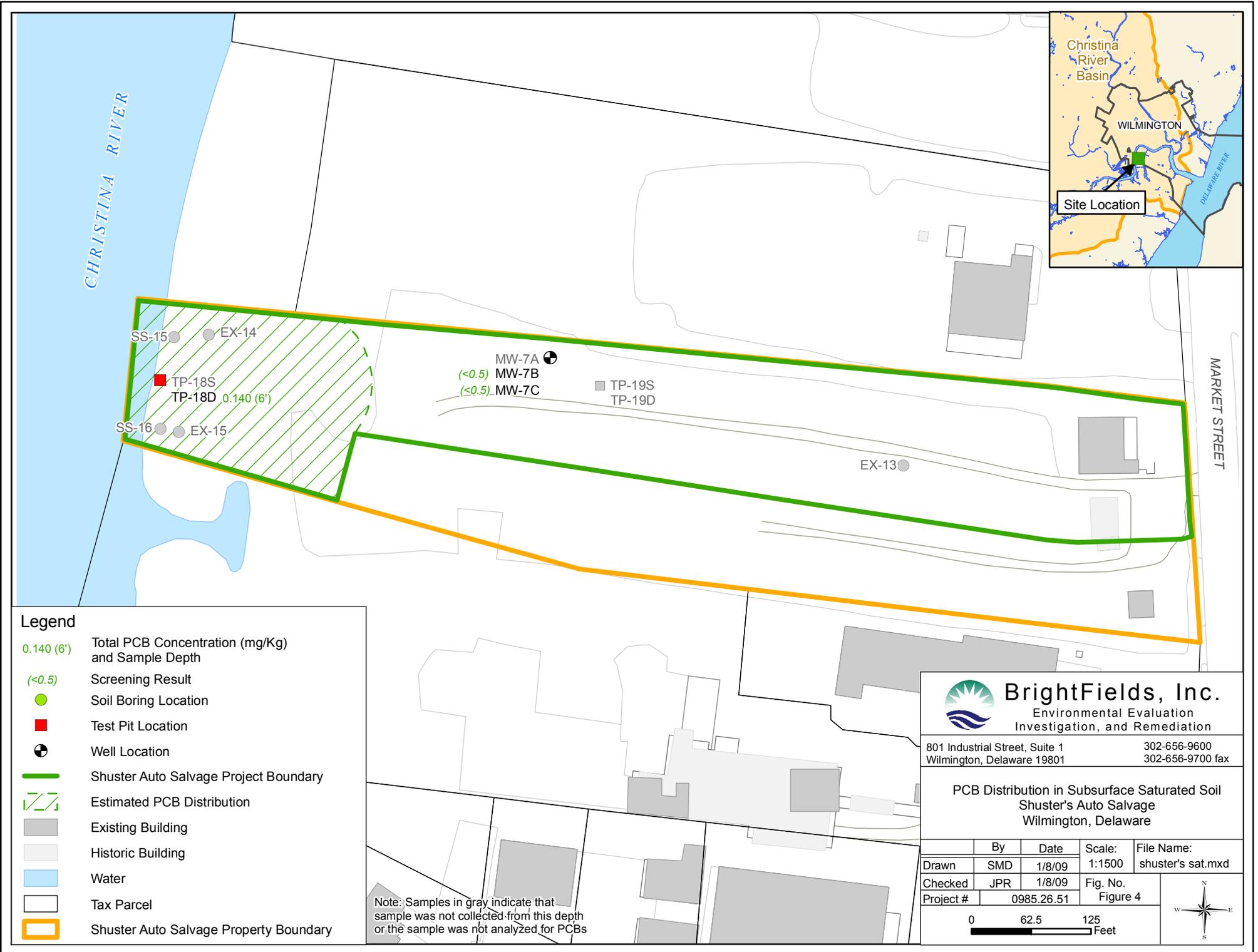
801 Industrial Street, Suite 1
 Wilmington, Delaware 19801

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 302-656-9700 fax

**PCB Distribution in Subsurface Unsaturated Soil
 Shuster's Auto Salvage
 Wilmington, Delaware**

	By	Date	Scale:	File Name:
Drawn	SMD	1/8/09	1:1500	shuster's unsat.mxd
Checked	JPR	1/8/09	Fig. No.	Figure 3
Project #	0985.26.51			

0 62.5 125 Feet



Legend

- 0.140 (6') Total PCB Concentration (mg/Kg) and Sample Depth
- (<0.5) Screening Result
- Soil Boring Location
- Test Pit Location
- ⊕ Well Location
- Shuster Auto Salvage Project Boundary
- ▨ Estimated PCB Distribution
- Existing Building
- Historic Building
- Water
- Tax Parcel
- ▭ Shuster Auto Salvage Property Boundary

Note: Samples in gray indicate that sample was not collected from this depth or the sample was not analyzed for PCBs



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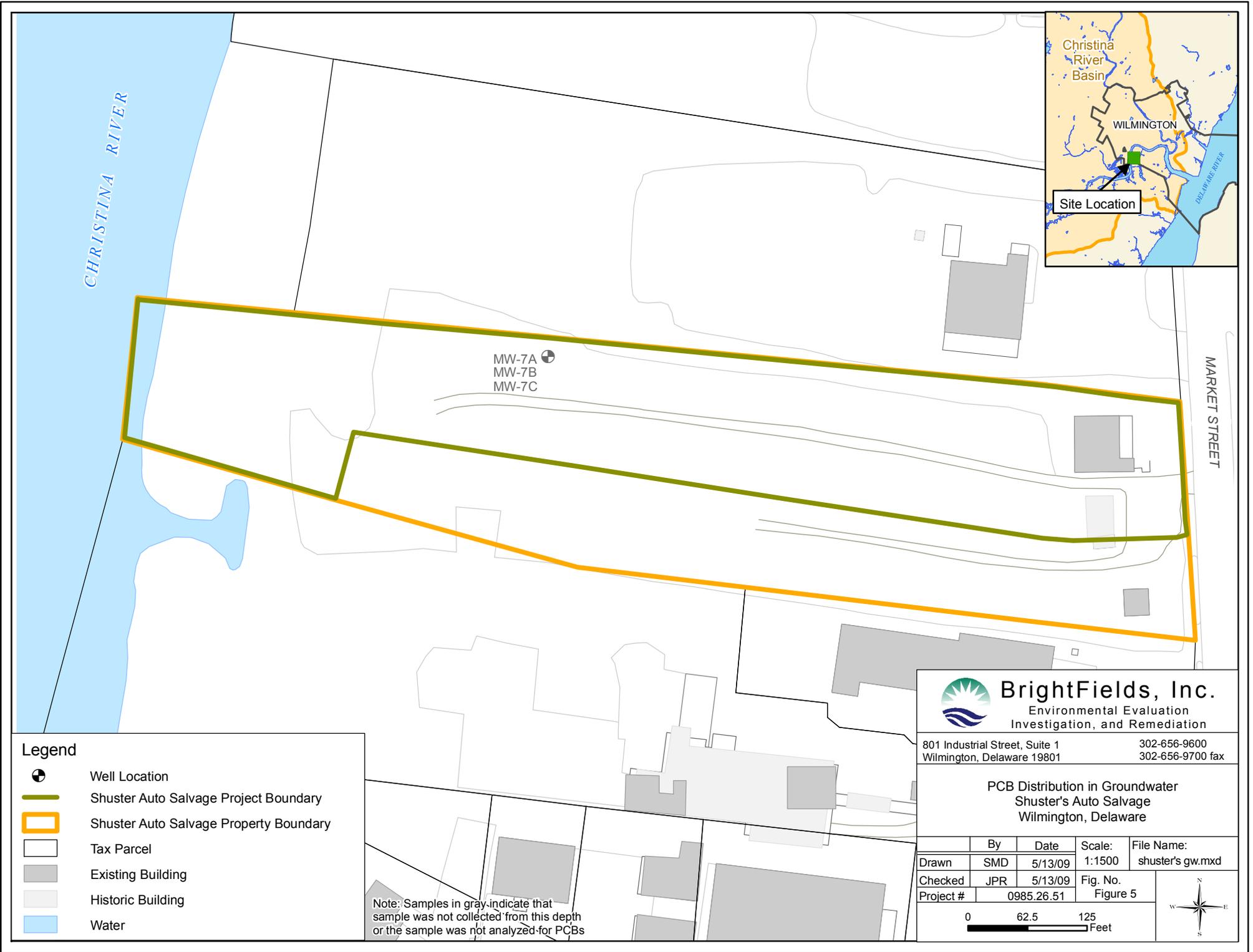
**PCB Distribution in Subsurface Saturated Soil
Shuster's Auto Salvage
Wilmington, Delaware**

	By	Date	Scale:	File Name:
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Checked	JPR	1/8/09	Fig. No.	Figure 4
Project #	0985.26.51			

0 62.5 125

Feet





MW-7A
MW-7B
MW-7C

MARKET STREET

Legend

- Well Location
- Shuster Auto Salvage Project Boundary
- Shuster Auto Salvage Property Boundary
- Tax Parcel
- Existing Building
- Historic Building
- Water

Note: Samples in gray indicate that sample was not collected from this depth or the sample was not analyzed for PCBs



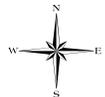
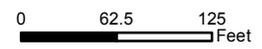
BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation

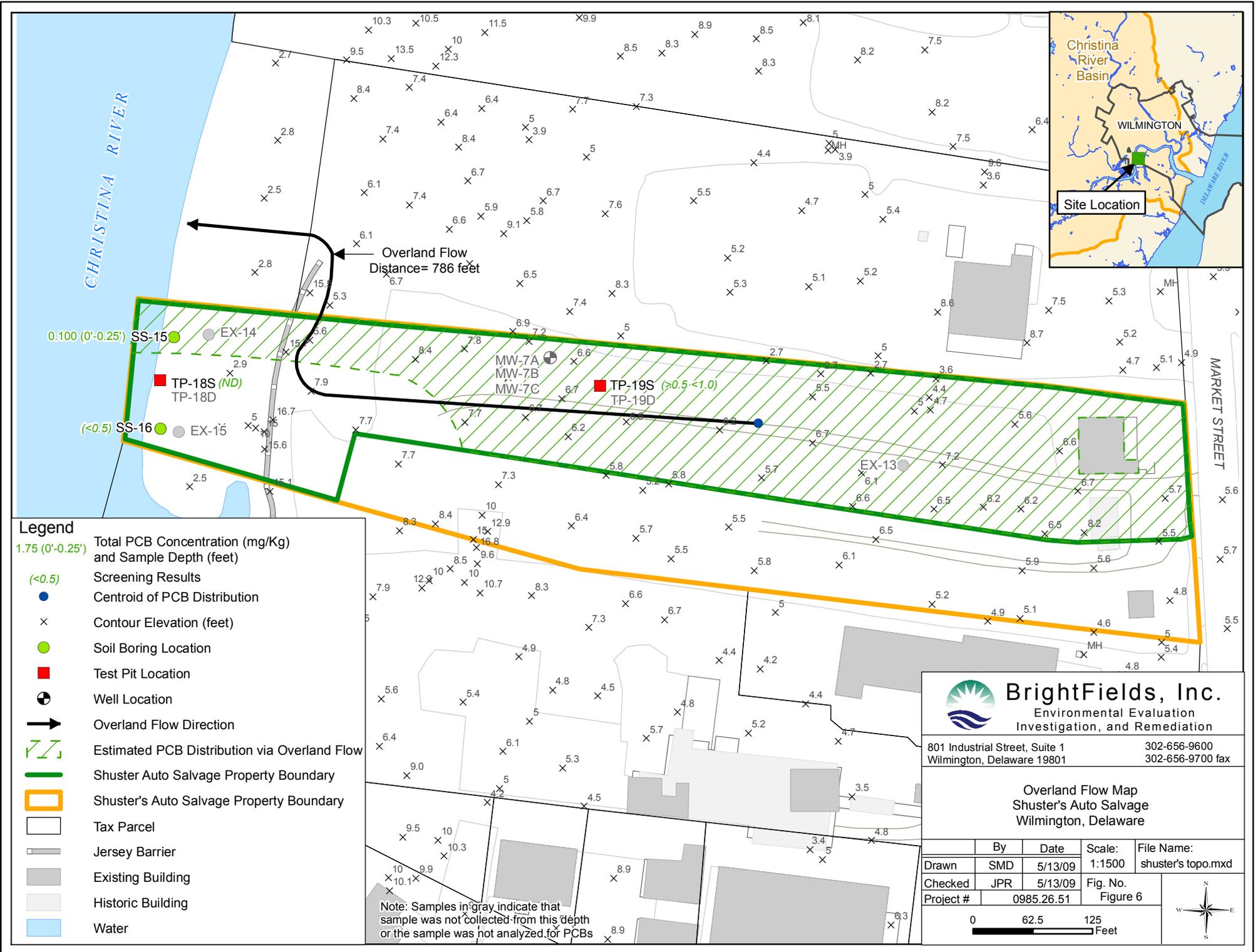
801 Industrial Street, Suite 1
Wilmington, Delaware 19801

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**PCB Distribution in Groundwater
Shuster's Auto Salvage
Wilmington, Delaware**

	By	Date	Scale:	File Name:
Drawn	SMD	5/13/09	1:1500	shuster's gw.mxd
Checked	JPR	5/13/09	Fig. No.	Figure 5
Project #	0985.26.51			





Legend

- 1.75 (0'-0.25')
- (<0.5)
- Centroid of PCB Distribution
- × Contour Elevation (feet)
- Soil Boring Location
- Test Pit Location
- ⊕ Well Location
- ➔ Overland Flow Direction
- ▨ Estimated PCB Distribution via Overland Flow
- ▭ Shuster Auto Salvage Property Boundary
- ▭ Shuster's Auto Salvage Property Boundary
- ▭ Tax Parcel
- ▭ Jersey Barrier
- ▭ Existing Building
- ▭ Historic Building
- ▭ Water

Note: Samples in gray indicate that sample was not collected from this depth or the sample was not analyzed for PCBs



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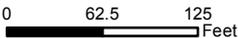
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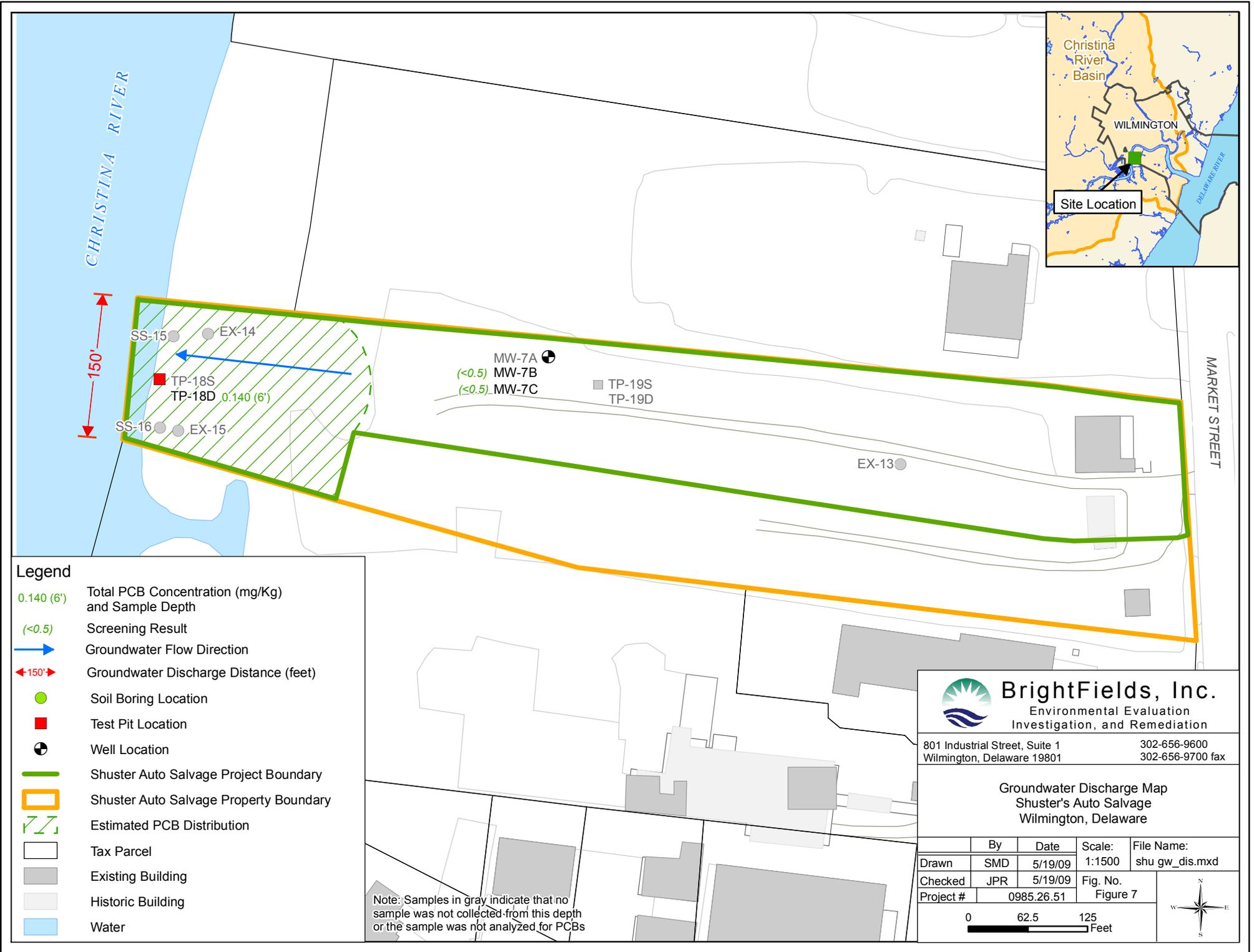
801 Industrial Street, Suite 1
Wilmington, Delaware 19801

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**Overland Flow Map
Shuster's Auto Salvage
Wilmington, Delaware**

By	Date	Scale:	File Name:
Drawn SMD	5/13/09	1:1500	shuster's topo.mxd
Checked JPR	5/13/09	Fig. No.	Figure 6
Project #	0985.26.51		





Legend

- 0.140 (6') Total PCB Concentration (mg/Kg) and Sample Depth
- (<0.5) Screening Result
- Groundwater Flow Direction
- ↔150' Groundwater Discharge Distance (feet)
- Soil Boring Location
- Test Pit Location
- ⊕ Well Location
- Shuster Auto Salvage Project Boundary
- Shuster Auto Salvage Property Boundary
- Estimated PCB Distribution
- Tax Parcel
- Existing Building
- Historic Building
- Water

Note: Samples in gray indicate that no sample was not collected from this depth or the sample was not analyzed for PCBs



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Groundwater Discharge Map
Shuster's Auto Salvage
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	5/19/09	1:1500	shu_gw_dis.mxd
Checked	JPR	5/19/09	Fig. No.	Figure 7
Project #	0985.26.51			

0 62.5 125

Feet



PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



BrightFields, Inc.

Tables

Table 1
 PCB Analytical Results For Soil
 Shuster Auto Salvage Property
 Wilmington, DE
 SIRB ID: DE-1178

Sample ID Sampling Depth (feet bgs) Sampling Date Units Report Issued	DNREC URS for Protection of Human Health Non-critical Water Resource Area mg/Kg		TP18-D 6.0 7/17/95 mg/Kg DNREC (1998)
	Unrestricted Use	Restricted Use	
PCBs			
Aroclor-1016	5	82	ND
Aroclor-1221	0.3	3	ND
Aroclor-1232	0.3	3	ND
Aroclor-1242	0.3	3	ND
Aroclor-1248	0.3	3	ND
Aroclor-1254	0.3	3	ND
Aroclor-1260	0.3	3	0.1 J 0.14 J

DNREC (1998) - South Wilmington Assessment Quadrants 3 & 4

Qualifiers

- U - The compound was not detected above the indicated laboratory detection limit
- NR - Not analyzed
- ND - Not Detected, but reporting limit could not be found for sample
- nca - no criteria available
- bold - concentration is above DNREC URS unrestricted use criteria
- shaded - concentration is above DNREC URS restricted use criteria

Table 2
 DNREC PCB Screening Data
 Shuster Auto Salvage Property
 Wilmington, DE
 SIRB ID: DE-1178

Sample ID	Sample Depth	Investigation Report	Sample Date	DNREC URS for Protection of Human Health (Non-critical Water Resource Area) Unrestricted Use (mg/kg)	Total PCBs (mg/kg)
TP-18S	0.33'	DNREC (1998)	7/17/95	1	ND
SS-16	0'-0.25'	DNREC (1998)	7/17/95	1	<0.5
TP-19S	0.5'	DNREC (1998)	7/17/95	1	>0.5<1.0
MW-7A	2-4'	DNREC (1998)	8/30/95	1	<0.5
MW-7C	6-8'	DNREC (1998)	8/30/95	1	<0.5
MW-7B	4-6'	DNREC (1998)	8/30/95	1	<0.5

DNREC (1998) - South Wilmington
 Assessment Quadrants 3 & 4

Qualifiers:

ND - compound was not detected

Bold - concentration exceeds URS

nca - no criteria available

PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



BrightFields, Inc.

Site Photographs (Not Applicable)

PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



BrightFields, Inc.

Overland Flow Calculations

**PCB Loading Calculations from the Universal Soil Loss Equation
Shuster Auto
Wilmington, DE
DE-1178**

Surface PCB Concentration 0.1 mg/kg

Symbol	Factor	Value	Units
R	Rainfall/Runoff Erosivity Index	170	10 ² ft-ton in/acre hr
K	Soil Erodibility	0.316	0.01 ton acre hr/ac ft-ton in
	Estimated Slope Length	786	Feet
	Estimated Elevation Difference	3.7	Feet
	Slope	0.5	Percent (ft/ft)
	Erodeable Area	2.92	Acres
LS	Topographic Factor	0.093	Dimensionless
C	Cover and Management Factor	0.45	Dimensionless
P	Support Practice Factor	1	Dimensionless
	Average Annual Soil Loss	1.600	ton/ac/yr

PCB Loading via Overland Flow 0.424 **grams/year - PCBs**

Shuster Auto Salvage Property Overland Flow Calculations

Location: USA\Delaware\New Castle County

Net C factor: 0.45
 Net LS factor: 0.093
 Net K factor: 0.32
 Net contour factor: 1.0
 Net ridge factor: 1.0
 Net ponding factor: 0.72

Rock cover, %: 0
 Adjust rock cover: open
 General yield level: Set by user
 Surf. res. cov. values: Surf. cover
 Adjust res. burial level: Normal res. burial

Soil conditioning index: open

Energy use for entire simulation, BTU/ac: 0

Energy use for entire simulation, gal/ac: 0
 Fuel cost for entire simulation, US\$/ac: 0

Align of oper on segments: General composite segment info | Biomass by layer | Biomass summary | C subfactor by day | C subfactor by period | C subfactor by operation
 Ridges_contour by day | Erosion by day | Erosion by period | Erosion by operation | Erosion by year | Extra C, L, crit. length values | Hydrology | Management output by day
 Management output by period | Residue values | Roughness | STRIPS_AND_BARRIERS | MANAGEMENT_STRIP_BUILDER | Runoff / Sediment overall results
 Runoff / Sediment results by day | Sediment results by flow path | Sediment by segment | Sediment by segment by day | Soil output by day | Yield values | Visuals | Info
Soil | MISC_CALCULATIONS1 | Topography | Management | Strips / Barriers | Irrigation / Subsurface drainage | Diversion/terrace, sediment basin

Soil: Slope Soils

Segment	Soil	Seg length (horiz), ft	Soil loss, t/ac/yr	Sed. del., t/ac/yr	Consolidatio n time, yr
+	-				
1	Generic Soils\loam (low-mod OM)	790	1.6	1.6	7

Manage Soil Topo

Add break | Erase break

Avg. slope steepness, %: 0.50
 Detachment on slope, t/ac/yr: 1.6
 Sediment delivery, t/ac/yr: 1.6

Slope length (horiz), ft: 790
 Soil loss erod. portion, t/ac/yr: 1.6
 Soil loss for cons. plan, t/ac/yr: 1.65
 T value, t/ac/yr: 3.0

Crit. slope length, ft: []

Fuel type for entire run: [none]

PCB Mass Loading
Shuster Auto Salvage
SIRB ID: DE-1178
Wilmington, Delaware



BrightFields, Inc.

Groundwater Transport Calculations

**PCB Loading Calculations - Groundwater Discharge to Surface Water
Shuster Auto Salvage Site
Wilmington, DE
DE-1178**

**TABLE A
Groundwater Discharge Calculations**

Location	Hydraulic Conductivity (K) (ft/day)	Horizontal Gradient (i) (ft/ft)	Cross-sectional Area (A) (ft ²)	Groundwater Discharge*	
				Liters/day	Gallons/day
TP18					
Minimum	5.67	0.021	150	510	130
Maximum	14.2	0.029	450	5,200	1,400

* - Groundwater Discharge (Q) = KiA

**TABLE B
Potential Groundwater PCB Concentration Calculation**

Location	Maximum Soil PCB (µg/kg)	f _{oc} (fraction of organic carbon)		Pore Water PCB (µg/L)	
				Minimum	Maximum
TP18	140	0.01	0.05	0.031	0.15

**TABLE C
Estimated Mass Loadings of PCBs in Groundwater to Surface Water**

Location	Subsurface Soil Concentration/ Converted to Pore Water Concentration (µg/L)	Estimated PCB Mass Loading (g/yr)	
		Minimum	Maximum
TP18	0.15	0.028	0.29