

PCB Mass Loading
Meco Drive/Wayman Fire Protection
SIRB ID: DE-1103
Wilmington, Delaware



BrightFields, Inc.

Appendix 19

MECO DRIVE/WAYMAN FIRE PROTECTION NEW CASTLE COUNTY, DELAWARE

SIRB ID: DE-1103

GENERAL SITE INFORMATION

Site Name: Meco Drive/Wayman Fire Protection

SIRB ID Number: DE-1103

Site Location and Description: The Meco Drive/Wayman Fire Protection (Meco Drive) property is combination of several adjacent sites. The site encompasses the Wayman site, the Boxwood Industrial Park site, and adjacent Meco Drive properties where free product was encountered, including: 401, 403, 404, 406, 407, 408, 410, and 412 Meco Drive. Meco Drive lies north of Interstate 95 and southeast of Maryland Ave., immediately west of the Little Mill Creek in New Castle County, Delaware (Figure 1).

Previous Site Uses:

As mentioned the site is composed of seven separate parcels totaling approximately 10.6 acres in size in New Castle County southwest of the City of Wilmington. The site has been historically linked to the release of an oily free product in the subsurface that discharges into a drainage culvert and into Little Mill Creek.

An Elizabeth Tavani owned the entire site area from the time period of 1930 to about 1958. After which various construction companies owned portions of the property. During the 1960s the area was thought to be used as a dumping facility. Evidence determining the source of the free product has never been established.

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.

Release of an Oily Seep (December 1986)

Meco Drive Site a.k.a Boxwood Industrial Park site was releasing oily free product to Little Mill Creek. As part of this investigation DNREC sampled the free product. The laboratory analysis showed very low levels of volatile organic compounds (VOCs) and metals cadmium, chromium, and lead at much greater concentrations. DNREC was unable to identify the source of contamination during this initial assessment.

Sediment Sampling (Duffield, May 1998)

Duffield Associates, on behalf of the owner, collected three sediment samples and one surface water sample from the drainage ditch in the vicinity of the oil seep. These samples were submitted to AccuQual Laboratories in New Castle, Delaware, for laboratory "GC-Fingerprint analysis" intended to identify hydrocarbons in the range from gasoline to motor oil. The comparison showed that the oil did not have any distinguishable hydrocarbon pattern of normal gasoline range organics (GRO) or diesel range organics (DRO). Unidentifiable hydrocarbon patterns were noted. Exact locations of these samples were never noted on a map.

Two additional sediment samples were collected after this sampling event. This sampling event indicated that the samples contained different concentrations of compounds that were of separate source materials.

Subsurface Investigation (Duffield, June-July 1998)

Duffield Associates advanced 18 borings for the collection of 18 subsurface soil samples. These samples were analyzed for high range organics (HRO) and DRO. Concentrations of HRO and DRO were found in 7 of the 18 samples collected. An additional twelve samples were collected to further delineate the area, which contained evidence of hydrocarbon contamination.

Sampling Site Inspection Report (Tetra Tech, July 2000)

Thirty-seven wells were installed to delineate presence of free product at the Meco Drive Site. The conclusions from this evaluation stated that there is no direct source of the contamination. The intermittent occurrence of the product within the fill unit suggests that the product(s) were present within the fill material as it was placed. Tetra Tech also reviewed files from DNREC's Underground Storage Tank Branch to verify that the contamination was not from a source other than the fill material. The two types of product encountered during the investigation did not match any known fuel oil standard, which further suggests that the contamination was not from any active leaking underground storage tank(s).

Current Regulatory Status:

An Amended Final Plan of Remedial Action (FPRA) was issued in September 2006, which outlined the remedial action objectives for the site. The remedy consisted of the excavation of a trench to intercept and divert the down gradient flow of the light non-aqueous phase liquid

(LNAPL) and contaminated groundwater prior to its discharge into the existing drainage swale. The trench will be constructed using a 24"- diameter perforated corrugated pipe, and clean crushed stone as backfill. The LNAPL and groundwater collected within the trench will be gravity fed into an oil/water separator and the treated water will be discharged into the county sewer system. The FPRA also required an environmental covenant, which prevents any land disturbing activities on the site prior to written consent from DNREC. In addition, the land will need to remain as industrial/commercial use in the future to maintain the assumptions of the human health risk assessment. Lastly DNREC recommended the southwest area of Wilmington enter into a groundwater management zone to prevent contact with shallow groundwater. The passive remediation trench was in place when the site visit was conducted on November 11, 2008.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

PCBs were detected in six soil samples collected from the Meco Drive property at total PCB concentrations ranging from 0.061 mg/kg to 2.1 mg/kg, quantified values. Two of these detections were reported from the DNREC-SIRB laboratory, which reported the qualitative measurement as greater than 0.5 mg/kg but below 10 mg/kg.

There was only one detection in the surface soil at the Meco Drive property, so this detected value was used in the calculations instead of calculating the 95% upper confidence level (UCL) of the mean across the site. In addition the detection observed in the surface soil was a screening value of greater than 0.5 mg/kg but less than 10 mg/kg. In these instances BrightFields assumed that the quantified concentration in the soil was 5 mg/kg.

Three detections were observed in the subsurface saturated zone, but this was not enough detections to run the appropriate 95 % UCL of the mean for the site in this zone. Instead BrightFields used the maximum detected quantified value of 0.234 mg/kg for the groundwater partitioning equations.

It should also be noted that PCBs were detected in sediment adjacent to 404 Meco Drive at 83.7 and 27.6 mg/kg.

Concentrations of PCBs on Site			
Sample Matrix	Corresponding Figure	Analytical Methods	Range of Total PCBs
Surface Soil	Figure 2	Immunoassay	Not detected to >0.5 <10 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Method 8082	Not detected to 2.1 mg/kg
Subsurface Soil (saturated)	Figure 4	Method 8082	Not detected to 0.234 mg/kg
Groundwater	Figure 5	Not Applicable	Not Applicable

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

Acreage where PCBs detected:

The total area associated with surface soils impacted by PCBs is 0.16 acres of which only 0.03 acres may be still contributing to via overland flow. The other 0.13 acres has been determined through the site cover evaluation to be under an impervious surface. The total area of subsurface

non-saturated soils impacted by PCBs is 3.17 acres. The total area of subsurface saturated soils impacted by PCBs is 2.24 acres.

PCB Remediation Status:

Currently the Meco Drive property contains a passive oil recovery remediation system. The only area of soil removed from site occurred during the excavation of the recovery trench. No PCB removal was required or planned for the site.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow and via groundwater transport were estimated for the Meco Drive site. 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 specific factors are site specific and rely on local information of the site. A breakdown of the individual factors is presented below with a brief explanation of their choice.

Ground Cover and Canopy:

A site inspection was performed on November 11, 2008 to estimate the current site ground cover and canopy. During the site visit the boring 2-10 was located on the edge of tributary that led to Little Mill Creek. The sample looks like it could have been collected from the edge of the asphalt parking lot. The surface cover in this area consisted of an erosion control blanket to reinforce the hay straw and seeding. This corresponded to a groundcover of approximately 60% consisting of grass and weeds.

Site Sediment and Erosion Control Practices:

The only sediment and erosion control observed on site was the erosion control blanket on the edges of the creek. No silt fencing was being utilized at the time of the site inspection.

Input Factors and Results:

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

Meco Drive Property

USLE Factors	Values Provided	Explanation of choice
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)	0.42	The soil erodibility factor was chosen based on the information provided by the boring log represented for MWP-2-10 in the Sampling Site Inspection Final Report of Findings (Tetra Tech 2000).
ls = topographic factor (dimensionless)	2.7	The slope length was estimated to 15 feet, which is the distance between the site and the discharge location along the overland flow path. The assumed slope (33.3 %) and slope length were used to calculate a topographic factor of 2.7 from the USGS windows based application.
C = cover/management factor (dimensionless)	0.062	The cover/management factor C assigned to the site by the USGS windows based application was 0.062, which corresponds to approximately a 60% cover with grass, tall weeds and short brush.
P = support practice factor (dimensionless)	1	To provide a more conservative estimate the sediment erosion blanket that was used only on a portion of the site was no taken into account as a support practice factor.

Because of the mathematics, you cannot simply take the net factors and multiply them to give the average annual erosion rate.

The total PCB loading via overland flow for Meco Drive is 1.5 grams per year. Please see attached table for specific variables.

Uncertainty Analysis Associated with Overland Flow

Specific Areas and Degree of Uncertainty for the Meco Drive

	Samples Per Acre (site)	Chemical Data Quality*	Topography	Soil Type	Site Coverage	Map Quality	Distance to Discharge Point
Site Specific Information	0.8	Immunoassay	Estimated based on the visual inspection.	Detailed logs that are located within the area of concern	Based on a thorough site assessment.	Scaled Map	15 feet
Degree of Uncertainty	Moderate to High	High	High	Low	Low	Moderate	Low

* Primary analysis used in the historical samples

Areas of uncertainty for the Meco Drive Site include the following: topography is not well documented in the area, so BrightFields had to estimate the change in elevation from the surface to the bottom of the drainage ditch to determine an appropriate slope. The surface detection used in the calculations was based on qualitative screening sample. BrightFields assigned a quantitative value based on screening data. During the site inspection BrightFields observed that the drainage ditch on the southeast portion of the property was utilizing sediment and erosion control for stabilization purposes. BrightFields did not think that this served as a support practice factor for overland flow calculations. Based on these evaluations the overall level of uncertainty associated with PCB mass loading from the Meco Drive site is **moderate**.

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 0.022 to 11.0 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)	14.2	42.5	Drilling logs from Geoprobe® /Earthprobe borings were used to evaluate the lithology beneath the site. An examination of the drilling logs shows that the groundwater being monitored is within a fill unit composed of fine to medium grained sand that overlies the marsh deposit clay. The hydraulic conductivity for fine to medium sand ranges from approximately 5×10^{-3} to 1.5×10^{-2} cm/sec (Cernica, 1995).
I = Horizontal Groundwater Gradient (ft/ft)	0.027	0.037	Groundwater elevations were collected in the wells at the site by Tetra Tech. Tetra Tech calculated that the horizontal gradient from these measurements ranged from approximately 0.027 to 0.037 ft/ft and is roughly radial, flowing toward the southeastern drainage ditch and Little Mill Creek.
Saturated Thickness (ft)	4.1	5.1	Based on the borings logs, the mean saturated zone above the marsh deposits is 4.1 feet and the 95% UCL of the mean thickness is 5.1 feet.
Lateral Discharge Distance (ft)	130	300	The lateral discharge distance was approximated to be equal to the length of the PCB impacted area measured perpendicular to the groundwater flow.
A= Cross-Sectional Area (ft ²)	533	1,530	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (µg/L)	0.257	0.051	The maximum concentration observed in the saturated subsurface soil (0.234 mg/kg) was used to determine the estimated concentration in groundwater.
Distance to Discharge point (ft)	25 to 150		Approximate distance from property boundary to closest surface water location.

Mass Loading Via Groundwater Transport Result:

The groundwater discharge is 5,790 to 68,100 L/day (attached Table A). The maximum detected PCB concentration (0.234 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 0.5 and 7.5 grams per year (attached Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for the Meco Drive Property

	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 detailed site logs.	Few points with limited number of groundwater measurements.	Few good quality logs	Good groundwater gradient defined and a moderate number of samples collected onsite.	25 to 150 feet
Degree of Uncertainty	High	Moderate	Moderate	Moderate	Moderate	Moderate

Based on this evaluation the overall uncertainty associated with the Meco Drive Property is **moderate**.



Site References:

Delaware Department of Natural Resources and Environmental Control (DNREC), 2006, Amended Final Plan of Remedial Action for the Meco Drive/Wayman Fire Company Site. September 2006.

Duffield Associates (Duffield), 1998, Duffield Sediment Sampling. May, 1998.

Duffield, 1998, Subsurface Investigation. June-July, 1998.

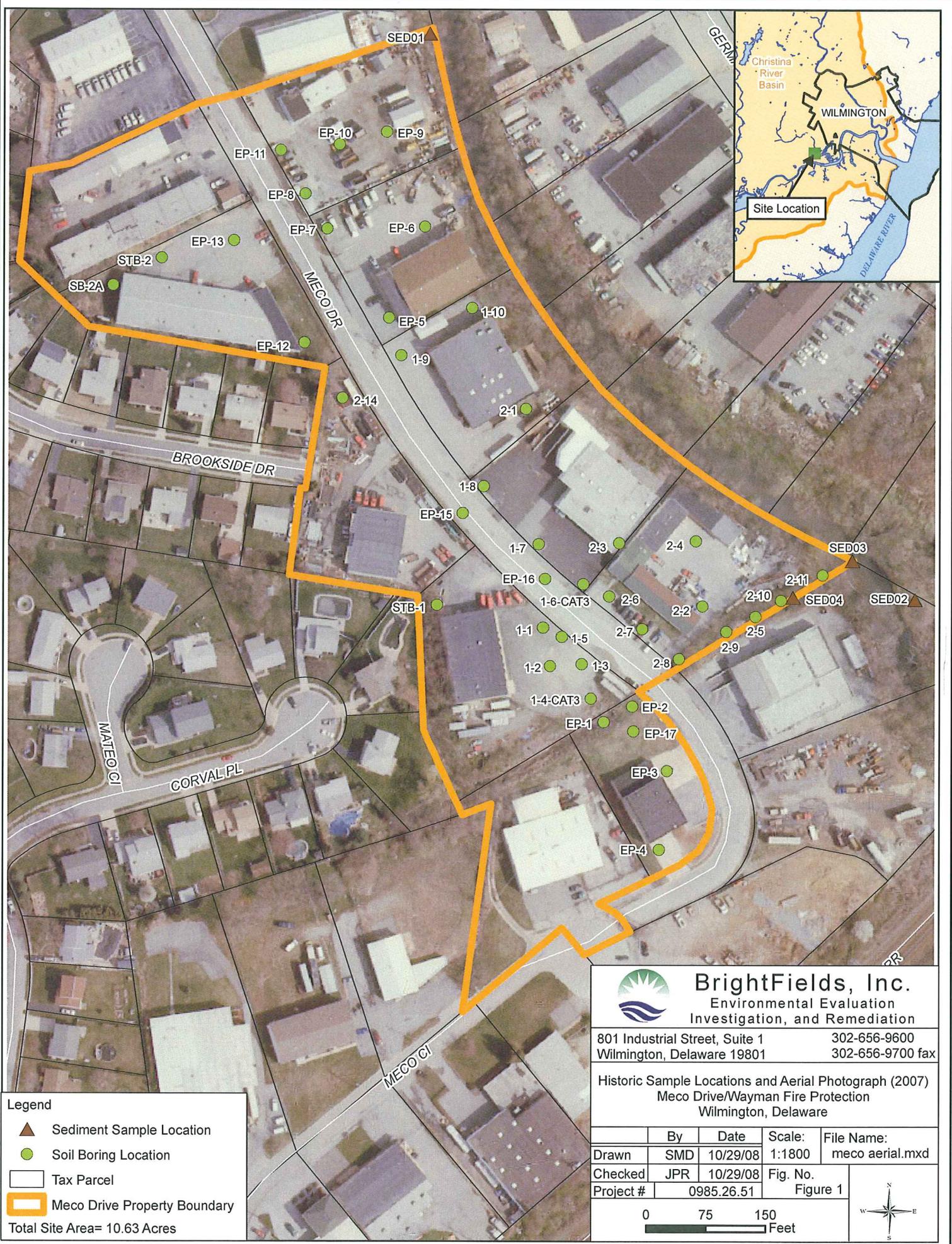
Tetra Tech, July 2000, Sampling Site Inspection Final Report of Findings. July, 2000.

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Figures



Legend

- Sediment Sample Location
- Soil Boring Location
- Tax Parcel
- Mecco Drive Property Boundary

Total Site Area= 10.63 Acres



BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation

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Historic Sample Locations and Aerial Photograph (2007)
Mecco Drive/Wayman Fire Protection
Wilmington, Delaware

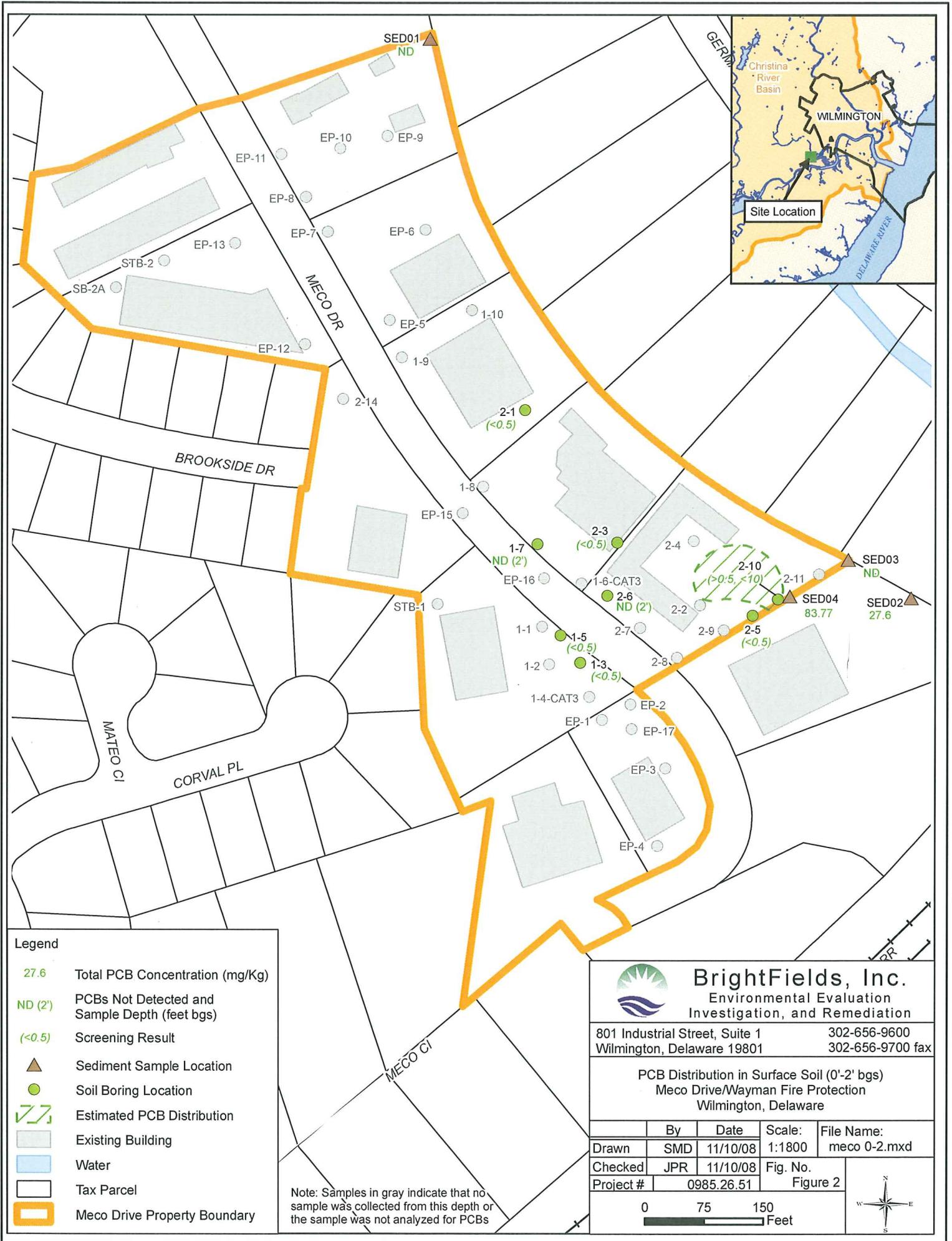
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Drawn	SMD	10/29/08	1:1800	meco aerial.mxd
Checked	JPR	10/29/08	Fig. No.	
Project #	0985.26.51		Figure 1	

0 75 150



Feet





- Legend**
- 27.6 Total PCB Concentration (mg/Kg)
 - ND (2') PCBs Not Detected and Sample Depth (feet bgs)
 - (<0.5) Screening Result
 - ▲ Sediment Sample Location
 - Soil Boring Location
 - ↗ Estimated PCB Distribution
 - Existing Building
 - Water
 - Tax Parcel
 - Meco Drive Property Boundary

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

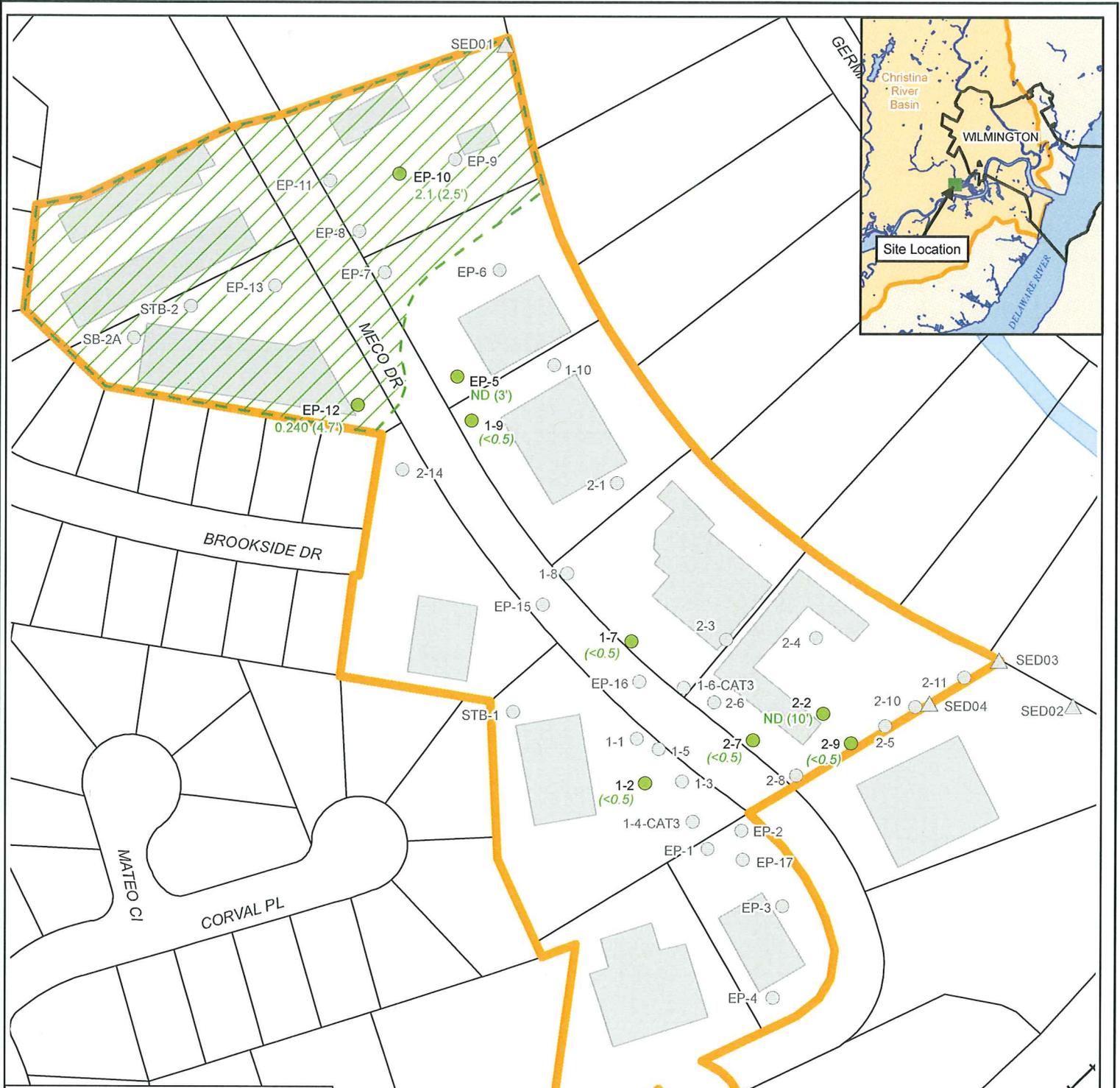
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PCB Distribution in Surface Soil (0'-2' bgs)
 Meco Drive/Wayman Fire Protection
 Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	11/10/08	1:1800	meco 0-2.mxd
Checked	JPR	11/10/08	Fig. No.	
Project #	0985.26.51		Figure 2	

0 75 150 Feet



Legend

- 2.1 (2.5) Total PCB Concentration (mg/Kg) and Sample Depth (feet bgs)
- ND (3') PCBs Not Detected and Sample Depth (feet bgs)
- <0.5 Screening Result
- ▲ Sediment Sample Location
- Soil Boring Location
- Estimated PCB Distribution
- Existing Building
- Water
- Tax Parcel
- Meco Drive Property Boundary

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



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Environmental Evaluation
Investigation, and Remediation

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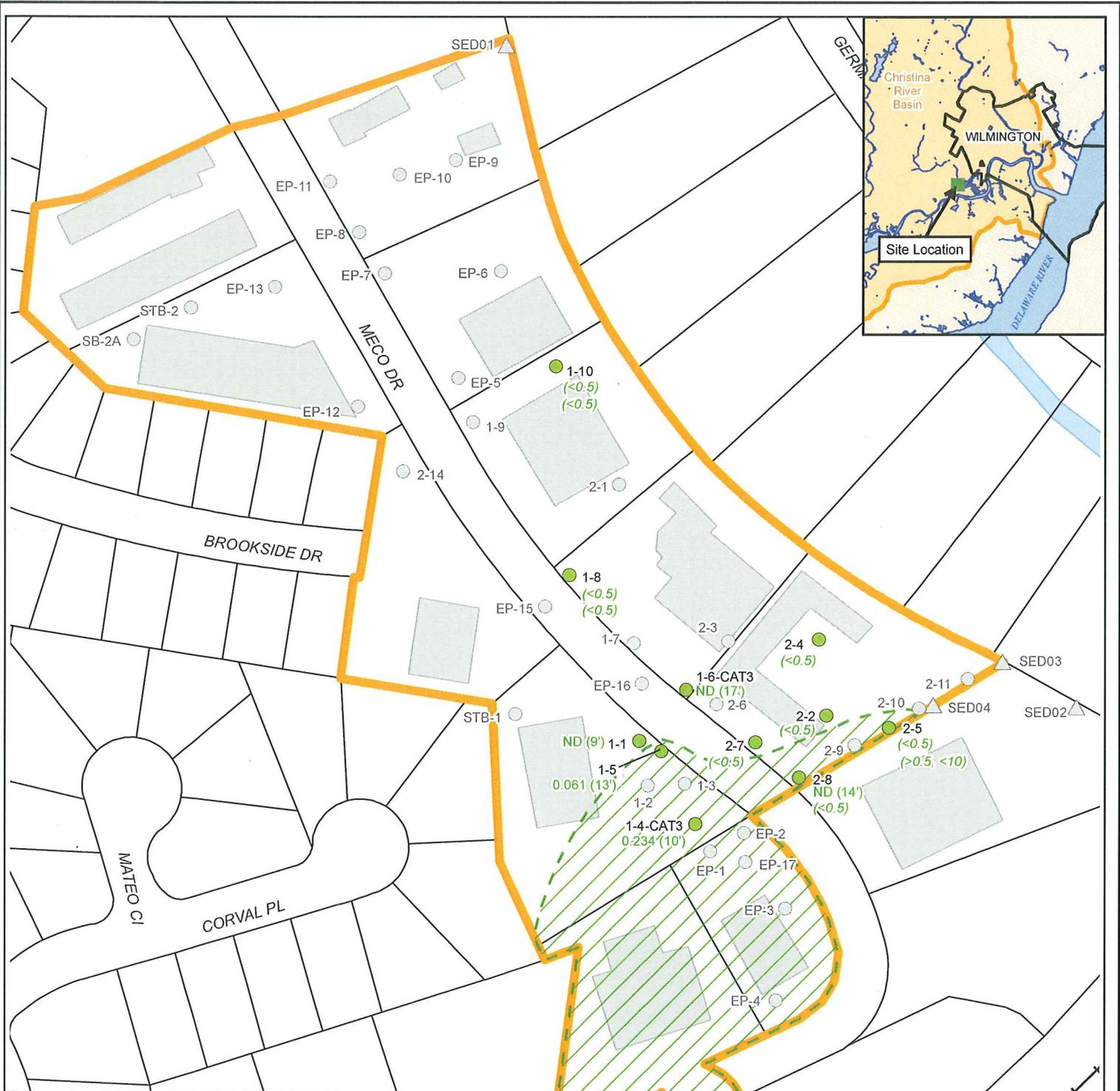
PCB Distribution in Subsurface Unsaturated Soil
Meco Drive/Wayman Fire Protection
Wilmington, Delaware

By	Date	Scale:	File Name:
Drawn SMD	10/29/08	1:1800	meco unsat.mxd
Checked JPR	10/29/08	Fig. No.	
Project #	0985.26.51	Figure 3	

0 75 150

Feet





Legend

- 0.234 (10') Total PCB Concentration (mg/Kg) and Sample Depth (feet bgs)
- ND (14') PCBs Not Detected and Sample Depth (feet bgs)
- (<0.5) Screening Result
- ▲ Sediment Sample Location
- Soil Boring Location
- [Green Hatched Box] Estimated PCB Distribution
- [Gray Box] Existing Building
- [Blue Box] Water
- [Black Outline] Tax Parcel
- [Orange Outline] Meco Drive Property Boundary

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

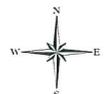


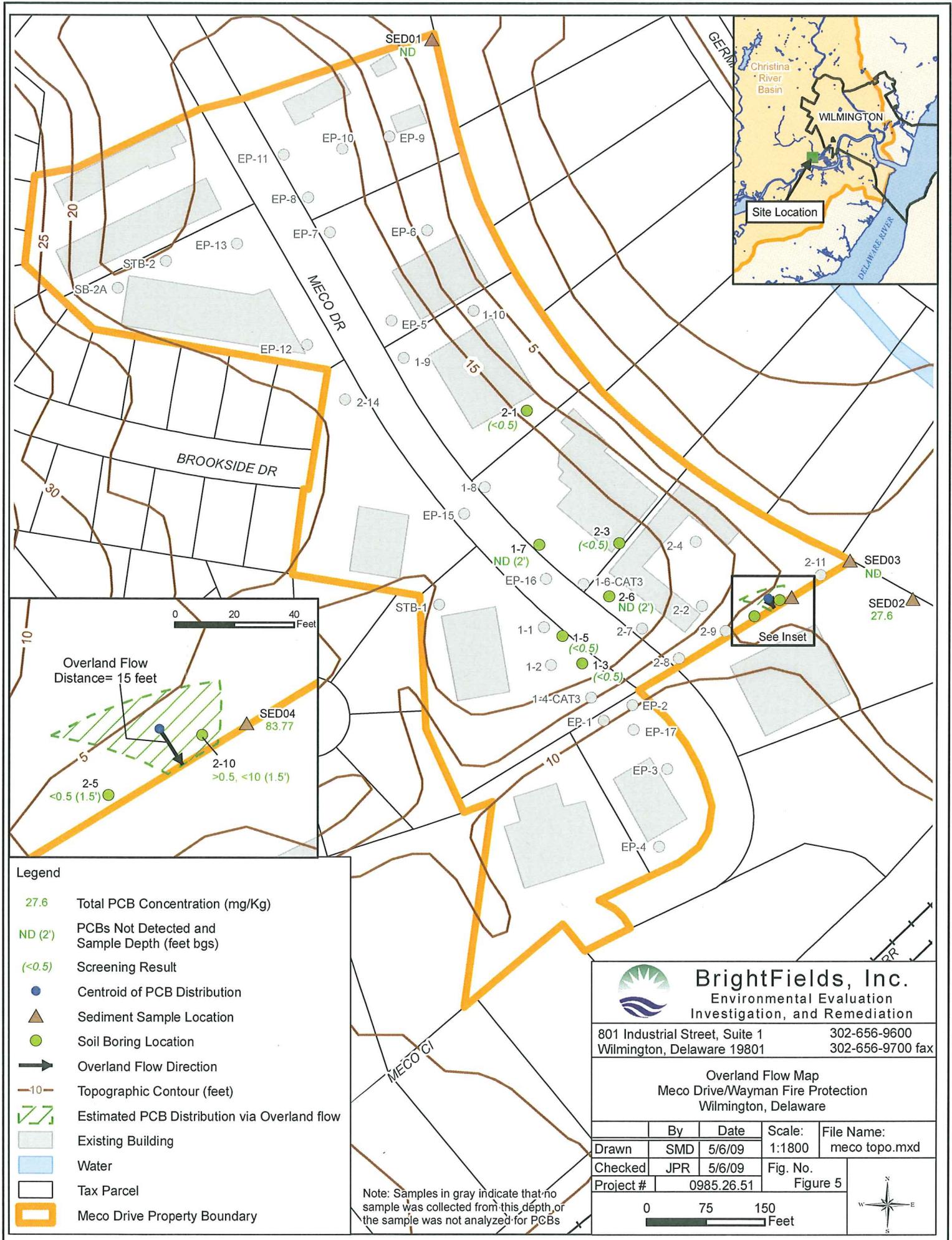
BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation

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**PCB Distribution in Subsurface Saturated Soil
Meco Drive/Wayman Fire Protection
Wilmington, Delaware**

	By	Date	Scale:	File Name:
Drawn	SMD	10/29/08	1:1800	meco sat.mxd
Checked	JPR	10/29/08	Fig. No.	
Project #	0985.26.51		Figure 4	





Legend

- 0.234 (10') Total PCB Concentration (mg/Kg) and Sample Depth (feet bgs)
- ND (14') PCBs Not Detected and Sample Depth (feet bgs)
- <0.5> Screening Result
- Groundwater Flow Direction
- ←325'→ Groundwater Discharge Distance (feet)
- ▲ Sediment Sample Location
- Soil Boring Location
- ▨ Estimated PCB Distribution
- ▭ Existing Building
- ▭ Water
- ▭ Tax Parcel
- ▭ Meco Drive Property Boundary

Note: Samples in gray indicate that no sample was 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		302-656-9600 302-656-9700 fax	
Groundwater Discharge Map Meco Drive/Wayman Fire Protection Wilmington, Delaware			
By	Date	Scale:	File Name:
Drawn SMD	5/6/09	1:1800	meco gw dis.mxd
Checked JPR	5/6/09	Fig. No.	
Project #	0985.26.51	Figure 6	



0 75 150
Feet

PCB Mass Loading
Meco Drive/Wayman Fire Protection
SIRB ID: DE-1103
Wilmington, Delaware



BrightFields, Inc.

Tables

Table 1
PCB Analytical Results For Soil
Meco Drive/Wayman Fire Protection Property
Wilmington, DE
SIRB ID: DE-1103

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		1-1 9' 6/29/1999 mg/Kg Tetra Tech (2000)	1-5 13' 6/29/1999 mg/Kg Tetra Tech (2000)	1-7 2' 6/29/1999 mg/Kg Tetra Tech (2000)	2-2 10' 6/30/1999 mg/Kg Tetra Tech (2000)
	Unrestricted Use	Restricted Use				
PCBs						
Aroclor-1016	5	82	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1221	0.3	3	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1232	0.3	3	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1242	0.3	3	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1248	0.3	3	0.04 U	0.061	0.038 U	0.039 U
Aroclor-1254	0.3	3	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1260	0.3	3	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1262	nca	nca	0.04 U	0.04 U	0.038 U	0.039 U
Aroclor-1268	nca	nca	0.04 U	0.04 U	0.038 U	0.039 U

Tetra Tech (2000) - Sampling Site Investigation Final Report of Findings (July 2000).

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 1
 PCB Analytical Results For Soil
 Mecco Drive/Wayman Fire Protection Property
 Wilmington, DE
 SIRB ID: DE-1103

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		2-6 2' 6/30/1999 mg/Kg Tetra Tech (2000)	2-8 14' 6/30/1999 mg/Kg Tetra Tech (2000)	1-4-CAT3 10' 6/29/1999 mg/Kg Tetra Tech (2000)	1-6-CAT3 17' 6/29/1999 mg/Kg Tetra Tech (2000)
	Unrestricted Use	Restricted Use				
PCBs						
Atroclor-1016	5	82	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1221	0.3	3	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1232	0.3	3	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1242	0.3	3	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1248	0.3	3	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1254	0.3	3	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1260	0.3	3	0.039 U	0.039 U	0.084	0.04 U
Atroclor-1262	nca	nca	0.039 U	0.039 U	0.059 U	0.04 U
Atroclor-1268	nca	nca	0.039 U	0.039 U	0.15	0.04 U

Tetra Tech (2000) - Sampling Site Investigation Final Report of Findings (July 2000).

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 1
 PCB Analytical Results For Soil
 Meco Drive/Wayman Fire Protection Property
 Wilmington, DE
 SIRB ID: DE-1103

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		EP-10 2.5' 11/10/1999 mg/Kg Tetra Tech (2000)	EP-12 4.7' 11/10/1999 mg/Kg Tetra Tech (2000)	EP-5 3' 11/10/1999 mg/Kg Tetra Tech (2000)
	Unrestricted Use	Restricted Use			
PCBs					
Atoclor-1016	5	82	0.075 U	0.077 U	0.08 U
Atoclor-1221	0.3	3	0.075 U	0.077 U	0.08 U
Atoclor-1232	0.3	3	0.075 U	0.077 U	0.08 U
Atoclor-1242	0.3	3	0.4	0.077 U	0.08 U
Atoclor-1248	0.3	3	0.075 U	0.077 U	0.08 U
Atoclor-1254	0.3	3	1.7	0.24	0.08 U
Atoclor-1260	0.3	3	0.075 U	0.077 U	0.08 U
Atoclor-1262	nca	nca	0.075 U	0.077 U	0.08 U
Atoclor-1268	nca	nca	0.075 U	0.077 U	0.08 U

Tetra Tech (2000) - Sampling Site Investigation Final Report of Findings (July 2000).

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
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- bold - concentration is above DNREC URS unrestricted use criteria
- shaded - concentration is above DNREC URS restricted use criteria

Table 2
 DNREC PCB Screening Data
 Meco Drive/Wayman Fire Protection Property
 Wilmington, DE
 SIRB ID: DE-1103

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)
1-2	9'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-3	2'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-5	1'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-7	10'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-8	14'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-8	10'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-9	5'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-10	13'	Tetra Tech (2000)	6/29/1999	1	<0.5
1-10	10'	Tetra Tech (2000)	6/29/1999	1	<0.5
2-1	1'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-2	14'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-3	1'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-4	5'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-5	1.5'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-5	12'	Tetra Tech (2000)	6/30/1999	1	>0.5, <10
2-5	10.5'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-7	5'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-7	15'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-8	7'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-9	7.5'	Tetra Tech (2000)	6/30/1999	1	<0.5
2-10	1.5'	Tetra Tech (2000)	6/30/1999	1	>0.5, <10

Tetra Tech (2000) - Sampling Site Inspection Final Report of Findings (July 2000)

Qualifiers:

ND - compound was not detected

Bold - concentration exceeds URS

nca - no criteria available

PCB Mass Loading
Meco Drive/Wayman Fire Protection
SIRB ID: DE-1103
Wilmington, Delaware



BrightFields, Inc.

Site Photographs



**PCB Mass Loading Evaluation
Meco Drive Property**



Drainage ditch adjacent to identified area of concern.



Sediment and erosion controls along bank of drainage ditch.

**PCB Mass Loading Evaluation
Meco Drive Property**



Surface cover associated with identified area of concern.



Wayman Fire company parking lot constructed of both asphalt and stone cover.

PCB Mass Loading
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BrightFields, Inc.

Overland Flow Calculations

**PCB Loading Calculations from the Universal Soil Loss Equation
Meco Drive/Wayman Fire Site
Wilmington, DE
DE-1103**

Surface PCB Concentration 5 mg/kg

Symbol	Factor	Value	Units
R	Rainfall/Runoff Erosivity Index	170	10 ² ft-tonf in/acre hr
K	Soil Erodibility	0.42	0.01 tonf acre hr/ac ft-ton in
	Estimated Slope Length	15	Feet
	Estimated Elevation Difference	5	Feet
	Slope	33.33	Percent
	Erodeable Area	0.03	Acres
LS	Topographic Factor	2.700	Dimensionless
C	Cover and Management Factor	0.062	Dimensionless
P	Support Practice Factor	1	Dimensionless
	Average Annual Soil Loss	11.00	ton/ac/yr

PCB Loading via Overland Flow 1.497 grams/year - PCBs

Meco Drive/Wayman Fire Protection Company Overland Flow Calculations

Location: USA\Delaware\New Castle County

Net C factor: 0.062
 Net LS factor: 2.7
 Net K factor: 0.42
 Net contour factor: 1.0
 Net ridge factor: 1.0
 Net ponding factor: 1.0

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: 210000

Energy use for entire simulation, gal/ac: 1.5
 Fuel cost for entire simulation, US\$/ac: 4.59

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 | STRIPS_AND_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_CALCULATION1 | Topography | Management | Strips / Barriers | Irrigation / Subsurface drainage | Division/terrace, sediment basin

Slope Soils

Segment	Soil	Seg length (horiz), ft	Soil loss, t/ac/yr	Sed. del., t/ac/yr	Consolidation time, yr
1	Generic Soils\silt loam (fm DM, subsoil, substr)	15	11	11	7

Manage Soil Topo

Avg. slope steepness, %: 33
 Slope length (horiz), ft: 15
 Crit. slope length, ft: 11
 Detachment on slope, t/ac/yr: 11
 Soil loss erod. portion, t/ac/yr: 11.4
 Sediment delivery, t/ac/yr: 11
 Soil loss for cons. plan, t/ac/yr: 11.4
 T value, t/ac/yr: 3.0

Fuel type for entire run: (none)

PCB Mass Loading
Meco Drive/Wayman Fire Protection
SIRB ID: DE-1103
Wilmington, Delaware



BrightFields, Inc.

Groundwater Transport Calculations

**PCB Loading Calculations - Groundwater Discharge to Surface Water
Meco Drive/Wayman Fire Protection Site
Wilmington, DE
DE-1103**

**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
GP02					
Minimum	14.2	0.027	530	5,800	1,500
Maximum	42.5	0.037	1,800	80,000	21,000

* - 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
GP02	234	0.01	0.05	0.051	0.26

**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
GP02	0.26	0.54	7.5