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December 1, 2016

U.S. Environmental Protection Agency Region III
Mr. Rich Rupert
On-Scene Coordinator
1650 Arch Street
Philadelphia, Pennsylvania 19103

Subject: Final Trip Report
Project: Hockessin Groundwater Site
EPA Contract No.: EP-S3-15-02
TDD No.: W501-16-07-005

Document Control No.: W0119.1F.01888

Dear Mr. Rupert:

Under Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-15-02, Technical Direction Document (TDD) No. W501-16-07-005, the U.S. Environmental Protection Agency (EPA) Region III tasked Weston Solutions Inc. (WESTON®) to collect groundwater and surface water samples in the vicinity of the Hockessin Groundwater Site (the Site) for volatile organic compounds (VOCs) in order to collect data of known quality with a high degree of confidence in support of preparation of a Hazard Ranking System (HRS) package for the Site and to define the nature and extent of contamination in the groundwater.

WESTON is submitting this final trip report to summarize the groundwater and surface water sampling activities conducted by WESTON in September 2016. Figures, analytical results summary tables, well purging forms, field logbook notes, and the data validation reports are presented at the end of this report.

If you have any questions regarding this report, please contact me at (856) 581-4180.

Very truly yours,
WESTON SOLUTIONS, INC.



Enclosure



1.0 SAMPLING AND FIELD ACTIVITIES

This section discusses the groundwater and surface water sampling activities performed at the Hockessin Groundwater Site (Site) located in Hockessin, New Castle County, Delaware, by Weston Solutions, Inc. (WESTON®) in September 2016. All activities were conducted in accordance with the *EPA Region III START 5 Program-Wide Uniform Federal Policy-Quality Assurance Project Plan (UFP QAPP)* (WESTON, 2015a) and the Field Sampling Plan for the Site (FSP) (WESTON, 2016), unless otherwise specified. The Site location is shown on Figure 1, the Site vicinity is shown on figure 2 and the sample locations are shown on Figure 3.

All samples collected during the 2016 sampling event were handled and packaged in accordance with *Contract Laboratory Program Guidance for Field Samplers* (EPA, 2014) for samples shipped to the assigned Contract Laboratory Program (CLP) laboratory for VOCs analysis under Case Number 46484. Samples were placed immediately on ice following collection and shipped to the laboratory the day after being collected. All shipping containers were properly labeled with EPA chain-of-custody seals and delivered with signed chain-of-custody forms and appropriate hazard warnings for laboratory personnel.

Field quality assurance/quality control (QA/QC) measures consisted of the collection of a field duplicate, equipment blank, and trip blank samples. QA/QC measures were conducted in accordance with the WESTON UFP QAPP (WESTON, 2015a).

1.1 Observation Well Sampling

On September 20 and September 21, 2016, WESTON collected groundwater samples from observation wells OB08 and OB10, which are completed in the Cockeysville Formation. Three well volumes were purged from each well prior to sampling. OB8 is a 6-inch bedrock well with a total depth of 287 feet below ground surface (ft bgs) and cased to 82 ft bgs. OB10 is a 6-inch bedrock well with a total depth of 298 ft bgs and cased to 145 ft bgs. The sample was collected from observation well OB8 to demonstrate that the background groundwater conditions have not been impacted by Site contaminants (i.e., volatile organic compounds [VOCs]).

Prior to sampling at each well, static water level measurements were collected in accordance with WESTON Standard Operating Procedure (SOP) No. 204, Water Level Measurements (WESTON, 2011a). All wells were purged in accordance with WESTON Standard Operating Procedure (SOP) No. 201, Groundwater Well Sampling (WESTON, 2011b), using a 2-inch diameter, submersible Grundfos® impeller pump and dedicated polyethylene tubing. Water quality parameters were measured and recorded at 10-minute intervals until the parameters stabilized as specified in the FSP. The water quality parameters were recorded on the well purge forms that are provided in Appendix A. A sample was collected from each well and submitted for VOC analysis.

WESTON containerized the purge water from both wells in a 2,500-gallon tank on-site. A sample of the purge water was collected from the tank. Upon receipt of the analytical results, the purge water was filtered through two 55-gallon drums in parallel, each containing activated carbon. The treated purge water was then discharged to the ground surface.

1.2 Irrigation Well Sampling

On September 21, 2016, WESTON collected one groundwater sample from an irrigation well, IWR-1, located on a residential property. The well had been used for irrigation purposes the day before sampling; additionally, the well was purged for 15 minutes prior to sample collection and released onto the ground.



The total depth, depth of casing, and completed formation of the well is not known. The water quality parameters were recorded on the purge forms that are provided in Appendix A.

1.3 Public Supply Well Sampling

From September 19 through September 21, 2016, WESTON collected groundwater samples from Public Supply Wells P1 (190 ft bgs), P2 (332 ft bgs), P3 (312 ft bgs), P4 (273 ft bgs), PG1 (200 ft bgs), and PG3 (305 ft bgs), which are all completed in the Cockeysville Formation. The public water supply well samples were collected directly from a sampling port located on each well. Prior to sample collection, WESTON purged the wells for approximately 10 to 15 minutes, in accordance with WESTON SOP No. 202, Residential Groundwater Sampling (WESTON, 2015b), to ensure that any standing water in the well was purged from the system and the collected sample was representative of fresh groundwater. WESTON collected water quality parameters in 2- to 3-minute intervals to verify fresh groundwater had been introduced into the system. Water quality parameters were recorded by WESTON personnel in the site field logbook in accordance with WESTON SOP No. 101, Logbook Documentation (WESTON, 2015c). A copy of the field logbook is presented in Appendix B. Due to the known levels of Tetrachloroethene (PCE) in Public Supply Well (PG3), purge water from this public supply well was containerized in a tank on-site. Upon receipt of the analytical results for PG3, the purge water was filtered through two 55-gallon drums in parallel and discharged to the ground surface.

1.4 Private Domestic Well Sampling

WESTON collected groundwater samples from four private domestic wells. Three of the domestic wells are equipped with carbon filter treatment systems; the fourth well (DW-4) does not have a treatment system. A total of three samples were collected at each residence with treatment systems: one pre-treatment, one mid-treatment, and one post-treatment. One sample was collected at the residence without the treatment system from a location closest to the well head. Prior to sample collection at each location, WESTON purged the well for approximately 10 to 15 minutes, in accordance with WESTON SOP No. 202, Residential Groundwater Sampling (WESTON, 2015b), to ensure that any standing water in the well had been purged from the system and the collected sample was representative of fresh groundwater. WESTON purged the wells from a spigot location in the residences after the carbon units (e.g., at the kitchen sink). WESTON also collected water quality parameters in 2- to 3-minute intervals to verify fresh groundwater had been introduced into the system. Water quality parameters were collected in accordance with the FSP. Water quality parameters were recorded by WESTON personnel in the site field logbook in accordance with WESTON SOP No. 101, Logbook Documentation (WESTON, 2015b).

1.5 Surface Water Sampling

On September 19 and 20, 2016, WESTON collected a total of seven surface water samples in accordance with WESTON SOP No. 203, Surface Water Sampling (WESTON, 2015d). One sample was collected from the storm water impoundment behind (east) Hockessin Cleaners. One sample was collected from the storm water impoundment behind (south) Wells Fargo Bank. Additionally, five surface water samples were collected from Mill Creek, including one sample collected upstream of the Site to document background surface water conditions. Mill Creek surface water sample locations were determined at the time of sample collection at the discretion of the EPA. The surface water samples collected from the impoundments were sampled by using a dip sampler and transferring the collected water into the pre-preserved 40-milliliter volatile organic analyses (VOA) vials. The surface water samples collected from Mill Creek were collected directly into the pre-preserved 40-milliliter VOA vials.



Sampling activities were documented in the site logbook in accordance with WESTON SOP No. 101, Logbook Documentation (WESTON, 2015b). The logbook notes are provided in Appendix B.

2.0 RESULTS

This section summarizes the analytical results for the samples collected at the Site by WESTON during this assessment. Analytical results were compared to EPA maximum contamination levels (MCLs) and EPA Regional Screening Levels (RSL) based on 1×10^{-6} risk and THQ of 1.0 for tap water (EPA, 2009 and 2016). A summary of detected analytical results is provided in the attached tables and the Data Validation Reports are provided in Attachment A.

2.1 Observation and Irrigation Well Sampling Results

PCE was detected in the samples collected from OB10 and IWR-1 at concentrations of 320 micrograms per liter ($\mu\text{g/L}$) and 49 $\mu\text{g/L}$, respectively. Both detections exceed the MCL of 5 $\mu\text{g/L}$ as well as the RSL of 11 $\mu\text{g/L}$.

Cis-1,2-dichloroethene (DCE) was detected in samples collected from OB10 and IWR-1 at an estimated (J-Qualified) concentration of 0.37 $\mu\text{g/L}$ and 0.33 $\mu\text{g/L}$, respectively. These detections do not exceed the RSL of 36 $\mu\text{g/L}$ or the MCL of 70 $\mu\text{g/L}$.

Trichloroethene (TCE) was detected in samples collected from OB10 and IWR-1 at a concentration of 1.1 $\mu\text{g/L}$ and an estimated (J-Qualified) concentration of 0.32 $\mu\text{g/L}$, respectively. The concentration detected in OB10 exceeds the RSL of 0.49 $\mu\text{g/L}$; however, it did not exceed the MCL of 5 $\mu\text{g/L}$. The concentration detected in IRW-1 does not exceed the RSL of 0.49 $\mu\text{g/L}$ or the MCL of 5 $\mu\text{g/L}$.

Toluene was detected in the sample collected from IWR-1 at an estimated (J-qualified) concentration of 0.14 $\mu\text{g/L}$. The detection does not exceed the RSL of 1100 $\mu\text{g/L}$ or the MCL of 1000 $\mu\text{g/L}$.

Trichlorofluoromethane was detected in the sample collected from IWR-1 at an estimated (J-qualified) concentration of 0.13 $\mu\text{g/L}$. The detection does not exceed the RSL of 5200 $\mu\text{g/L}$.

A summary of detected results for the observation and irrigation well samples is provided in Table 1.

2.2 Public Well Sampling Results

PCE was detected in 4 of the 6 samples collected from the public supply wells. Of these 4 locations, 3 exceed the MCL of 5 $\mu\text{g/L}$ and the RSL of 11 $\mu\text{g/L}$. The samples with concentrations of PCE that exceed the MCL and RSL were collected from █4, █G1, and █G3 at concentrations of 16 $\mu\text{g/L}$, 14 $\mu\text{g/L}$, and 99 $\mu\text{g/L}$, respectively. PCE was also detected in the sample collected from P1 at an estimated (J-qualified) concentration of 0.14 $\mu\text{g/L}$.

Bromodichloromethane was detected in the sample collected from █1 at an estimated (J-qualified) concentration of 0.46 $\mu\text{g/L}$. The detection exceeds the RSL of 0.13 $\mu\text{g/L}$, but does not exceed the MCL of 80 $\mu\text{g/L}$.

Chloroform was detected in the sample collected from P2 at a concentration of 1.7 $\mu\text{g/L}$. The detection exceeds the RSL of 0.22 $\mu\text{g/L}$, but does not exceed the MCL of 80 $\mu\text{g/L}$.



Cis-1,2-DCE was detected in samples collected from █4 and PG3 at concentrations of 0.68 µg/L and 0.67 µg/L, respectively. These detections do not exceed the RSL of 36 µg/L or the MCL of 70 µg/L.

TCE was detected in the samples collected from locations █4 and █G3 at concentrations of 1.1 µg/L and 0.56 µg/L, respectively. Both detections exceed the RSL of 0.49 µg/L, but do not exceed the MCL of 5 µg/L.

Dibromodichloromethane was detected in the sample collected from location █2 at an estimated (J-qualified) concentration of 0.3 µg/L. The detection does not exceed the RSL of 0.87 µg/L or the MCL of 80 µg/L.

A summary of detected results for public well samples is provided in Table 2.

2.3 Private Domestic Well Sampling Results

PCE was detected in three domestic wells, all in the pre-treatment samples only. PCE was detected at locations DW-1, DW-2, and DW-3 at concentrations of 13 µg/L, 20 µg/L, and 4.5 µg/L, respectively. The concentration of PCE in the pre-treatment samples collected from locations DW-1 and DW-2 exceeds both the RSL of 11 µg/L and the MCL of 5 µg/L. The concentration of PCE detected in the pre-treatment sample at location DW-3 does not exceed either the RSL or the MCL. PCE was not detected in any other private domestic well sample collected during this sampling event.

TCE was detected in a pre-treatment sample collected from location DW-2 at an estimated (J-qualified) concentration of 0.13 µg/L. This detection does not exceed the RSL of 0.28 µg/L or the MCL of 5 µg/L. TCE was not detected in any other private domestic well samples collected during this sampling event.

Chloroform was detected in a pre-treatment sample collected from DW-2 at a concentration of 1.0 µg/L. The detection exceeds the RSL of 0.22 µg/L, but does not exceed the MCL of 80 µg/L. Chloroform was not detected in any other private domestic well samples collected during this sampling event.

Methyl tert-butyl ether (MTBE) was detected in a sample collected from DW-4 at a concentration of 0.61 µg/L. The detection does not exceed the RSL of 14 µg/L. There is no listed MCL for MTBE.

Carbon disulfide was detected in a total of 5 private domestic well sample locations. The concentrations of these detections ranged from 0.16 to 0.55 µg/L. Of these 5 detections, none exceed the RSL of 810 µg/L. There is no listed MCL for carbon disulfide.

A summary of detected results for private domestic well samples is provided in Table 3.

2.4 Surface Water Sampling Results

VOCs were not detected above the CRQL in the collected surface water samples. Table 4 shows nondetect TCE and PCE results with comparison to EPA recommendations for water and organism and organism only human health criteria for states (EPA, 2015).

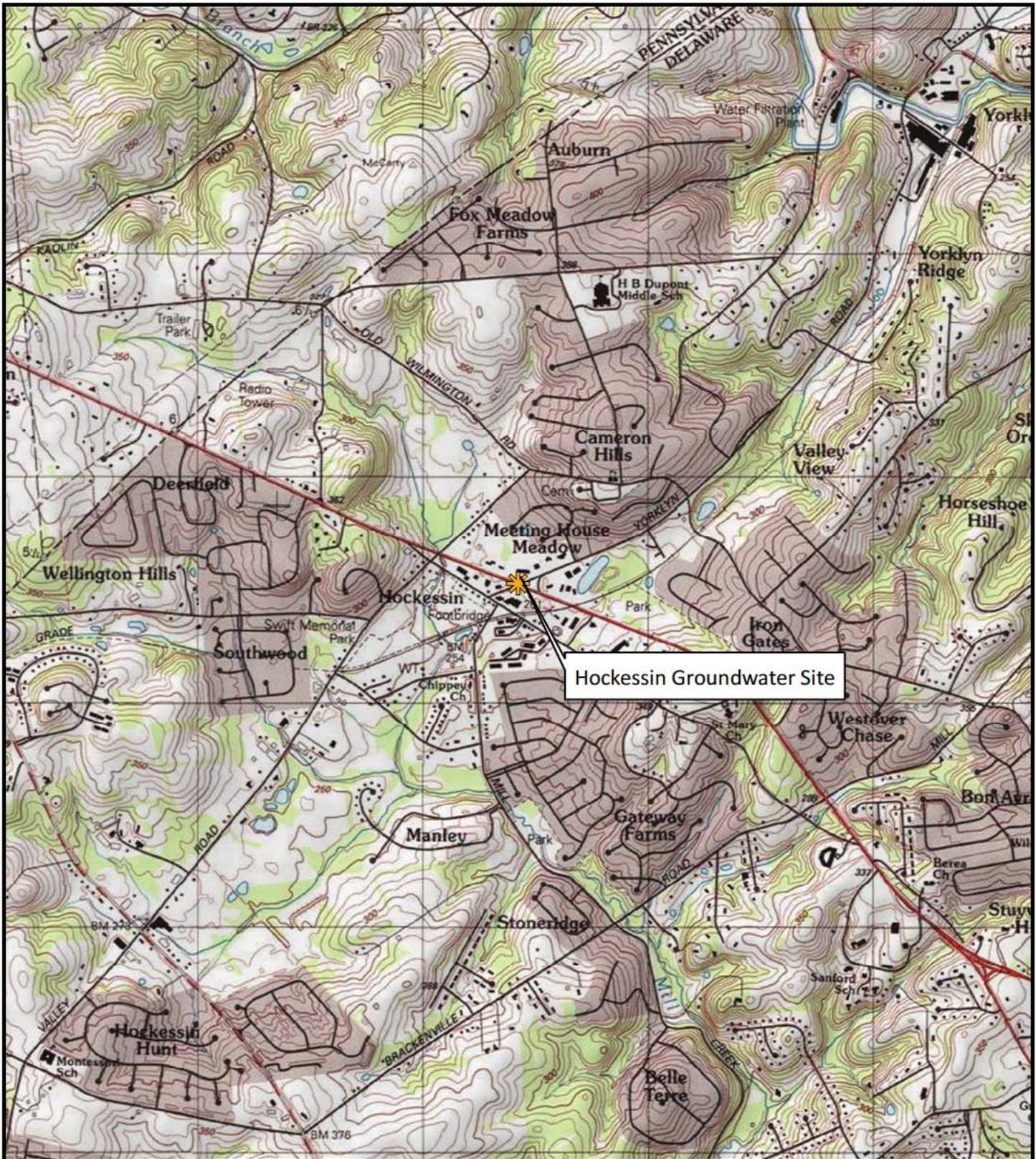


3.0 REFERENCES

- EPA (U.S. Environmental Protection Agency). 2009. National Primary and Secondary Drinking Water Regulations. EPA 816-F-09-0004. May.
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- EPA (U.S. Environmental Protection Agency). 2015. *National Recommended Water Quality Criteria*. November.
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- WESTON (Weston Solutions, Inc.). 2011b. Groundwater Well Sampling. SOP No. 201. October.
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- WESTON (Weston Solutions, Inc.). 2015c. Logbook Documentation. SOP No. 101. December.
- WESTON (Weston Solutions, Inc.). 2015d. Surface Water Sampling. SOP No. 203. November.
- WESTON (Weston Solutions, Inc.). 2016. Field Sampling Plan for Hockessin Groundwater Site. September.



FIGURES



Hockessin Groundwater Site

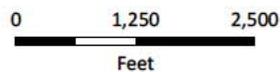


Delaware

USGS 7.5 Minute Quadrangle
Kennett Square PA/DE, 1973. Revised 1974



Coordinate System:
WGS84 UTM Zone 18N Feet



Hockessin Groundwater Site
Hockessin, New Castle County, Delaware

Figure 1
Site Location Map

TDD#: W501-16-07-005
Contract: EP-53-15-02
Prepared: 9/12/2016





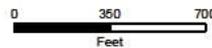
Legend

-  Buildings
-  Hockessin Groundwater Site

Imagery: ESRI, Bing Mapping Service



Coordinate System:
WGS84 UTM Zone 18N Feet



Hockessin Groundwater Site
Hockessin, New Castle County, Delaware

Figure 2
Site Vicinity Map

TDD#: W501-16-07-005
Contract: EP-S3-15-02
Prepared: 9/12/2016





Legend

	Surface Water Sample Locations		Irrigation Wells	Imagery: ESRI, Bing Mapping Service
	Buildings		Wells	 Coordinate System: WGS84 UTM Zone 18N Feet
	Hockessin Groundwater Site		Observation Wells	
	Domestic Wells			 Feet

Hockessin Groundwater Site
 Hockessin, New Castle County, Delaware

Figure 3
 Groundwater and Surface
 Water Sample Locations Map

TDD#: W501-16-07-005
 Contract: EP-S3-15-02
 Prepared: 11/2/2016



TABLES

Table 1
Hockessin Groundwater Site
Observation and Irrigation Well Sampling Results Summary

			Sample Number:	COAB7	COAB8	COAC1
			Sample Location:	OB8	OB10	IRW-1
			Matrix:	Water	Water	Water
			Units:	µg/L	µg/L	µg/L
			Date Sampled:	9/21/2016	9/20/2016	9/21/2016
Compound	RSL (µg/L)	MCL (µg/L)	Result	Result	Result	
Cis-1,2-Dichloroethene	36	70	0.5 U	0.37 J	0.33 J-	
Tetrachloroethene	11	5	0.5 U	320	49	
Toluene	1100	1000	0.5 U	0.5 U	0.14 J	
Trichloroethene	0.49	5	0.5 U	1.1	0.32 J	
Trichlorofluoromethane	5200	NL	0.5 U	0.5 U	0.13 J	

µg/L = micrograms per liter

Non-detect results are reported at the CLP CRQL

CLP = Contract Laboratory Program

CRQL = Contract-required quantitation limit

MCL = EPA Maximum Contaminant Level

NL = No listed Value

U = Not detected

J = Estimated concentration

J- = Concentration may be lower than estimated value

RSL = Regional Screening Level

Bold = Exceeds RSL and or MCL

Note: EPA Regional Screening Levels (RSL) based on 1×10^{-6} risk and THQ of 1.0 for tap water

Table 2

Hockessin Groundwater Site
Well Sampling Results Summary

Compound	RSL (µg/L)	MCL (µg/L)	Sample Number:	Sample Location:	Matrix:	Units:	Date Sampled:	C0AA0	C0AA1	C0AA2	C0AA3	C0AA4	C0AA5
								µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Bromodichloromethane	0.13	80	1	Water			9/19/2016	0.5 U	0.46 J	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.22	80	2	Water			9/21/2016	0.5 U	1.7	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethene	36	70	3	Water			9/19/2016	0.5 U	0.5 U	0.5 U	0.68	0.5 U	0.67
Dibromochloromethane	0.87	80	4	Water			9/19/2016	0.5 U	0.3 J	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	11	5	1	Water			9/19/2016	0.14 J	0.5 U	0.5 U	16	14	99
Trichloroethene	0.49	5	2	Water			9/19/2016	0.5 U	0.5 U	0.5 U	1.1	0.5 U	0.56

µg/L = micrograms per liter

Non-detect results are reported at the CLP CRQL

CLP = Contract Laboratory Program

CRQL = Contract-required quantitation limit

MCL = EPA Maximum Contaminant Level

U = Not detected

J = Estimated concentration

RSL = Regional Screening Level

Bold = Exceeds RSL and or MCL

Note: EPA Regional Screening Levels (RSL) based on 1 x 10⁻⁶ risk and THQ of 1.0 for tap water

Table 3
Hockessin Groundwater Site
Domestic Well Sampling Results Summary

Compound	RSL (µg/L)	MCL (µg/L)	Sample Number:	COAC2	COAC6	COAC9	COAC3	COAC7	COAD0	COAC4	COAC8	COAD1	COAC5
			Sample Location:	DW-1 PRE	DW-1 MID	DW-1 POST	DW-2 PRE	DW-2 MID	DW-2 POST	DW-3 PRE	DW-3 MID	DW-3 POST	DW-4
			Matrix:	Water									
			Units:	µg/L									
			Date Sampled:	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016	9/21/2016
				Result									
Carbon Disulfide	810	NL		0.16 J	1.8	0.21 J	0.5 U	0.3 J	0.55	0.53	0.5 U	0.5 U	0.5 U
Chloroform	0.22	80		0.5 U	0.5 U	0.5 U	1	0.5 U					
Methyl tert-butyl Ether	14	NL		0.5 U	0.61								
Tetrachloroethene	11	5		13	0.5 U	0.5 U	20	0.5 U	0.5 U	4.5	0.5 U	0.5 U	0.5 U
Trichloroethene	0.49	5		0.5 U	0.5 U	0.5 U	0.13 J	0.5 U					

µg/L = micrograms per liter

Non-detect results are reported at the CLP CRQL

CLP = Contract Laboratory Program

CRQL = Contract-required quantitation limit

MCL = EPA Maximum Contaminant Level

NL = No listed Value

U = Not detected

J = Estimated concentration

RSL = Regional Screening Level

Bold = Exceeds RSL and/or MCL

Note: EPA Regional Screening Levels (RSL) based on 1 x 10⁻⁶ risk and THQ of 1.0 for tap water

Table 4
Hockessin Groundwater Site
Surface Water Sampling Results Summary

Compound	Date Sampled:		Sample Number:	Sample Location:	Matrix:	Units:	Date Sampled:	C0AB0	C0AA9	C0AD4	C0AB2	C0AB3	C0AB4
	Water + Organism	Organism Only											
Tetrachloroethene	10	29	C0AA8 SW-1	Water	µg/L	9/19/2016	9/20/2016	9/20/2016	9/20/2016	9/20/2016	9/19/2016	9/19/2016	9/19/2016
Trichloroethene	0.6	7											

µg/L = micrograms per liter

Non-detect results are reported at the CLP CRQL

CLP = Contract Laboratory Program

CRQL = Contract-required quantitation limit

U = Not detected

Note: Compound concentrations are compared to EPA recommendations for water + organism and organism only human health criteria