BrightFields, Inc.

Appendix 3

AMTRAK REFUELING YARD
WILMINGTON, DELAWARE

SIRB ID: DE-0266

BrightFields, Inc.

GENERAL SITE INFORMATION

Site Name: Amtrak Refueling Yard

SIRB ID Number: DE-0266

Site Location and Description: The Former Fueling Facility encompasses approximately 20 acres along Vandever Avenue in Wilmington, Delaware. The Amtrak Refueling Yard has two primary drainage areas referred to in this report as the Eastern Drainage Ditch and Western Drainage Ditch. The drainage ditches flow south into a confluence area. The Former Fueling Facility is bounded to the east by Railcar Avenue and to the west by the Western Drainage Ditch previously mentioned (Figure 1). The surrounding area is primarily an industrial area. In the 1980's this site and the Amtrak Maintenance Yard were referred to as the same property. Indication of the site as a separate entity did not start to appear until the early 1990's. The Refueling Yard is most distinguished by the former roundhouse area, which formerly held a 250,000-gallon diesel fuel tank to refuel the locomotives.

Previous Site Uses: The Amtrak Wilmington facilities were constructed in the early 1900's and were used to service both the locomotives and passenger cars. Servicing included providing the locomotives with coal and later diesel fuel, lubricating oil and sand. The diesel fuel was provided from a 250,000-gallon above ground storage tank that was constructed in 1954. This tank was removed in 1996, but the outline of the tank is still present in the northern extent of the property (Figure 1). This report will refer to this area as the roundhouse. Underground piping distributed the fuel to the different areas of the facility. The fueling operations ceased in 1995. The area is currently used to store passenger railcars, locomotives, and maintenance equipment. There is no planned development for this area and Amtrak continues to use this land for these purposes.

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.

A number of investigations have been conducted at the Amtrak Maintenance Facility and Amtrak Refueling Facility since 1981. Table 1 summarizes the scope of the investigations, reports, remedial actions, and regulatory actions that are pertinent to this site.

Chronology of Investigations and Regulatory Actions

Investigation or Regulatory Action	Dates	Description
Assessment of PCBs at the Wilmington Maintenance Facility (includes samples from Refueling Yard as well)	Jan. 1981	Forty-one (41) soil samples were collected for PCBs in backfilled soils along roadways and mainline tracks, and in marshes and puddles throughout the yard. Thirty-five (35) additional samples were collected from split-spoon samples at 18 well locations along the perimeter and throughout the yard. Sediment, surface water, groundwater, sewer water and sewer sediment samples were also collected (Woodward-Clyde, 1981).
Analyses of Soil Samples from AMTRAK	July 1982	Sixty-four (64) samples were collected from one-and two foot soil cores from areas bordering Brandywine Creek, its tributary, and on-site drainage areas for analyses of PCBs and oil and grease. Forty-nine (49) of these samples were collected along drainage areas adjacent to the Former Fueling Facility (Radiation Management, 1982).
Soil Sampling in 1983 and 1984.	1983-1984	Three hundred and four (304) samples were collected at depths from six to 12 inches along the perimeter of the AMTRAK Wilmington Shops, in the Maintenance Facility, and around the locomotive shop (Radiation Management, 1984)
Soil Removal Activities of 1984 and 1985.	1984-1985	During 1984 and 1985 approximately 10,000 cubic yards of PCB impacted soils were removed from "hot spots" in and around the Maintenance Facility. The cleanup area included: track area south of the locomotive shop. The Former Fueling Facility was not remediated because sampling reported only low levels of PCBs.
Preliminary Assessment of the Wilmington AMTRAK Rail Yard - Maintenance Facility (includes samples from Refueling Yard as well)	Feb. 1989	This report summarized previously collected data and no new data were collected. Prepared by NUS Corporation and dated February 23, 1989.
Tank Closure Record - Wilmington Maintenance Facility	May 1991	This report documents the removal of two 8,000-gallon buried tanks in the Former Fueling Facility and one 5,000-gallon kerosene UST from north of the roundhouse by Joseph T. Hardy Sons, Inc.

Chronology of Investigations and Regulatory Actions (continued)

Investigation or Regulatory Action	Dates	Description
Preliminary Assessment - AMTRAK Wilmington Refueling Facility	Feb. 1993	DNREC reviewed existing data to determine the need for further investigations. No new data were collected during this assessment (DNREC 1993).
Inspection Report - AMTRAK Wilmington Refueling Facility	Dec. 1994	This investigation included the collection and analyses of three surface soil (at depths of 0 to 1 foot) samples (two were collected on-site and one in a nearby community park), seven surface water samples and seven sediment samples (co-located with the water samples). Subsequently, two on-site surface soil samples and seven sediment samples were collected because the initial samples were not analyzed within the required holding times. All samples were submitted for Target Compound List (TCL) and Target Analyte List (TAL) analyses. No groundwater samples were collected during the investigation (DNREC, 1994).
Toxicological Evaluation Report	Dec. 1994	The evaluation reported the cancer risk calculated for an on-site worker from surface soils (the most likely potential exposure route) was within the range of 1.0E-04 to 1.0E-06 (reported by DNREC as the acceptable cancer risk range normally used by USEPA Region III). A detailed discussion of exposure assumptions and risk calculations is presented in the referenced report (DNREC, 1994)
Results of Maintenance Yard Soil and Groundwater Investigation	May 1995	Documented results of a subsurface investigation at the former fueling facility. The investigation included: the advancement of 12 soil borings which were installed and converted to two-inch diameter PVC monitoring wells (MW-1 through MW-12); collection of 19 soil samples from the borings for chemical analyses (all samples were analyzed for total petroleum hydrocarbons (TPH) and one sample per boring was analyzed for PCBs and select metals); groundwater samples were collected from 5 monitoring wells (for analyses of petroleum diesel range organics, TCL base/neutral semi-volatile compounds, total PCBs and select dissolved metals (lead, aluminum, iron and zinc)); and analyses of product samples from three wells for PCBs (Smith Environmental, 1995).

Chronology of Investigations and Regulatory Actions (continued)

Investigation or Regulatory Action	Dates	Description
Phase I Remedial Investigation	1998-2007	The purpose of the Phase I remedial investigation was to determine the extent of subsurface diesel fuel occurrence in the Former Fueling Facility and to provide a database for the development and selection of appropriate remedial alternatives for the removal of this liquid-phase diesel fuel. Remedial investigations were initiated in 1998 and included the installation test pits, soil borings and monitoring wells; aquifer and product bail down testing; and a characterization of PCB occurrence in product. The site data and consideration of realistic exposure scenarios were then used to estimate the risk to human health associated with the potential chemicals of concern. An ecological assessment was also performed to characterize biological communities, identify and quantify potential chemicals of concern, and to assess the effects of potential chemicals of concern. Sediment and fish tissue samples were also collected from site drainage features.
Phase II Remedial Investigation and Focused Feasibility Study	July 2007	The Phase II Remedial Investigation and Focused Feasibility Study Report (RI/FFS) summarized the additional sampling conducted in the Brandywine Creek as well as other drainage ditches in the immediate vicinity of the Former Fueling Facility. In addition different remedial alternatives were proposed by SECOR to remediate the sediments in these drainage ditches (SECOR, 2007)

Current Regulatory Status:

Multiple interim remedial actions have taken place at the former fueling facility, but currently DNREC is reviewing the SECOR Phase II Remedial Investigation/Focused Feasibility Study to determine what the best plan of action will be in the future. No Final Plan of Remedial Action has been issued for the Amtrak Refueling Facility as of December 2008.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

PCBs were detected in the majority of samples collected from the Amtrak Former Refueling Facility. The Refueling Yard was divided into five drainage areas (see figure 6) for overland flow evaluation. These five areas were then evaluated using the samples within each area. The areas were evaluated taking into account the interim actions that were completed on the site as of December 2008. These actions included stone mulch cover, small removal areas, and permanent sediment and erosion controls.

Once the areas were evaluated, BrightFields calculated the 95% UCL of the mean of the concentration of total PCBs observed in the surface soils on each area. The 95% UCL of the mean concentration of total PCBs in surface soils ranged from 9.53 to 171 mg/kg.

Total PCBs were detected in the subsurface unsaturated and saturated soils at concentrations ranging from non-detect to 3,200 mg/kg. The site specific cross section developed by Secor in their Phase II RI/FS indicates that there is confining clay layer approximately 10 feet below ground surface in most areas. The boring logs and samples indicate that the contamination may be restricted to this layer. Shallow groundwater was observed on the property between 1.5 to 10 feet bgs, which would indicate that it is in constant contact with contaminated soils.

Concentrations of PCBs on Site			
Sample Matrix	**Corresponding Figure**	**Analytical Methods**	**Range of Total PCBs**
Surface Soil	Figure 2	Method 8082 and Congener Analysis	Not detected to 2,500 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Method 8082 and Congener Analysis	Not detected to 1,300 mg/kg
Subsurface Soil (saturated)	Figure 4	Method 8082 and Congener Analysis	Not detected to 3,200 mg/kg
Ground Water	Figure 5	Congener Analysis	Not detected to 8.52 µg/L

Please find the attached historical information for the Amtrak Refueling Yard

Acreage where PCBs detected:

The estimated surface soil area impacted by PCBs is approximately 57 acres (Figure 2) of which only 54 acres (Figure 6) may still be contributing to mass loading via overland flow. The remaining 3 acres were found to be under impervious surfaces during the site evaluation. Approximately 52 acres of subsurface unsaturated soil may be impacted by PCBs (Figure 3). Approximately 44 acres of subsurface saturated soil may be impacted by PCBs (Figure 4).

PCB Remediation Status:

In an effort to reduce sediment migration offsite, Amtrak instituted erosion and sediment controls on the northwest portion of property. These controls included the installation of bioretention caps, stone/fabric filter berms, grading of certain areas, placing fabric/stone stabilized construction entrances and stone check dams. BrightFields accounted for these measures in our overland flow calculations by associating support practice factors to each individual area that was segregated out as separate drainage areas. All other interim remedial actions that have taken place on the former fueling facility concern primarily the diesel fuel release in the former 250,000-gallon holding tank area ("roundhouse area"). These actions include installation and operation of an oil recovery system, bioremediation of surface soils in the vicinity of the Eastern Drainage Ditch, test trenching and closure/removal of preferential pathways, review of NPDES surface water sampling results, groundwater monitoring program, and continuation of the sorbent boom maintenance program.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow and via groundwater transport are discussed below. 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 estimated on this site 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:

BrightFields assessed the surface cover and flow paths through aerial photography and available contour mapping (Delaware Data Mil, 2007). During this assessment BrightFields identified five separate drainage areas. Each of these areas was assessed separately. The cover/management factors (C) assigned to the site and associated flow paths ranged from 0.012 to 0.45, which corresponds to areas instituting a vegetative cover primarily consisting of grass or grass like plants, areas consisting of a vegetative cover comprised of primarily trees, short brush, and weeds, and areas of bare ground.

Site Sediment and Erosion Control Practices:

Amtrak has taken measures to reduce sediment migration offsite to the northwest portion of the site. These practices include bioretention caps, stone/fabric filter berms, grading of certain areas, placing fabric/stone stabilized construction entrances and stone check dams.

Input Factors and Results:

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

Area 1: Eastern portion of the site confined by the Eastern Drainage Ditch and Railcar Road

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 chosen based on the information provided by the Secor Phase II Remedial Investigation and Focused Feasibility Study of the Amtrak Former Fueling Facility in Wilmington, DE. The geology section indicated that surface soils generally consisted of fine to coarse sand with cinder ash.
LS = topographic factor (dimensionless)	0.109	The slope length was estimated to 281 feet, which is the distance between the Area 1 centroid and the Eastern Drainage Ditch along the overland flow path. The associated slope (1.4 %) and slope length were used to calculate a topographic factor of 0.200 by the USDA program.
C = cover/management factor (dimensionless)	0.053	The cover/management factor C assigned to Area 1 and associated flow path was 0.053, which corresponds to vegetative cover consisting of trees, short brush, and weeds.
P = support practice factor (dimensionless)	1.0	There are no sediment and erosion controls in place on this portion of the 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 Amtrak Refueling Yard Area 1 to the surface water body under current site conditions is 236 grams per year.

Area 2: Area adjacent to the Eastern Drainage Ditch to the West.

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 chosen based on the information provided by the Secor Phase II Remedial Investigation and Focused Feasibility Study of the Amtrak Former Fueling Facility in Wilmington, DE. The geology section indicated that surface soils generally consisted of fine to coarse sand with cinder ash.

RUSLE Factors	Values Provided	Explanation of Selection
LS = topographic factor (dimensionless)	0.780	The slope length was estimated to 92.5 feet, which is the distance between the Area 2 centroid and the Eastern Drainage Ditch along the overland flow path. The associated slope (6.5 %) and slope length were used to calculate a topographic factor of 0.780 by the USDA program.
C = cover/management factor (dimensionless)	0.22 to 0.45	The cover/management factor C assigned to Area 2 and associated flow path was 0.053, which corresponds areas of vegetation consisting of trees, short brush, and weeds to areas of bare ground.
P = support practice factor (dimensionless)	0.57	Stone and filter berms are in place on this portion of the 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 Amtrak Refueling Yard Area 2 to the surface water body under current site conditions is 20,900 grams per year.

Area 3: Western portion of the site adjacent to the Western Drainage Ditch

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 chosen based on the information provided by the Secor Phase II Remedial Investigation and Focused Feasibility Study of the Amtrak Former Fueling Facility in Wilmington, DE. The geology section indicated that surface soils generally consisted of fine to coarse sand with cinder ash.
LS = topographic factor (dimensionless)	1.7	The slope length was estimated to 35.3 feet, which is the distance between the Area 3 centroid and the Western Drainage Ditch along the overland flow path. The associated slope (17 %) and slope length were used to calculate a topographic factor of 1.7 by the USDA program.
C = cover/management factor (dimensionless)	0.45	The cover/management factor C assigned to the site and associated flow path was 0.45, which corresponds to surface cover of bare ground.
P = support practice factor (dimensionless)	1.0	There are no sediment and erosion controls in place on this portion of the 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 Amtrak Refueling Yard Area 3 to the surface water body under current site conditions is 2,660 grams per year.

Area 4: Former Roundhouse Area and associated drainage on the Northern portion of the site

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 chosen based on the information provided by the Secor Phase II Remedial Investigation and Focused Feasibility Study of the Amtrak Former Fueling Facility in Wilmington, DE. The geology section indicated that surface soils generally consisted of fine to coarse sand with cinder ash.
LS = topographic factor (dimensionless)	0.120	The slope length was estimated to 903 feet, which is the distance between the Area 4 centroid and the Western Drainage Ditch along the overland flow path. The associated slope (0.7 %) and slope length were used to calculate a topographic factor of 0.120 by the USDA program.
C = cover/management factor (dimensionless)	0.45	The cover/management factor C assigned to the site and associated flow path was 0.45, which corresponds to surface cover of bare ground.
P = support practice factor (dimensionless)	1.0	There are no sediment and erosion controls in place on this portion of the 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 Amtrak Refueling Yard Area 4 to the surface water body under current site conditions is 378 grams per year.

Area 5: Northwest Portion of the Site

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 chosen based on the information provided by the Secor Phase II Remedial Investigation and Focused Feasibility Study of the Amtrak Former Fueling Facility in Wilmington, DE. The geology section indicated that surface soils generally consisted of fine to coarse sand with cinder ash.

RUSLE Factors	Values Provided	Explanation of Selection
LS = topographic factor (dimensionless)	0.310	The slope length was estimated to 760 feet, which is the distance between the Area 5 centroid and the Western Drainage Ditch along the overland flow path. The associated slope (1.8 ft/ft) and slope length were used to calculate a topographic factor of 0.310 by the USDA program.
C = cover/management factor (dimensionless)	0.012 – 0.05	The cover/management factor C assigned to the site and associated flow path was 0.012 to 0.05, which corresponds to surface cover of bare ground instituting two to six inches of stone mulch, to areas of grass or grass-like plants.
P = support practice factor (dimensionless)	1.0	There are no sediment and erosion controls in place on this portion of the 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 Amtrak Refueling Yard Area 5 to the surface water body under current site conditions is 28.8 grams per year.

Uncertainty Evaluation Associated with Overland Flow:

Specific Areas and Degree of Uncertainty for the Amtrak Refueling Site

	Samples Per Acre (site)	Chemical Data Quality*	Topography	Soil Type	Site Coverage	Map Quality	Distance to Discharge Points
Site Specific Information	3.81	Method 8082**	Estimated using topography and information available	Detailed logs that are located within the area of concern	Based on aerial photography	Scaled Map / Sketched sample locations	281 feet 92.5 feet 35.3 feet 903 feet 760 feet
Degree of Uncertainty	Moderate	Low	Low to Moderate	Low	High	Moderate to High	High

* Primary analysis used in historical samples
** Congener data was available

Areas of uncertainty concerning the Amtrak Refueling Yard include the following: numerous samples with reported data were not located on any figures. In these instances BrightFields had to leave the data out of the assessment. Remedial efforts have been made on the Refueling Yard, but no large scale PCB remediation efforts have been made. There have been multiple attempts at limiting the amount of sediment discharged into the drainage ditches through erosion and

sediment controls. These practices were accounted for in the overland flow calculations through the support practice factor. Some areas instituted berms as an engineering control to reduce sediment migration. The RUSLE2 program does not have the capability of accounting for this type of measure. In these instances BrightFields had to account for this measure by substituting hay berms within the program. This could lead to a discrepancy in support practice factor, but the discrepancy will be more conservative. In addition, BrightFields was unable to complete a thorough assessment of the facility due to the restricted access to the site. Instead BrightFields used aerial photography and boring descriptions to determine the surface cover in the areas. Lastly the site was originally determined to have six drainage areas by Secor. During BrightFields' assessment five areas were identified; the drainage patterns that BrightFields indentified were not the same as the defined Secor drainage patterns. Based on these findings the overall uncertainty associated with the Amtrak Refueling Yard 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.

PCBs were detected in groundwater and these concentrations were used. Site was divided into based the presence of a groundwater divide and on well placement - wells 7 and 8 (Zone A), and wells 15, 16, and 18 (Zone B) (see attached Figure 7). The average PCB concentrations in unfiltered groundwater samples collected in July 1980 (except for well 16 where only a filtered sample was collected) were used for each of the zones.

Input Factors:

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

Zone A

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.066	1.83	Slug tests were perform in four of the wells on the Amtrak Refueling Yard Property. The measured horizontal hydraulic conductivity ranged from 2.33×10^{-5} to 6.45×10^{-4} cm/sec.
I = Horizontal Groundwater Gradient	0.003	0.0034	Calculations of horizontal hydraulic gradients were derived from measurements conducted in July and August 1980.
Saturated Thickness (ft)	3	12	Based on the boring logs, the saturated thickness was approximately 3 to 12 feet.

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
Lateral Discharge Distance (ft)	2,150	2,150	The lateral discharge distance was chosen to be equal to the length of the PCB impacted area measured perpendicular to the groundwater flow.
A= Cross-Sectional Area (ft2)	6,450	25,800	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (ug/L)	2.5		The average PCB concentrations in unfiltered groundwater samples collected in July 1980 were used for each of the zones. The average concentration of PCBs in groundwater for this area was 2.5 ug/L.
Distance to Discharge point (ft)	Directly adjacent		Approximate distance from property boundary to closest surface water location.

The PCB loading via groundwater discharge for Zone A is between 0.03 to 4.2 grams per year. Please see attached tables for specific variables.

Zone B

Groundwater Transport Factors	Value Used		Justification/Derivation of Value Used
	min	max	
K = Hydraulic Conductivity (ft/day)	0.066	1.83	Slug tests were perform in four of the wells on the Amtrak Refueling Yard Property. The measured horizontal hydraulic conductivity ranged from 2.33×10^{-5} to 6.45×10^{-4} cm/sec.
I = Horizontal Groundwater Gradient	0.003	0.0037	Calculations of horizontal hydraulic gradients were derived from measurements conducted in July and August 1980.
Saturated Thickness (ft)	3	12	Based on the boring logs, the saturated thickness was approximately 3 to 12 feet.
Lateral Discharge Distance (ft)	2,150	2,150	The lateral discharge distance was chosen to be equal to the length of the PCB impacted area measured perpendicular to the groundwater flow.
A= Cross-Sectional Area (ft2)	6,450	25,800	Calculated from the saturated thickness and lateral discharge distance.
Groundwater PCB Concentration (ug/L)	0.83		The average PCB concentrations in unfiltered groundwater samples collected in July 1980 were used for each of the zones. The average concentration of PCBs in groundwater for this area was 0.83 ug/L.
Distance to Discharge point (ft)	Directly adjacent		Approximate distance from property boundary to closest surface water location.

The PCB loading via groundwater discharge for Zone B is between 0.01 to 1.5 grams per year. Please see attached tables for specific variables.

Mass Loading Via Groundwater Transport Result:

The groundwater discharge is 13,000 to 52,000 L/day (attached Table A). The average detected PCB concentration in groundwater for each area of concern 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 0.04 and 5.7 grams per year (attached Table C).

Uncertainty Analysis Associated with Groundwater Transport:

Specific Areas and Degree of Uncertainty for the Amtrak Refueling Yard

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

Based on this evaluation the overall uncertainty associated with the Amtrak Refueling Yard is **low.**

Site References:

Department of Natural Resources and Environmental Control (DNREC), Site Investigation and Research Branch (SIRB), 1994, Toxicological Evaluation Report of the Amtrak Wilmington Refueling Facility, December 1994.

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