Appendix 10

DIAMOND STATE SALVAGE
WILMINGTON, DELAWARE

SIRB ID: DE-0281

BrightFields, Inc.

GENERAL SITE INFORMATION

Site Name: Diamond State Salvage

SIRB ID Number: DE-0281

Site Location and Description: Diamond State Salvage is located at 14th and Church Streets in Wilmington, DE. The southwestern boundary is the Brandywine Creek, the southeastern boundary is Church Street, and the northeastern boundary is 14th Street. The site is located in downtown Wilmington and is approximately 4.25 acres in size. The site is currently vacant.

Previous Site Uses: Past uses of the property were all industrial and owners included Brandywine Lumber Company, Delaware Electric Supply Co., Delaware Oil Products Inc., Pierce, Ellison Petroleum Company, and Diamond State Junk Company. Diamond State Salvage Company was in operation from approximately 1949 to 1992. Diamond State Salvage Company was a former salvage yard that accepted automobiles, batteries, compressed gas cylinders, appliances, empty drums, and tanks for salvageable material. Materials that were not salvageable were stockpiled as debris onsite.

Site Regulatory Status: This section briefly summarizes previous investigations performed on the site through the United State Environmental Protection Agency (USEPA) and the Delaware SIRB program. A current SIRB regulatory status is also included.

Extensive investigations have been conducted at Diamond State Salvage since 1995. Table 1 lists a chronology of investigations, reports, remedial actions, and regulatory actions.

Chronology of Investigations and Regulatory Actions

Investigation or Regulatory Action	Dates	Description
Preliminary Assessment	April 1994	Contaminated surface water runoff to the Brandywine Creek was observed. It was determined that the runoff had the potential to impact water quality of the Brandywine Creek, Christina River, and Delaware River fisheries. Extensive soil staining, petroleum hydrocarbon , and turpentine odors were noted across the site. No samples were collected as part of the Preliminary Assessment. (DNREC, 1994)
Site Inspection	Sept. 1995	During the initial site inspection, debris and soil piles were observed. A sheen was observed on surface water onsite and a petroleum or turpentine odor was evident throughout the site. Surface water, groundwater, shallow and deep soil, and sediment samples were collected. Major contaminants found in the soil were benzo(a)pyrene, lead, and PCBs. Further action and investigations were recommended. (DNREC, 1995)
EPA Investigation	June 1995	One surface water sample and 18 soil and sediment samples were collected. Major contaminants of concern were PAHs, PCBs (aroclor-1242 and arochlor-1254), and lead. (USEPA, 1995)
Remedial Investigation	Aug. 1996	Twenty-five test pits were excavated to facilitate collection of 75 soil samples (3 from each test pit) to assess the extent of impacted soils at the salvage yard. All 75 soil samples were field screened, and 13 soil samples were analyzed using HSCA protocols. Three groundwater samples, 3 surface water samples, and 11 composite sediment samples were collected. Lead and PCBs (aroclor-1254 and aroclor-1260) were the primary contaminants of concern. (WIK, 1996)
Brandywine Creek Sediment Investigation Report	Sept. 1997	Forty sediment samples were collected in ten transects across the Brandywine Creek to assess the extent of PCB contamination in the sediment along the creek and define an area for excavation. PCBs were found consistently elevated in the mudflat adjacent to the site. The recommendation was to dredge the entire mudflat adjacent to the site to a "worst case scenario" depth of 3 feet to equal approximately 2,100 cubic yards. This would eliminate the majority of PCBs in the sediment, but small hotspots may remain. (DNREC, 1997)

Chronology of Investigations and Regulatory Actions (continued)

Investigation or Regulatory Action	Dates	Description
Federal On-Scene Coordinator's After Action Report	2001-2002	Over 2,000 soil samples were collected on-site and at nearby off-site locations to determine extent of necessary removal. Sediment samples were collected to determine the affect of contamination of the streambank, mudflat, and overall health of the Brandywine Creek. The major contaminants from previous site uses were lead and PCBs. Over 200,000 tons of contaminated soil and debris were removed from the site as an USEPA Emergency Removal Action. Soil was excavated from depths of 1 foot bgs to 6 feet bgs. After the removal, the site was backfilled and landscaped. Site activities were completed on June 19, 2001. (USEPA, 2001-2002)

Current Regulatory Status:

In 2001, an USEPA Emergency Removal Action was completed. In 2008, DNREC certified Diamond State Salvage as a Brownfield.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

In 1999, the EPA removed approximately 200,000 tons of contaminated soil from the Diamond State Salvage Site and neighboring parcels. After the soil was removed the site was backfilled with assumed clean "fill" material. Because of the removal and cap placement there are no longer any "surficial" PCB concentrations remaining at Diamond State Salvage Site.

PCB concentrations have been determined to remain in the subsurface unsaturated zone at concentrations ranging from non-detect to 123 mg/kg, which is above both the unrestricted and restricted use URS criteria. PCB concentrations in the subsurface saturated zone range from non-detect to 71 mg/kg, which is above the respected URS criteria.

The PCBs in the subsurface saturated soil are considered to be in the mobile phase and because the site is not capped with an impervious surface the site soils can still contribute to the groundwater concentrations in the future.

Concentrations of PCBs on Site			
Sample Matrix	**Corresponding Figure**	**Analytical Methods**	**Range of Total PCBs**
Surface Soil	Figure 2	Screening and Method 8082	Not detected (Samples Removed)
Subsurface Soil (unsaturated)	Figure 3	Screening and Method 8082	Not detected to 123 mg/kg
Subsurface Soil (saturated)	Figure 4	Screening and Method 8082	Not detected to 71 mg/kg
Groundwater	Figure 5	Method 8082	Not detected

Please find the attached historical information pertaining to this site

Acreage where PCBs detected:

Due to the remediation activities completed on the site by the EPA we have assumed that there are no longer any surface soil concentrations of PCBs. The subsurface unsaturated soil impacted by PCBs is approximately 3.7 acres. The subsurface saturated soil area impacted by PCBs is approximately 2.8 acres. The groundwater estimated area impacted by PCBs is 1.45 acres.

PCB Remediation Status:

In 2001, the EPA removed approximately 200,000 tons of contaminated soil from the Diamond State Salvage Site and neighboring parcels.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow is discussed below. After the remedial actions completed by the USEPA, there are no longer PCB contamination in the surface. Therefore mass loading via overland flow is currently zero. A summary of the results is included below and the details of the calculations are included as attachments to this Appendix.

Overland Flow:

There should no longer be any PCBs in the surface soils; therefore, overland flow is not considered a mechanism of transport on the Diamond State Salvage property.

Ground Cover and Canopy:

A site inspection was performed on November 7, 2008 to estimate the current site ground cover and canopy. The cover consists of a vegetative cover consisting of 90% groundcover, with the cover at the surface being grass, grass-like plants, decaying compacted duff, or litter at least 2 inches deep. 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 Diamond Salvage property.

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.

PCBs were detected in one sample (MW02-W001) in groundwater for the Diamond State Salvage property. This sample was collected in 1996 prior to any remedial activities that took place on the property. Therefore BrightFields concluded that the mass loading via groundwater transport would be more representative of current conditions by using partitioning equations from the soil concentrations in the subsurface saturated soil existing currently on the site.

The majority of the site has soil PCB concentrations ranging from 0.033 mg/kg to 7.7 mg/kg. However, there are soil samples from two locations (SL05 and SK06) that are in close proximity and that have PCB concentrations of 27 mg/kg and 71 mg/kg, respectively. This area was

calculated separately from the remainder of the site. Average PCB concentrations were calculated for the two samples and for the remainder of the site. This resulted in an average PCB concentration of 49 mg/kg in a 85 foot wide section and an average PCB concentration of 1.7 mg/kg in the remaining width (375 feet).

The calculated PCB concentration in the pore water ranges from 0.37 to 54 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: Vicinity of samples SL05/SK06

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.28	5.7	Test pit logs were available from the SI, EPA Investigation, and the RI. In addition, 18 Engineer's Field Boring Logs from the EPA Investigation were also available, and these were used to evaluate the lithology beneath the site. An examination of the logs shows that the groundwater unit monitored is typically within a silty clay, interbedded with fine sand The hydraulic conductivity for a coarse sandy silt ranges from approximately 1×10^{-4} to 2×10^{-3} cm/sec (Cernica, 1995). This is equivalent to 0.28 to 5.7 ft/day.
I = Horizontal Groundwater Gradient	0.0092	0.092	Three groundwater wells were installed at the site during the SI. Based on surveyed elevations and depth to water measurements taken during groundwater sampling during the RI, the horizontal groundwater gradient was approximately 0.0092 ft/ft.
Saturated Thickness (ft)	2	10	Based on the boring and test pit logs, the saturated thickness is highly variable. The top of the water bearing unit ranged from approximately 2 to 10 feet bgs. Because PCB were not detected below 12 feet bgs, this was chosen for the bottom of the water bearing unit. Therefore, the saturated thickness ranged from 2 to 10 feet
Lateral Discharge Distance (ft)	85	85	The lateral discharge distance was chosen as the width of the site measured perpendicular to the groundwater flow direction. This is approximately 460 feet.
A= Cross-Sectional Area (ft2)	170	850	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (µg/L)	10.7	54	The average PCB concentration in subsurface saturated soil for this area (49 mg/kg) was used in the partitioning equations.
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 0.24 to 25 grams per year. Please see attached tables for specific variables.

Area B: Remainder of Site

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.28	5.7	Test pit logs were available from the SI, EPA Investigation, and the RI. In addition, 18 Engineer's Field Boring Logs from the EPA Investigation were also available, and these were used to evaluate the lithology beneath the site. An examination of the logs shows that the groundwater unit monitored is typically within a silty clay, interbedded with fine sand. The hydraulic conductivity for a coarse sandy silt ranges from approximately 1×10^{-4} to 2×10^{-3} cm/sec (Cernica, 1995). This is equivalent to 0.28 to 5.7 ft/day.
I = Horizontal Groundwater Gradient	0.0092	0.092	Three groundwater wells were installed at the site during the SI. Based on surveyed elevations and depth to water measurements taken during groundwater sampling during the RI, the horizontal groundwater gradient was approximately 0.0092 ft/ft.
Saturated Thickness (ft)	2	10	Based on the boring and test pit logs, the saturated thickness is highly variable. The top of the water bearing unit ranged from approximately 2 to 10 feet bgs. Because PCB were not detected below 12 feet bgs, this was chosen for the bottom of the water bearing unit. Therefore, the saturated thickness ranged from 2 to 10 feet
Lateral Discharge Distance (ft)	375	375	The lateral discharge distance was chosen as the width of the site measured perpendicular to the groundwater flow direction. This is approximately 460 feet.
A= Cross-Sectional Area (ft2)	750	3,750	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (µg/L)	0.37	1.9	The average PCB concentration in subsurface saturated soil for this area (1.7 mg/kg) was used in the partitioning equations.
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 0.04 to 3.8 grams per year. Please see attached tables for specific variables.

Mass Loading Via Groundwater Transport Result:

The groundwater discharge is 67 to 6,800 L/day (attached Table A). 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 0.28 and 28 grams per year (attached Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for Diamond State Salvage

	Groundwater PCB Concentration	Sampling Density	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	PCB distribution adequately defined	Conductivity based on good quality logs or geotechnical logs	Gradient based on few professionally surveyed wells.	Inconsistent saturated thickness	Average sample control/ quality, acceptable ground-water flow data	Directly adjacent
Degree of Uncertainty	Moderate	Low	Moderate	Moderate to High	Moderate to High	Moderate	Low

Based on this evaluation the overall uncertainty associated with mass loading via groundwater discharge for the Diamond State Salvage is **moderate.**

Site References:

Department of Natural Resources and Environmental Control (DNREC), 1997, Brandywine Creek Sediment Investigation Report, September, 1997.

DNREC, 1995, Site Inspection at Diamond State Salvage, September 1995.

DNREC, 1994, Preliminary Assessment Report for Diamond State Salvage, April 1994.

United States Environmental Protection Agency (USEPA), 2002, Federal On-Scene Coordinator's After Action Report, 2002.

USEPA, 1995, EPA Site Investigation at Diamond State Salvage, June 1995.

WIK Associates, Inc., 1996, Remedial Investigation of Diamond State Salvage, August 1996.

Figures