SOIL ANALYSIS REPORT

DTC-NEC Commuter Rail Improvements

Third Track – Yard to Ragan Interlockings
New Castle County, Delaware

Amtrak Mile Post 28.15 to 29.85

Prepared for:

Delaware Transit Corporation

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GENERAL:

The Northeast Corridor (NEC) is the main corridor serving inter-city passenger rail traffic between Washington, DC and Boston, MA. Through Delaware, the NEC is owned, operated, and maintained by the National Railroad Passenger Corporation (Amtrak). In addition to several Amtrak routes, both freight traffic (Norfolk Southern) and commuter passenger rail service also operate on the NEC from Newark, Delaware to points north. Commuter rail service in Delaware is provided by Southeastern Pennsylvania Transportation Authority (SEPTA) R2 regional rail service. Delaware Transit Corporation (DTC) presently contracts with SEPTA to provide rail service from Central Philadelphia into Delaware.

PROJECT DESCRIPTION:

To increase the capacity on the NEC beyond the existing two tracks, DTC has retained Rummel, Klepper & Kahl, LLP (RK&K) to design a third track between the Ragan and Yard interlockings (between Wilmington and Newport, Delaware). This construction involves the installation of 1.5 miles of track, replacement of an existing railroad bridge over Little Mill Creek, construction of a major retaining wall at Little Mill Creek, and the installation of several low retaining walls (4 feet or less) to avoid wetland impacts due to trackbed grading operations.

During the soil boring operations to assess the geotechnical aspects of the project, environmental samples were collected and analyzed to assess the possibility of the contractor encountering contaminated materials. Soil borings were drilled by the drilling contractor, Walton Corporation, under separate contract to the Delaware Department of Transportation (DelDOT) for this project. All borings were located a minimum of 14’ 0” from the nearest track.

METHODOLOGY:

Representative soil samples were collected from selected test borings for laboratory analysis. The purpose of the laboratory analysis was to determine if one or more of several common contaminants are present along the Amtrak right-of-way at concentrations that will necessitate special handling or disposal of excavated materials during the construction of the Third Track project.

Sampling Protocol – The samples were collected from the upper 5 feet of soil under the railway ballast in the selected test borings. All samples were obtained by Walton Corporation. The sampling procedure was as follows:

- Soil samples were collected using a split-spoon sampler that has been cleaned and rinsed using detergent and potable water. If there was insufficient sample from the split-spoon after the location’s geotechnical sample had been taken, appropriate soil was retrieved from the soil brought up by the hollow-stem auger flights from the relevant depths.
- Sufficient sample was collected to fill one 16-ounce laboratory jar and two 4-ounce containers, with no headspace. The upper ½ foot of the sample was excluded to avoid sampling ballast, plant debris, and other non-soil surface materials.

- The soils were transferred by hand with appropriate protective gloves to a stainless steel bowl, and composited evenly to create a representative sample for each location, across the indicated depths. (The first two samples collected were composited by RK&K personnel off-site.)
- The samples were transferred to laboratory-provided containers and were labeled with provided labels indicating test boring identification, and date and time of sampling.
- The samples were placed on ice within an insulated cooler and maintained cold (approximately 4 ºC), and were delivered to RK&K within six days of collection. Each batch of samples was accompanied by completed chain-of-custody forms.

Sampling Locations – The attached Figure 1 identifies the test borings where environmental samples were taken.

Selected Test Borings for Environmental Sampling

F-T-7	(SB-45)	F-T-6A	(SB-45)	F-T-6	(SB-45)
F-RW-7	(SB-44)	F-MC-6	(SB-44)	F-T-4	(SB-43)
F-GW-13	(SB-43)	F-GW-11	(SB-43)	F-GW-7	(SB-42)
F-GW-5	(SB-41)	F-GW-1	(SB-41)	F-T-1	(SB-40)

Laboratory Analyses – The samples were delivered to Microbac Laboratories, Inc. (Gascoyne Division) in Baltimore, Maryland to be analyzed for the following parameters.

- Resource Conservation and Recovery Act (RCRA) toxic metals,
- Target Compound List (TCL) semi-volatile organic compounds (SVOCs),
- Polychlorinated biphenyls (PCBs), and
- Diesel range organics (DRO).

One samples was selected for a Complete Toxicity Characteristic Leaching Procedure (TCLP) analysis, even though evidence of gross contamination was not observed.

Additional Soil Waste Characteristic Testing – Samples from five additional test borings were collected and analyzed for waste characteristics, to determine soil reuse/disposal requirements for soil excavated from the proposed drainage trench adjacent to the alignment. Geotechnical test borings F-EX-1 through F-EX-5 (shown in the attached test boring plans) will be drilled to depths of 10 feet at specified locations along the trench. The samples were analyzed for:

- Gasoline range organics (GRO)
- TCL volatile organic compounds (VOCs)
- Total Organic Halides
- Paint Filter Test
- Reactivity, cyanide
- Corrosivity, pH
- Ignitability
- Reactivity, sulfide

Sufficient sample was collected at each location to fill one 16-ounce laboratory jar and two 4-ounce containers, with no headspace. Samples were collected and handled in accordance with the previous protocol, except that soil samples were collected from soil cuttings mixed and brought up by the auger flights in the top 5 feet drilled under the railway ballast.

SIGNIFICANT FINDINGS:

All of the certified laboratory results are included in the Appendix. The significant results are summarized in Table 1, Environmental Samples and Table 2, Waste Characteristic Samples.

No significant contamination was found in any of the Environmental Samples. Except for Arsenic, no results were above Delaware Department of Natural Resources and Environmental Control (DNREC) VCP Risk-Based Remediation Standards for Subsurface Soil in a Non-Critical Area, either Unrestricted or Restricted. Arsenic was detected in ten of the twelve samples at a level above the Unrestricted standard of 0.4 mg/kg. Four samples contained arsenic levels above the Restricted standard of 4 mg/kg. However, the Typical Delaware Soil Concentration, which describes naturally occurring metal levels, has an Arsenic range up to 10 mg/kg, and no sample result surpassed this concentration.

No significant contamination was found in the five waste characterization samples. The samples contained no detectable levels of GRO, Total Organic Halogens, Ignitibility, Paint Filter (free liquid), and Cyanide Reactivity. Minor results were detected for VOCs and Sulfide Reactivity, none of which exceeded regulatory criteria. The Corrosivity results of the five samples ranged from pH 5.4 to 7.1. Therefore, no waste disposal restrictions are anticipated due to corrosivity.

A Complete TCLP analysis was performed only on the first sample taken, F-MC-6. This sample also happened to have the highest detected total values for Arsenic, Cadmium, Lead, and Silver (though all were still below their respective standards). No leachable concentrations of these metals or other contaminants were detected.

RECOMMENDATIONS:

The contaminants of concern during excavation of the project area include petroleum, PCBs, and toxic metals. The analytical results indicate that excavation for the proposed construction would probably not encounter significant soil contamination. However, considering the industrialized nature of the project area and the historic land uses along the alignment, localized contamination is still possible.

For health and safety purposes, soils that contain evidence of contamination during excavation, based on odor or visible staining, should be segregated from the “uncontaminated” soils and stockpiled pending confirmatory analysis and/or appropriate on-site reuse or off-site disposal. Confirmation testing should include analysis for TAL Metals, DRO, GRO, PCBs, and SVOCs. The disposal facility may require TCLP analysis before acceptance. Soils that are not acceptable for on-site reuse and that contain concentrations exceeding Risk-Based Remediation Standards should be removed for off-site treatment or disposal, in accordance with DNREC requirements.

South Maryland Avenue, SR 4
Germay Drive
Interstate 95
Mill Creek
Middleboro Road
Banning Park
Christina River
F-EX-5
F-EX-4
F-T-7
F-EX-3
F-T-6A
F-T-6
F-RW-7
F-MC-6
F-T-4
F-GW-13
F-GW-11
F-GW-7
F-GW-5
F-GW-1
F-T-1
F-EX-2
F-EX-1
N
27-512-01
Figure 1
DTC Third Track – Environmental and Waste Characterization Sample Locations
Environmental Sample
Waste Characterization Sample

TABLE 1
Delaware Transit Corporation
DTC-NEC Commuter Rail Improvements, Third Track
Soil Sample Analytical Results, Environmental

Petroleum Hydrocarbons

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-MC-6	F-RW-7	F-T-6	F-T-6A	F-T-7	F-T-4
					Date	11/16/2007	1/14/2008	1/15/2008	1/16/2008	1/17/2008	1/21/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
DRO (C_{10} to C_{28})	mg/kg	1,000	2,500	8015B	10	<10	<10	<10	<10	<10	<10

TOTAL RCRA METALS

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-MC-6	F-RW-7	F-T-6	F-T-6A	F-T-7	F-T-4
					Date	11/16/2007	1/14/2008	1/15/2008	1/16/2008	1/17/2008	1/21/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
Arsenic [(1)]	mg/kg	0.4	4	6020	0.099 to 0.4	**6.4**	**1.7**	**2.4**	**3.1**	**5.8**	**0.67**
Barium	mg/kg	550	14,000		0.25 to 1.0	**60**	**60**	**61**	**50**	**84**	**14**
Cadmium	mg/kg	4	100		0.025 to 0.10	**0.47**	<0.099	<0.099	<0.099	<0.099	<0.025
Chromium	mg/kg	270 [(2)]	610 [(2)]		0.12 to 2.4	**19**	**13**	**33**	**14**	**29**	**5.7**
Lead	mg/kg	400	1,000		0.099 to 0.4	**130**	**12**	**18**	**44**	**25**	**14**
Mercury	mg/kg	1 [(3)]	20 [(3)]	7470A	0.00022 to 0.031	<0.026	**0.10**	**0.038**	<0.029	**0.033**	**0.039**
Selenium	mg/kg	39	1,000	6020	0.25 to 1.0	<0.97	**1.1**	<0.99	<0.99	<0.99	<0.25
Silver	mg/kg	39	1,000		0.049 to 1.0	**0.60**	**0.42**	**0.29**	<0.20	<0.20	<0.050

PCBs

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-MC-6	F-RW-7	F-T-6	F-T-6A	F-T-7	F-T-4
					Date	11/16/2007	1/14/2008	1/15/2008	1/16/2008	1/17/2008	1/21/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
PCBs, Total	mg/kg	*various*	*various*	8082	1.1 to 1.3	<1.1	<1.1	<1.2	<1.2	<1.3	<1.2

TCL SVOCs

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-MC-6	F-RW-7	F-T-6	F-T-6A	F-T-7	F-T-4
					Date	11/16/2007	1/14/2008	1/15/2008	1/16/2008	1/17/2008	1/21/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
SVOCs, Total	µg/kg	*various*	*various*	8260B	360 to 2,200	ND	ND	ND	As Specified	ND	As Specified
Bis(2-ethylhexyl)phthalate	µg/kg	46,000	410,000	8260B	360 to 420	ND	ND	ND	**440**	ND	**1,100**
Diethyl phthalate	µg/kg	1,000,000	5,000,000	8260B	360 to 420	ND	ND	ND	ND	ND	ND

TABLE 1
Delaware Transit Corporation
DTC-NEC Commuter Rail Improvements, Third Track
Soil Sample Analytical Results, Environmental

Petroleum Hydrocarbons

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-GW-13	F-GW-11	F-GW-7	F-GW-5	F-GW-1	F-T-1
					Date	1/22/2008	1/23/2008	1/24/2008	1/29/2008	1/29/2008	1/30/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
DRO (C_{10} to C_{28})	mg/kg	1,000	2,500	8015B	10	<10	<10	<10	<10	**11**	<10

TOTAL RCRA METALS

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-GW-13	F-GW-11	F-GW-7	F-GW-5	F-GW-1	F-T-1
					Date	1/22/2008	1/23/2008	1/24/2008	1/29/2008	1/29/2008	1/30/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
Arsenic [(1)]	mg/kg	0.4	4	6020	0.099 to 0.4	**5.7**	**4.5**	<0.099	**1.5**	**3.5**	<0.39
Barium	mg/kg	550	14,000		0.25 to 1.0	**93**	**67**	**13**	**17**	**48**	**55**
Cadmium	mg/kg	4	100		0.025 to 0.10	**0.11**	<0.10	<0.025	**0.097**	**0.10**	<0.096
Chromium	mg/kg	270 [(2)]	610 [(2)]		0.12 to 2.4	**31**	**31**	**14**	**7.6**	**23**	**33**
Lead	mg/kg	400	1,000		0.099 to 0.4	**75**	**33**	**4.5**	**33**	**63**	**7.8**
Mercury	mg/kg	1 [(3)]	20 [(3)]	7470A	0.00022 to 0.031	<0.029	<0.030	<0.031	<0.030	**0.059**	**0.0050**
Selenium	mg/kg	39	1,000	6020	0.25 to 1.0	<0.99	<1.0	<0.25	<0.25	<1.0	<0.96
Silver	mg/kg	39	1,000		0.049 to 1.0	**0.25**	<0.20	<0.050	<0.049	<1.0	<0.96

PCBs

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-GW-13	F-GW-11	F-GW-7	F-GW-5	F-GW-1	F-T-1
					Date	1/22/2008	1/23/2008	1/24/2008	1/29/2008	1/29/2008	1/30/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
PCBs, Total	mg/kg	*various*	*various*	8082	1.1 to 1.3	<1.2	<1.2	<1.3	<1.2	<1.2	<1.1

TCL SVOCs

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-GW-13	F-GW-11	F-GW-7	F-GW-5	F-GW-1	F-T-1
					Date	1/22/2008	1/23/2008	1/24/2008	1/29/2008	1/29/2008	1/30/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
SVOCs, Total	µg/kg	*various*	*various*	8260B	360 to 2,200	As Specified	ND	ND	ND	As Specified	ND
Bis(2-ethylhexyl)phthalate	µg/kg	46,000	410,000	8260B	360 to 420	**670**	ND	ND	ND	ND	ND
Diethyl phthalate	µg/kg	1,000,000	5,000,000	8260B	360 to 420	ND	ND	ND	ND	**510**	ND

TABLE 1
Delaware Transit Corporation
DTC-NEC Commuter Rail Improvements, Third Track
Soil Sample Analytical Results, Environmental

Metals, TCLP Method 1311

Analyte	Units	VCP Risk-Based Remediation Standards Groundwater		EPA Method	Sample ID	F-MC-6
					Date	11/16/2007
		Unrestricted	Restricted		Detection Limit	0 to 5 feet
Metals	mg/L	*various*	*various*	6010B/7470A	0.010 to 5.0	ND

Herbicides/Pesticides, TCLP Method 1311

Analyte	Units	VCP Risk-Based Remediation Standards Groundwater		EPA Method	Sample ID	F-MC-6
					Date	11/16/2007
		Unrestricted	Restricted		Detection Limit	0 to 5 feet
Herbicides	mg/L	*various*	*various*	8151A	0.020 to 0.050	ND
Pesticides	mg/L	*various*	*various*	8081A	0.00050 to 0.030	ND

SVOCs, TCLP Method 1311

Analyte	Units	VCP Risk-Based Remediation Standards Groundwater		EPA Method	Sample ID	F-MC-6
					Date	11/16/2007
		Unrestricted	Restricted		Detection Limit	0 to 5 feet
SVOCs	mg/L	*various*	*various*	8270C	0.10 to 0.50	ND

VOCs, TCLP Method 1311

Analyte	Units	VCP Risk-Based Remediation Standards Groundwater		EPA Method	Sample ID	F-MC-6
					Date	11/16/2007
		Unrestricted	Restricted		Detection Limit	0 to 5 feet
VOCs	mg/L	*various*	*various*	8260B	0.050 to 0.50	ND

(1) - The Typical Delaware Soil Concentration for Arsenic has a range up to 10 mg/kg.
(2) - Chromium VI.
(3) - Methylmercury.
ND - Not Detected at or above the method detection limit

TABLE 2
Delaware Transit Corporation
DTC-NEC Commuter Rail Improvements, Third Track
Soil Sample Analytical Results, Waste Characterization

Analyte	Units	VCP Risk-Based Remediation Standards Subsurface Soil, Non-Critical Area		EPA Method	Sample ID	F-EX-1	F-EX-2	F-EX-3	F-EX-4	F-EX-5
					Date	1/30/2008	1/30/2008	1/16/2008	1/17/2008	1/18/2008
		Unrestricted	Restricted		Detection Limit	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet	0 to 5 feet
Corrosivity	pH units	--	--	9045C	1.0	**6.7**	**5.4**	**5.4**	**6.5**	**7.1**
Ignitability	°F	--	--	1020A	--	>200	>200	>200	>200	>200
Paint Filter Test	--	--	--	9095A	--	Negative	Negative	Negative	Negative	Negative
Reactivity, Cyanide	mg/kg	--	--	SW 846 7.3	1.0 to 50	<50	<50	<1.0	<1.0	<1.0
Reactivity, Sulfides	mg/kg	--	--	SW 846 7.3	10 to 100	<100	<100	<10	**19**	<10
Total Organic Halogens	mg/kg	--	--	SW 846 9023	10	<10	<10	<10	<10	<10
Gasoline Range Organics (C_6 to C_{10})	mg/kg	100	500	8015B	7.9 to 10	<10	<10	<8.1	<8.0	<7.9
Volatile Organic Compounds	µg/kg	*various*	*various*	8260B	0.61 to 6,000	ND	ND	As Specified	ND	As Specified
Acetone	µg/kg	780,000	5,000,000	8260B	12 to 6,000	ND	ND	**14**	ND	**16**
Ethylbenzene	µg/kg	400,000	5,000,000	8260B	0.85 to 300	ND	ND	ND	ND	**0.89**
Methylene chloride	µg/kg	13,000	760,000	8260B	11 to 300	ND	ND	**15**	ND	**13**

Soil Sampling Review, Little Mill Creek
June 18 and 22, 2007

Methodology

Soil samples were taken in the area of the NEC Commuter Rail's overpasses over the Little Mill Creek near Wilmington, New Castle County, Delaware, in support of dredging activities planned for the installation of scour protection measures around the overpasses and retaining wall. Three environmental samples were taken by hand-bored auger on June 18 and 22, 2007. The samples Mill-1 and Mill-2 were taken on June 18 upstream of the crossing from the approximate center of the stream channel. Mill-1 was taken directly upstream of the railroad bridges, at the upper edge of the existing scour hole under the railroad bridges, near the confluence of Little Mill Creek and an unnamed tributary from the north. Mill-2 was taken approximately 60 feet upstream and southwest of the railroad bridges, along the planned location of the retaining wall. The sample Mill-3 was taken on June 22 directly downstream of the railroad bridges, at the lower edge of the existing scour hole. The sample was a combination of three borings taken from the west side, center, and east side of the stream channel.

The samples were taken from the creek's channel bottom to approximately two feet below. The top layers were excluded, to avoid plant material and other detritus. All remaining soil collected by the borings was transferred by hand with appropriate protective gloves to separate sealable plastic bags, and composited to create the representative sample for analytical testing from each location. These were then transferred to laboratory-provided containers and placed on ice within an insulated cooler and maintained at a temperature of approximately 4 ºC. Analytical samples were taken on the same day to Microbac Laboratories, Inc., 2101 Van Deman Street, Baltimore, Maryland for analytical testing. Remaining soil material was taken to Robert B Balter Co., 18 Music Fair Road, Owings Mills, Maryland for geotechnical testing.

Significant Findings

All soil samples were analyzed for the thirteen Priority Pollutant (PP) metals, Target Compound List (TCL) pesticides/PCBs, chlorinated herbicides, oil & grease, phenolics, total organic carbon (TOC), phosphorus, and organic nitrogen parameters: total Kjeldahl nitrogen (TKN), ammonia, and nitrate & nitrite. Additionally, Mill-1 and Mill-2 were analyzed for TCL volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), gasoline range organics (GRO), diesel range organics (DRO), total organic halides (TOH), corrosivity, ignitability, paint filter test, reactivity with cyanide, reactivity with sulfide, and a complete Toxicity Characteristic Leaching Procedure (TCLP) including VOCs, SVOCs, pesticides, metals, and herbicides. All results are shown in Table S-1.

No detectable concentrations were found for the analytes: GRO, TCL pesticides/PCBs, TCL VOCs, chlorinated herbicides, TOH, TOC, and cyanide reactivity. Results of the paint filter test were negative. No significant level of ignitability was found. No detectable concentrations were found in the TCLP tests.

Most of the analytes that had measurable results and no Delaware remediation standards were present in levels fairly typical of lightly impacted soil. These include: corrosivity, reactivity with sulfide, oil & grease, phenolics, phosphorus, TKN, ammonia, and nitrate & nitrite.

Measurable results that had applicable Delaware remediation standards were well below these standards, except for six metals. These include two results for DRO at Mill-1 and Mill-2, and a result for the TCL SVOCs fluoranthene and pyrene at Mill-2. All metal results were below remediation standards for: beryllium, copper, lead, nickel, selenium, silver, and thallium.

Six metals were above remediation standards in samples from Mill-1 or Mill-2. (No metals were detected above any standards in sample Mill-3.) Cadmium, copper, and zinc were slightly above the December 1999 DNREC Uniform Risk Based Remediation Standards (URS) for unrestricted use in both samples. Antimony was slightly above the URS for unrestricted use in Mill-2, and mercury was in Mill-1. No results were above applicable URS for restricted use. Arsenic was detected at 20 mg/kg at Mill-1 and 31 mg/kg at Mill-2. These are above the Delaware default background concentration of arsenic (11 mg/kg), but not above its historic industrial action level and cleanup goal (40 mg/kg), as described in the "Arsenic Risk Management Plan Background Document", published by DNREC in February 2007.

The geotechnical analysis by Robert B Balter determined Mill-1 to be a dark gray lean clay with sand, Mill-2 to be a dark gray elastic silt, and Mill-3 to be a dark grayish brown poorly graded sand with gravel, with only 3.7% silt/clay. These results confirmed that the TCLP analysis was best performed on Mill-1 and Mill-2, as the sand and gravel in Mill-3 would have little leachate.

Recommendations

In the highly industrial area around Little Mill Creek and with possible impacts from the railroad, the contaminants of concern during an excavation of the project area include petroleum products, VOCs, SVOCs, PCBs, and toxic metals, all of which may be encountered during dredging of the creek's sediments and surrounding soils. The analytical results indicate that excavation for the proposed construction has little risk of encountering areas of contaminated soils.

The total and TCLP results for VOCs, SVOCs, pesticides, and herbicides show no contamination at significant levels, and these analytes should not be considered primary contaminants for this project. GRO, DRO, and oil & grease results indicate only minimal impact to the soil from petroleum products. A slightly elevated concentration of phenolics in the downstream sample of Mill-3 might indicate the presence of creosote or other phenol-based wood preservative from the railroad, but no risk is indicated from this result. Metal results show that the any excavated soil must be disposed at an approved upland facility according to Restricted Use standards.

During excavation, testing should include analysis for phosphorus, nitrogen, TOC, oil & grease, PP metals, DRO, GRO, VOCs, SVOCs, phenolics, and PCBs. Excavated soils that contain clear evidence of petroleum contamination, based on odor or visible staining, should be segregated from the other soils and stockpiled pending confirmatory analysis and/or appropriate off-site disposal. The disposal facility may require additional TCLP analysis before acceptance.

TABLE 3
DTC MILL CREEK DREDGINGS, NEW CASTLE, DELAWARE
Dredge Samples Collected on 6/18 and 6/22/2007

	Units	Method	Mill-1	Mill-2	Mill-3
Total Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	mg/kg	EPA 8015B	25	12	
Gasoline Range Organics (GRO)	mg/kg	EPA 5030A/8015B	< 9.8	<9.7	
TCL VOCs	µg/kg	EPA 5030A/8260B	ND	ND	
TCL SVOCs	µg/kg	EPA 8270C	ND		
Fluoranthene	µg/kg	"		620	
Pyrene	µg/kg	"		860	
TOH	mg/kg	EPA 9023	< 10	< 10	
Corrosivity	pH units	EPA 9045C	6.2	6.3	
Ignitability	°F	EPA 1020A	> 200	> 200	
Paint Filter Test	--	EPA 9095A	Negative	Negative	
Reactivity					
with Cyanide	mg/kg	SW 846 7.3	< 1.0	< 1.0	
with Sulfide	mg/kg	SW 846 7.3	95	120	
TCLP VOCs	mg/L	EPA 1311/5030A/8260B	ND	ND	
TCLP SVOCs	mg/L	EPA 1311/8270C	ND	ND	
TCLP Pesticides	mg/L	EPA 1311/8081A	ND	ND	
TCLP Metals	mg/L	EPA 1311/6010B/7470A	ND	ND	
TCLP Herbicides	mg/L	EPA 1311/8151A	ND	ND	
PPL Metals					
Antimony	mg/kg	EPA 6020	< 0.99	5.6	1.1
Arsenic	mg/kg	EPA 6020	20	31	4.7
Beryllium	mg/kg	EPA 6020	1	13	< 0.50
Cadmium	mg/kg	EPA 6020	4.7	15	0.19
Chromium	mg/kg	EPA 6020	340	350	29
Copper	mg/kg	EPA 6020	34	46	20
Lead	mg/kg	EPA 6020	89	100	390
Mercury	mg/kg	EPA 7471A	5.8	0.075	< 0.027
Nickel	mg/kg	EPA 6020	24	37	8.9
Selenium	mg/kg	EPA 6020	< 0.99	10	< 1.0
Silver	mg/kg	EPA 6020	0.25	5.5	< 0.20
Thallium	mg/kg	EPA 6020	0.48	9.5	0.41
Zinc	mg/kg	EPA 6020	2600	2900	180
TCL Pesticides/PCBs	µg/kg	EPA 8081A/8082	ND	ND	ND
Herbicides, Chlorinated	µg/kg	EPA 8151A	ND	ND	ND
Oil & Grease	mg/kg	EPA 9071B	440	220	360
Phenolics	mg/kg	EPA 9065	0.24	< 0.16	9.4
TOC	%	MSA 29-3.5.2	< 0.20	< 0.20	< 0.20
Phosphorus	mg/kg	SM 19 4500 P	530	520	59
Organic Nitrogen	mg/kg	--	1,800	1,800	80
TKN	mg/kg	E351.2_R2.0	1,300	1,200	69
Ammonia	mg/kg	SM 20 4500 NH3	120	87	< 47
Nitrate + Nitrite	mg/kg	EPA 353.2	5.2	2.4	0.81

ATTACHMENT TABLE S-3
DTC MILL CREEK DREDGINGS, NEW CASTLE, DELAWARE
Soil Boring Samples Collected on 6/18 and 6/22/2007

Analytes	Units	Delaware Remediation Standards		Method	Mill-1	Mill-2	Mill-3
		Tier 0 Action Level[1]					
Total Petroleum Hydrocarbons							
Diesel Range Organics (DRO)	mg/kg	1,000		EPA 8015B	**25**	**12**	NA
Gasoline Range Organics (GRO)	mg/kg	100		EPA 5030A/8015B	< 9.8	<9.7	NA
		Unrestricted Use[2]	Restricted Use[3]				
TCL VOCs	µg/kg	*various*	*various*	EPA 5030A/8260B	ND	ND	NA
TCL SVOCs	µg/kg	*various*	*various*	EPA 8270C	ND	*as specified*	NA
Fluoranthene	µg/kg	310,000	5,000,000	EPA 8270C	--	**620**	NA
Pyrene	µg/kg	230,000	5,000,000	EPA 8270C	--	**860**	NA
TOH	mg/kg	--	--	EPA 9023	< 10	< 10	NA
Corrosivity	pH units	--	--	EPA 9045C	**6.2**	**6.3**	NA
Ignitability	°F	--	--	EPA 1020A	> 200	> 200	NA
Paint Filter Test	--	--	--	EPA 9095A	Negative	Negative	NA
Reactivity							
with Cyanide	mg/kg	--	--	SW 846 7.3	< 1.0	< 1.0	NA
with Sulfide	mg/kg	--	--	SW 846 7.3	**95**	**120**	NA
		Groundwater[4]					
TCLP VOCs	mg/L	*various*		EPA 1311/5030A/8260B	ND	ND	NA
TCLP SVOCs	mg/L	*various*		EPA 1311/8270C	ND	ND	NA
TCLP Pesticides	mg/L	*various*		EPA 1311/8081A	ND	ND	NA
TCLP Metals	mg/L	*various*		EPA 1311/6010B/7470A	ND	ND	NA
TCLP Herbicides	mg/L	*various*		EPA 1311/8151A	ND	ND	NA
		Unrestricted Use[2]	Restricted Use[3]				
PP Metals							
Antimony	mg/kg	3	82	EPA 6020	< 0.99	**5.6**	**1.1**
Arsenic	mg/kg	11 [(5)]	40 [(6)]	EPA 6020	**20**	**31**	**4.7**
Beryllium	mg/kg	16	410	EPA 6020	**1.0**	**13**	< 0.50
Cadmium	mg/kg	4	100	EPA 6020	**4.7**	**15**	**0.19**
Chromium	mg/kg	270 [(7)]	610 [(7)]	EPA 6020	**340**	**350**	**29**
Copper	mg/kg	310	8,200	EPA 6020	**34**	**46**	**20**
Lead	mg/kg	400	1,000	EPA 6020	**89**	**100**	**390**
Mercury	mg/kg	1 [(8)]	20 [(8)]	EPA 7471A	**5.8**	0.075	< 0.027
Nickel	mg/kg	160	4,100	EPA 6020	**24**	**37**	**8.9**
Selenium	mg/kg	39	1,000	EPA 6020	< 0.99	**10**	< 1.0
Silver	mg/kg	39	1,000	EPA 6020	**0.25**	**5.5**	< 0.20
Thallium	mg/kg	18	220	EPA 6020	**0.48**	**9.5**	**0.41**
Zinc	mg/kg	2,300	61,000	EPA 6020	**2,600**	**2,900**	**180**
TCL Pesticides/PCBs	µg/kg	*various*	*various*	EPA 8081A/8082	ND	ND	ND
Herbicides, Chlorinated	µg/kg	*various*	*various*	EPA 8151A	ND	ND	ND
Oil & Grease	mg/kg	--	--	EPA 9071B	**440**	**220**	**360**
Phenolics	mg/kg	--	--	EPA 9065	**0.24**	< 0.16	**9.4**
TOC	%	--	--	MSA 29-3.5.2	< 0.20	< 0.20	< 0.20
Phosphorus	mg/kg	--	--	SM 19 4500 P	**530**	**520**	**59**
Organic Nitrogen	mg/kg	--	--	--	**1,800**	**1,800**	**80**
TKN	mg/kg	--	--	E351.2_R2.0	**1,300**	**1,200**	**69**
Ammonia	mg/kg	--	--	SM 20 4500 NH3	**120**	**87**	< 47
Nitrate + Nitrite	mg/kg	--	--	EPA 353.2	**5.2**	**2.4**	**0.81**

Shading. Analytical results above Remediation Standards for Unrestricted Use.

1. DNREC action level for petroleum hydrocarbons in soil, DERBCAP - January 2000.
2. DNREC Uniform Risk Based Remediation Standards (URS) for Unrestricted Use, Non-Critical Water Resource Area, Subsurface Soil, December 1999, 7 Del. C., Chapter 91.
3. DNREC Uniform Risk Based Remediation Standards (URS) for Restricted Use, Non-Critical Water Resource Area, Subsurface Soil, December 1999, 7 Del. C., Chapter 91.
4. DNREC Uniform Risk Based Remediation Standards (URS) for Groundwater, December 1999, 7 Del. C., Chapter 91.
5. Delaware Default Background Concentration of Arsenic, Arsenic Risk Management Plan Background Document, February 2007.
6. Historic industrial action level and cleanup goal, Arsenic Risk Management Plan Background Document, February 2007.
7. Chromium IV.
8. Methyl-mercury.