BrightFields, Inc.

Appendix 7

FORMER CARNEY HARRIS
WILMINGTON, DELAWARE

SIRB ID: DE-1397

BrightFields, Inc.

GENERAL SITE INFORMATION

Site Name: Former Carney Harris

SIRB ID Number: DE-1397

Site Location and Description: The Former Carney Harris Property consists of 1.2 acres of land at 1101 East 8th Street in the City of Wilmington. The site is east of the Christina River and along the west bank of the Brandywine Creek at the head of Wilmington's 7th Street Peninsula. The tax parcel identification for the property is 26-044.00-033. Currently, one vacant building occupies the property, which contains two large brick chimneys. A second building was demolished but the concrete pad remains as of June 2009.

Previous Site Uses: Historical records indicate that the site was previously part of a 25-acre plant owned by Jackson & Sharp Company, which manufactured passenger cars, street cars, and wooden ships. The company was formed in 1863 and was sold in 1901 to American Car & Foundry who continued to produce the same products.

Site use continued to be heavy industrial up through 1971 when Approved Ladder and Equipment took over the facility. Approved Ladder and Equipment utilized the building primarily as a storage facility and was maintained as a storage facility up until 1996. Currently the site contains two connected vacant buildings in dilapidated condition.

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

Brownfield Preliminary Assessment of the 7th Street Peninsula Northside (DNREC, 1999)

A Brownfield Preliminary Assessment II (BPA II) was conducted by the Delaware Department of Natural Resources and Environmental Control (DNREC) for the 7th Street Peninsula-Northside in 1999 (DNREC, 1999). During this investigation, a shallow soil sample (0 to 2 feet below ground surface (bgs)) and a deep soil sample (3.5 feet bgs) were collected from Test Pit 2, on an adjacent property near the southeastern border of this property (Figure 2). Chemical analysis of these samples indicated that the soil had elevated concentrations (above Restricted Use - Uniform Risk-based Remediation Standards (URS)) of arsenic (surface sample analyzed only); benzo(a)pyrene and dibenz(a,h,)anthracene (deep sample only); and aldrin (shallow and deep samples). In addition, both the shallow and deep soil samples contained concentrations of

total polychlorinated biphenyls (PCBs) above the restricted URS of 3 mg/kg (58.4 mg/kg in the shallow sample and 52.4 mg/kg in the deep sample). In the Air Pathways and Soil Exposure Conclusions, DNREC recommended that "surface and subsurface soil be further tested on all properties in order to accurately define the extent and degree of contamination."

Phase I Environmental Site Assessment (BrightFields 2006)

A Phase I Environmental Site Assessment (Phase I) was performed by BrightFields in May 2006 at the request of the Putnam Group. The purpose of the Phase I was to identify existing and potential releases of hazardous substances on or around the site; to inquire into the previous ownership and uses of the property; and to identify other recognized environmental conditions on the site. The Phase I confirmed that the site was historically used for industrial purposes, including the manufacturing of rail cars. One of the Phase I recommendations was that given the former industrial usage of the site, the presence of nearby identified Hazardous Substance Cleanup Act (HSCA) sites and, in consideration of DNREC's BPA II recommendation for more sampling, further soil sampling should be conducted. This Phase II investigation was conducted to assess the presence of soil contamination associated with the historical site operations.

Phase II Environmental Site Assessment (BrightFields 2006)

The 2006 Phase II ESA was conducted in three stages. Stage 1 (March 2006) consisted of the advancement of three Geoprobe® soil borings and five test pits: Four of these test pits and two soil borings were installed on the Former Carney Harris Property, while soil boring GP-03, test pit TP-04, and hand auger borings HA-1 and HA-2 were not located on the site, but on the 8th Street Right of Way.

A total of 13 soil samples were collected on the Former Carney Harris Property, six surface soil samples (0-2 ft) and seven deeper subsoil samples. The six surface soil samples were composed of miscellaneous fill materials.

No constituent concentrations exceeded the restricted use standard in the other 6 subsurface soil samples. These samples were collected below the fill in a gray sandy clay soil which matches the description of the native shallow geologic unit at the site, the Delaware Bay Group, an alluvial (stream) deposit of Pleistocene age. None of the 13 on-site soil samples collected outside of the PCB Area contained PCB Aroclors at concentrations above the restricted use URS value (3 mg/kg). PCB concentrations ranged from 0.1 to 1.2 mg/kg in eight samples, and PCBs were not detected in the remaining five samples.

PCBs concentration exceeded the restricted use standard (3 mg/kg) and the federal Toxic Substances Control Act (TSCA) reporting level (50 mg/kg) in both of the TP-04 samples (collected on the ROW on the Pack & Process property). PCB levels were 6,300 mg/kg in the 0-2 ft sample, and 81 mg/kg in a 3 - 3.5 ft sample. Stage 2 (April 2006): Two Hand Auger surface soil samples were collected from the 8th Street ROW at the locations shown on Figure 2. The total PCB concentrations were 177 mg/kg and 1,760 mg/kg in the 0-2 ft samples from the Hand Augers. Stage 3 (June 2006): A PCB-delineation effort was conducted along the southern site boundary in late June 2006, subsequent to the other Phase II ESA sampling.

Soil borings were performed using a square sampling grid established at 3-meter intervals, and soil samples were collected in 2-ft intervals from ground surface to a depth of six feet, resulting in the collection of 35 soil samples. Twenty-three of the samples were field screened for total PCBs using immunoassay, and 12 of those 23 samples were sent to STL for lab analysis of PCB Aroclors. Three of the samples from the PCB grid contained Aroclor 1242 at a concentration above the 50 mg/kg TSCA PCB reporting level. These PCB concentrations included 61 mg/kg (from sample D-6 at 2-4 ft); 1,500 mg/kg (from C-6 at 4-6 ft); and 18,000 mg/kg (from A-6 at 0-2 ft). Of the nine PCB Aroclors analyzed, only two Aroclor compounds (1242 and 1248) were detected. Of those two detected Aroclor compounds, only one (Aroclor-1242) was detected at a concentration above the restricted use URS of 3 mg/kg.

One oily soil sample collected from A-6 was submitted for a fingerprint analysis, and was reported to consist of a mixture of PCBs (no Aroclors were identified) and a degraded Diesel #2 Fuel Oil. Sample location GP-02 (a Geoprobe boring sampled in the Phase II ESA) was located just north of the northern row of the PCB grid; no elevated PCBs were detected in any of the 3 depth-discrete soil samples (0-2 ft, 4-6 ft, and 8-10 ft) collected at the GP-02 location.

Brownfields Investigation Report 1101 East 8th Street (Former Carney Harris Property) (Ten Bears Environmental, LLC 2008)

Ten Bears Environmental, LLC (Ten Bears) conducted a Brownfield Investigation of the Former Carney Harris Property located at 1101 East 8th Street, Wilmington, DE. Ten Bears advanced 31 borings on the property to further delineate the PCB contaminated area and an additional seven borings on the remainder of the site. In addition, three groundwater monitoring wells were installed and sampled on the property and one sediment sample was collected from the bank of the Brandywine River.

The laboratory results from the PCB analysis of the investigation confirmed and further delineated the PCB-area discovered in the 2005 Phase II Environmental Assessment completed by BrightFields. The surface soil was reported to have concentrations ranging from 0.310 mg/kg to 34,000 mg/kg. The subsurface soil was reported to have concentrations ranging from 0.012 mg/kg to 3,300 mg/kg. As a result Ten Bears proposed remedial actions to be met prior to site development, which include: soil in the PCB area containing total PCBs at a concentration above 100 mg/kg should be excavated and removed from site and disposed of at an approved PCB facility; surface and subsurface soil in the PCB area containing total PCBs at a concentration above 50 mg/kg but below 100 mg/kg will be contained onsite below a 6 inch thick concrete or asphalt cap; site land will be restricted to industrial/commercial by an Environmental Covenant that also restricts future land uses in the PCB area to low occupancy uses (below 16.5 hours/week); all excavation activities shall be done in accordance to a DNREC approved contaminated materials management plan; and environmental impacts from soil disturbance during construction activities will be mitigated using normal sediment and erosion controls during redevelopment and storm water management controls afterwards.

Current Regulatory Status:

The Brownfield Investigation Report (BRI) was submitted to DNREC on October 31, 2008 and was approved in May of 2009. The BRI report received by BrightFields was not the final draft of the report and should be recognized as pending. Information from the DNREC project officer received in June 2009 indicated the following; "The approved Brownfield text does not include a Phase II PCB grid delineation. Phase II is not available in a public document yet. The remedial actions for the site are yet to be determined". Currently the site remains unoccupied and is restricted to public.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

PCBs were detected in the majority of samples collected from the Former Carney Harris Property. During the Phase II Investigation of the Former Carney Harris Property, BrightFields identified a hot spot location in the southern portion of the site. BrightFields utilized a grid sampling approach to delineate the PCB contamination in this area. Ten Bears, in an effort to further delineate the area, sampled based off the same sampling grid established by BrightFields. The results indicated that greatest concentrations were observed in the surface samples and seemed to distribute vertically until a confining layer was observed. Concentrations reported at the bottom of boring were higher than the intermediate soils, which was not unexpected since PCBs are a dense non-aqueous phase liquid.

During the site inspection BrightFields identified two distinct areas of concern. Area 1 is confined by the building and river, and can be identified by the area in the vicinity of MW01. This area was evaluated using the maximum concentration observed in the surface soil for that area (9.57 mg/kg).

Area 2 is the remainder of the site. BrightFields calculated a 95% UCL of the mean of the concentration of total PCBs observed in the surface soil for overland flow calculations in Area 2. The result indicated that the 95% UCL of the mean of the concentration of surface soil was 5,510 mg/kg.

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 saturated soil was divided into two areas. The first area (Area A) is in the vicinity of MW02 and the second area (Area B) is located adjacent to MW01. BrightFields calculated a 95% UCL of the mean of the concentration of total PCBs observed in the subsurface saturated soil for Area A. The concentration observed in the deep sample collected from MW01 was used in the partitioning equations for Area B.

Concentrations of PCBs on Site			
Sample Matrix	**Corresponding Figure**	**Analytical Methods**	**Range of Total PCBs**
Surface Soil	Figure 2	Method 8082	Not detected to 34,000 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Method 8082	Not detected to1,500 mg/kg
Subsurface Soil (saturated)	Figure 4	Method 8082	Not detected to 10,500 mg/kg
Groundwater	Figure 5	Homolog Analysis	Not detected

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

Acreage where PCBs detected:

The estimated total area associated with surface soils impacted by PCBs is 1.23 acres of which only 0.63 is considered to still be contributing to overland flow loading. The remainder of the site is under an impervious surface. The subsurface unsaturated soil impacted by PCBs is approximately 0.57 acres. The subsurface saturated soil impacted by PCBs is approximately 0.67 acres.

PCB Remediation Status:

No remedial activities have occurred on the site as of December 2008.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow and via groundwater transport were estimated for the Former Carney Harris 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 evaluated 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 surface evaluation BrightFields identified two distinguishable areas, which could still be contributing to PCB mass loading via overland flow. The first area is located in the northern portion of the site and is confined to approximately 0.06 acres between the building and the Brandywine River. The cover/management factor (C) assigned to this potion of the site and its associated flow path is 0.011, which corresponds to areas that have a vegetative cover consisting of 75% groundcover, with the cover at the surface being mostly broadleaf herbaceous plants or un-decayed residues or both. The second area consists primarily of the identified hot spot location in the southern portion of the property. The cover/management factor (C) assigned to this portion of the site and the associated flow path is 0.011, which corresponds to bare ground that is incorporating two to six inches of stone mulch as cover. This assessment was based off of the current site conditions, which include a severely damaged concrete pad in the vicinity of the hot spot area in Area 2. Photographs of the site ground cover and canopy are attached.

Site Sediment and Erosion Control Practices:

There are no current erosion and sediment controls in place at the Former Carney Harris Property.

Input Factors and Results:

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

Former Carney Harris Property (Area 1)

RUSLE Factors	Values Provided	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)	0.24	The soil erodibility factor was inferred based on the information provided by the boring log represented for MW01 in the Brownfield Investigation Report for 1101 E. 8th Street (Ten Bears 2008).
ls = topographic factor (dimensionless)	4.4	The slope length was estimated to 15.5 feet, which is the distance between the site and river along the overland flow path. The assumed slope (58.7 %) and slope length were used to calculate a topographic factor of 4.4 from the USGS windows based application.
C = cover/management factor (dimensionless)	0.047	The cover/management factor C assigned to the site by the USGS windows based application was 0.047, which corresponds to approximately a 75% cover with the cover being mostly broadleaf herbaceous plants or un-decayed residues or both.
P = support practice factor (dimensionless)	1.0	There is no current support practices implemented.

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

The total PCB loading via overland flow for Area 1 of the Former Carney Harris Property is 4.7 grams per year. Please see attached table for specific variables.

Former Carney Harris Property (Area 2)

RUSLE Factors	Values Provided	Explanation of Selection
E = rainfall/erodibility index (10^2 m-tonne-cm/ha-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).

RUSLE Factors	Values Provided	Explanation of Selection
K = soil erodibility (0.01 tonf acre hr/acre ft-ton in)	0.28	The soil erodibility factor was inferred based on the information provided by the boring log represented for the Carney Harris Property in the Brownfield Investigation Report for 1101 E. 8th Street (Ten Bears 2008) and Phase II Investigation Report (BrightFields 2006).
ls = topographic factor (dimensionless)	0.041	The slope length was estimated to 110 feet, which is the distance between the site and river along the overland flow path for Area 2. The assumed slope (0.01 %) and slope length were used to calculate a topographic factor of 0.041 from the USGS windows based application.
C = cover/management factor (dimensionless)	0.053	The cover/management factor C assigned to the site by the USGS windows based application was 0.053, which corresponds to bare ground that is incorporating two to six inches of stone mulch as cover
P = support practice factor (dimensionless)	1.0	There is no current support practices implemented.

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

The total PCB loading via overland flow for Area 2 of the Former Carney Harris Property is 130 grams per year. Please see attached table for specific variables.

Uncertainty Analysis Associated with Overland Flow:

Specific Areas and Degree of Uncertainty for the Carney Harris Property

	Samples Per Acre (site)	Samples Per Acre (hotspot)	Chemical Data Quality*	Topography	Soil Type	Site Coverage	Map Quality	Distance to Discharge Points
Site Specific Information	25	~2,377	Method 8082	Estimated using topography/Visual Inspection	Detailed logs that are located within the area of concern	Based on a limited site assessment.	Grid Sampling Figure	15.5 feet 105 feet
Degree of Uncertainty	Low	Low	Low to Moderate	High	Low	Moderate to High	Low to Moderate	Low

- Primary analysis used in the historical samples

Sources of uncertainty for the Former Carney Harris Property include the following: the slope for Area 2 of the property is an assumed 0.01 %. This assumption was made because the low lying area of the site was determined to be on the western portion of the site towards 7th Street. In extreme weather conditions BrightFields assumed that water could pond in this area and then be forced back toward the Brandywine River. The site inspection that was conducted onsite was very limited due to the restricted access to the site. The site could only be assessed from outside of the gate. Due to these reasons BrightFields had to estimate the approximate thickness of the gravel/stone surface cover layer from aerial photography and boring log information. The overall uncertainty associated with overland flow for the Former Carney Harris Property 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 0.01 to 260 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.

Area A: Area in the vicinity of MW02

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.28	5.7	An examination of the drilling logs shows that the groundwater being monitored is within a moderately coarse-grained fill unit that overlies the marsh deposit clay. The fill unit ranges in composition from coarse-grained sandy silt. The hydraulic conductivity for coarse-grained sandy silt to fine sand ranges from approximately 1×10^{-4} to 2.0×10^{-3} cm/sec (Cernica, 1995).
I = Horizontal Groundwater Gradient	0.0044	0.0067	Calculations of the horizontal hydraulic gradient from the Brownfield Investigation Report and from the nearby SIP, Inc. property showed that the gradient of groundwater flowing toward Brandywine Creek.

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
Saturated Thickness (ft)	6	8	Based on the logs, the saturated thickness was approximately 6 to 8 feet.
Lateral Discharge Distance (ft)	190	190	The lateral discharge distance was chosen to be equal to the length of the PCB impacted area measured parallel to Brandywine Creek
A= Cross-Sectional Area (ft2)	1,100	1,500	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (µg/L)	13	260	The 95% UCL of the mean PCB concentration observed in the saturated subsurface soil (670 mg/kg) in this area 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.

The PCB loading via groundwater discharge for Area A is between 3.6 to 154 grams per year. Please see attached table for specific variables.

Area B: Area in the vicinity of MW01

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.28	5.7	An examination of the drilling logs shows that the groundwater being monitored is within a moderately coarse-grained fill unit that overlies the marsh deposit clay. The fill unit ranges in composition from coarse-grained sandy silt. The hydraulic conductivity for coarse-grained sandy silt to fine sand ranges from approximately 1×10^{-4} to 2.0×10^{-3} cm/sec (Cernica, 1995).
I = Horizontal Groundwater Gradient	0.0044	0.0067	Calculations of the horizontal hydraulic gradient from the Brownfield Investigation Report and from the nearby SIP, Inc. property showed that the gradient of groundwater flowing toward Brandywine Creek.
Saturated Thickness (ft)	6	8	Based on the logs, the saturated thickness was approximately 6 to 8 feet.
Lateral Discharge Distance (ft)	165	165	The lateral discharge distance was chosen to be equal to the length of the PCB impacted area measured parallel to Brandywine Creek
A= Cross-Sectional Area (ft2)	990	1,300	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (ug/L)	0.01	0.20	The reported calculation in the deep sample collected from MW01 (0.510 mg/kg) in this area 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.

The PCB loading via groundwater discharge for Area B is between 0.0025 to 0.1 grams per year. Please see attached table for specific variables.

Mass Loading Via Groundwater Transport Result:

The estimated minimum and maximum contaminant mass loading contributions are shown in the Table C in the groundwater transport calculations attachment. As previously described, these calculations are conservative (protective), and they overestimate the actual mass loading because they assume that there are no contaminant losses due to degradation, dispersion, sorption, volatilization, etc.

The total PCB loading via groundwater discharge is between 3.6 and 150 grams per year (attached Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for the Carney Harris Property

	Groundwater PCB Concentration	Hydraulic Conductivity	Horizontal Groundwater Gradient	Saturated Thickness	Lateral Discharge Distance	Distance to Discharge point
Site Specific Information	Groundwater concentration based on Aroclor data in saturated soil	Conductivity based on good quality logs	Gradient based on few professionally surveyed wells and/or tidal influenced wells	High quality logs with consistent saturated thickness	High density sample data, acceptable ground-water flow data	Directly adjacent
Degree of Uncertainty	Moderate - High	Moderate	Moderate	Low	Low to Moderate	Low

Based on this evaluation the overall uncertainty associated with the Carney Harris Property is **low to moderate.**

Site References:

BrightFields, Inc. (BrightFields), 2008, Brownfield Investigation Report for the SIP, Inc Property. July 2008.

BrightFields, 2006, Phase I Environmental Site Assessment. March 2006.

BrightFields, 2006, Phase II Environmental Site Assessment. May 2006.

Department of Natural Resources and Environmental Control (DNREC, 1999), Brownfield Preliminary Assessment II of the 7th Street Peninsula Northside. September 1999.

Ten Bears Environmental (Ten Bears 2008), Brownfields Investigation Report 1101 East 8th Street (Former Carney Harris Property). October 2008.