April 3, 2019

Dustin Armstrong
Environmental Cleanup Program
PA Department of Environmental Protection
2 East Main Street
Norristown, Pennsylvania 19401

Re: Bishop Tube Site
Response to PADEP March 19, 2019 Letter

Dear Mr. Armstrong:

On behalf of the Bishop Tube Project Team ("BT Team"), Roux Associates, Inc. ("Roux Associates") submits this letter in response to the Pennsylvania Department of Environmental Protection's ("DEP") March 19, 2019 letter. In accordance with Paragraph 5g of the Amended Consent Order and Agreement ("COA") dated August 4, 2009, this letter constitutes the BT Team's written response to DEP's requests, as detailed in the following three sections:

- Factors Supporting the Use of a 2D Model for "Site" Delineation[1];
- Information for DEP Follow-up Actions Regarding Other Potential Sources; and
- Updated Schedule.

Factors Supporting the Use of a 2D Model for "Site" Delineation (i.e., Establishing the 5 ug/L Downgradient TCE Plume Boundary)

As stated in the March 1, 2019 Modeling Work Plan ("Modeling WP"), the principal objective of DEP's required fate and transport analysis is to provide an additional line of evidence (in conjunction with site-specific empirical groundwater quality and hydrogeologic data) to assist in defining the downgradient Site boundary (i.e., the point where chlorinated volatile organic compound ["CVOC"] concentrations comply with groundwater Medium-Specific Concentrations ["MSCs"]). This objective can be achieved using the model proposed in the March 1, 2019 Modeling WP as an additional line of evidence, coupled with empirical data.

As more fully described in the August 31, 2015 Remedial Investigation Report ("2015 RIR") and subsequent communications with DEP, the empirical data indicate that the CVOC plume is either in a spatial equilibrium or is contracting back toward the source as a function of declining mass flux. Furthermore, DEP has previously acknowledged that the Site is largely defined/delineated by the existing empirical data. Despite its reservations, the BT Team has agreed to conduct a fate and transport analysis to support the definition of the downgradient extent of the Site to groundwater MSCs. The bases in support of the model proposed in the Modeling WP are presented below.

[1] Based on existing empirical data collected at the Site, the BT Team reasserts its position that a model is unnecessary due to the limitations inherent in the application of any groundwater flow and contaminant transport model (particularly given Site-specific conditions). That said, based on DEP's directive that a model shall be conducted, the BT Team submitted a 2-D Modeling WP to DEP on March 1, 2019 and supports the model selection herein.

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California ■ Illinois ■ Massachusetts ■ New Jersey ■ New York ■ Texas

As more fully described in the 2015 RIR, hydrogeologic conditions beneath and downgradient from the former Bishop Tube property are generally characterized by two hydrostratigraphic units: 1) partially saturated unconsolidated soils; and 2) fractured bedrock. Data collected in conjunction with the 2015 RIR (e.g., geophysical logging and vertical hydraulic testing) have demonstrated that the fracture density, fracture connectivity and hydraulic permeability of the bedrock hydrostratigraphic unit decrease with increasing depth. Moreover, given the predominantly high-angle bedding and fracture plane orientation, the fractured bedrock functions as a single unconfined hydrostratigraphic unit. Accordingly, the shallowest interval of the fractured bedrock exhibits the greatest permeability and therefore the greatest potential for groundwater and CVOC mobility. This conceptual hydrogeologic model is validated through the existing groundwater quality data, whereby slight exceedances of groundwater MSCs are confirmed only in the two most-downgradient shallow bedrock wells MW-81 and MW-82A (screened at depths extending to 26 feet and 85 feet below ground surface ["bgs"], respectively)[2]. Therefore, considering the above-stated modeling objective, the shallow interval of the bedrock hydrostratigraphic unit represents the only zone for which a predicted downgradient plume boundary is necessary and is the pathway where the longest potential plume dimension is anticipated.

Additionally, regional hydrogeologic conditions in the Chester Valley were first modeled by the United States Geological Survey ("U.S.G.S.") in 1990 (U.S. Geological Survey Water-Resources Investigation Report 89-4169, Robert A. Sloto). The domain of the U.S.G.S. model extended up and downgradient of the former Bishop Tube property. As noted by Mr. Sloto, "the geologic units in Chester Valley are assumed to approximate porous media" and "act together as a single heterogeneous water-table aquifer." Further, Sloto described that "the basin was modeled as a two-dimensional water-table" using the finite-difference numerical computer code of McDonald and Harbaugh (1984)[3]. Moreover, the Sloto model served as the basis upon which Baker Environmental ("Baker"; DEP's consultant) conducted its groundwater flow and contaminant transport model analysis (Baker, 2010). Although the Baker MODFLOW model incorporated 4 layers, this was an artificial construct simply to decrease the hydraulic conductivity with increasing depth in a single heterogeneous water-table aquifer (i.e., the same simplifying assumption made by Sloto of the U.S.G.S.). The Baker MODFLOW model did not incorporate hydraulically confined conditions and was not calibrated with vertical hydraulic head data, therefore the Baker groundwater flow (MODFLOW) analysis essentially functioned as a 2D model.

The DEP comments that "[a] 2D model will need to be demonstrated through pumping test data that shows a predominant 2D flow exists at the Site." Although a pumping test can be used to quantify the bulk hydraulic properties of an aquifer (e.g., permeability, storage), given the high-angle bedrock structure beneath and downgradient from the former Bishop Tube property, a pumping test would not establish vertical differences in permeability or storage. In fact, numerous case studies have demonstrated that tracer studies are most useful with respect to assessing the hydrodynamics of groundwater flow in bedrock systems. To this end, the existing groundwater quality data serve as a tracer highlighting the predominant pathway for CVOC transport downgradient from the former Bishop Tube property, and also demonstrating that there are additional off-Site contributing sources of CVOCs. Specifically, the predominance of horizontal groundwater flow/CVOC transport is demonstrated by observed plume dimensions: approximately 3,500 feet in length (shallow bedrock zone) and approximately 300 – 400 feet in depth. Although, as noted by DEP, "[s]ome of the most elevated levels of CVOCs have been identified at greater than 200 feet below ground surface", fracture density, fracture

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[2] Although DEP makes note of the detected concentration of TCE in well MW-84B, an exceedance of the MSC has not been confirmed in this well. Samples collected on 3/9/18 and 9/4/18 reported TCE concentrations of 2.1 and 5.3 ug/L, respectively.
[3] The McDonald and Harbaugh model used by Sloto (a 2D finite-difference model) was the predecessor to the current U.S.G.S. MODFLOW model.

connectivity and permeability are lower at this depth (as compared with the shallow bedrock) and continue to decrease with increasing depth. As such, matrix diffusion of CVOCs into discontinuous fractures restricts the mobility and mass flux at greater depths in the bedrock. Simply, there is no expectation that the deep bedrock interval will produce higher groundwater velocities or a longer CVOC plume when compared with the shallow interval.

Site-specific vertical potentiometric head data were summarized in Table 24 of the 2015 RIR. The potentiometric head data from nested wells completed on the former Bishop Tube property (e.g., MW-25, MW-27 and MW-26) do not demonstrate a predominant/consistent vertical gradient between the three bedrock intervals. The three vertical bedrock intervals in well MW-28 (located north and hydraulically downgradient of the former Bishop Tube property), demonstrate a slight upward potentiometric bias, but these conditions are inconsistent/variable. Only one off-site monitoring well (MW-45) located in the valley bottom exhibited a consistent downward hydraulic head between the three bedrock intervals. In contrast wells MW-43, MW-44 and MW-58 (also located in the valley bottom and proximal to MW-45) exhibited no predominant/consistent vertical gradient between the three bedrock monitoring intervals. In aggregate, these data do not support a consistent vertical potentiometric gradient between the shallow, intermediate and deep bedrock monitoring intervals either on or off the former Bishop Tube property. Rather, observed differences in potentiometric head between monitoring intervals of these wells are attributed to local variability (both horizontal and vertical) in the connectivity between individual fractures. In contrast, as conceptualized by Sloto, in the valley bottom the regional vertical hydraulic gradient is upward from the bedrock into the unconsolidated soils where Valley Creek functions as a groundwater discharge boundary.

All groundwater flow and contaminant transport models suffer from the same underlying limitation, specifically that simplifying mathematical assumptions must be made in an attempt to replicate a highly complex natural system. This is true of one-, two- and three-dimensional models, whether analytical (e.g., Quick Domenico[4]) or numerical (e.g., MODFLOW/MT3D). In part, for this reason, a groundwater flow and contaminant transport model provides a simplified approximation of subsurface conditions. Moreover, one of the great fallacies associated with the application of groundwater models is that precision goes hand-in-hand with the degree of model sophistication. In fact, the fidelity of a groundwater model is largely controlled by the quantity and accuracy of the underlying empirical hydrogeologic and groundwater chemistry data (i.e., input), as well as the degree to which simplifying mathematical assumptions approximate site conditions. To this end, model selection is principally dictated by the stated modeling objective (in this case defining the maximum horizontal plume length) and quantity/quality of available data. As conceptualized by Sloto, the hydrogeologic properties of the Chester Valley are fairly characterized as a “single heterogeneous water-table aquifer” that can be modeled in two dimensions. To this end, the underlying mathematical algorithm and boundary conditions of the WinFlow/WinTran models are capable of simulating the hydrogeologic conditions described above (i.e., the movement of CVOCs through a heterogeneous water table aquifer) while controlling the uncertainty inherent with groundwater modeling. In contrast, the available site empirical data are insufficient to accurately parameterize and calibrate a 3D numerical groundwater flow and contaminant transport model analysis (e.g., MODFLOW/MT3D)[5]. Development of a 3D groundwater flow and contaminant transport model in the absence of sufficient and robust input data would result in

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[4] In its Technical Guidance Manual, the DEP advocates the use of the Quick Domenico model to assess plume characteristics (including length) at contaminated sites. The Quick Domenico Model is a 1-dimensional groundwater transport model.
[5] The quantity of data required to minimize uncertainty and accurately model a bedrock aquifer system (especially at this scale) is far beyond that required to complete an RI/FS. Although sufficient data currently exist to complete the Site RI/FS, there are insufficient data to develop and technically defend a 3D fate and transport model analysis.

a high degree of uncertainty in the output (i.e., the model results would be susceptible to producing unreliable results).

The BT Team believes that the above-noted information addresses DEP's request to provide further justification for the use of a 2D model for the express purpose of providing an additional line of evidence to establish the downgradient Site boundary. For this reason, the BT Team is proposing no changes to the March 1, 2019 Modeling WP. As described in the existing work plan, WinFlow/WinTran models will be used to evaluate the fate and transport of TCE downgradient of the former Bishop Tube property in a single heterogeneous water table aquifer. The entire thickness of the aquifer (e.g., 500 feet) will be captured in the model domain. Further, the characteristics of the shallow (<120 ft bgs) bedrock interval (i.e., greatest fracture density, highest permeability, largest groundwater/contaminant flux and highest groundwater velocity) will be assigned to the entire aquifer thickness to provide a conservative evaluation of plume dynamics (i.e., initial conditions will be biased to produce the longest plume).

Information for DEP Follow-up Actions Regarding Other Potential Sources

In its March 19, 2019 comment letter, DEP asked for information pertaining to specific language in the Modeling WP that referred to evidence of non-Site-related sources of CVOCs downgradient from the former Bishop Tube property. This information request was made by DEP to support its "ongoing evaluation of the contamination associated with the Site and to take follow-up actions at other potential sources."

As an initial source of information, the BT Tube Team directs DEP to information contained in the 2015 RIR as briefly described below.

- The tetrachloroethene ("PCE") distribution observed in a soil gas survey completed on undeveloped parcels to the north of Lancaster Avenue was markedly different than the distribution of other CVOCs. A soil sampling program was not completed in the area of the PCE anomaly, as the access agreement secured by the BT Team for this property expressly denied approval to collect soil samples on these parcels (see Figure 12 and page 63 of 2015 RIR).

- In the bedrock groundwater quality section of the 2015 RIR, it states: "[t]here are at least two known dry cleaners in the vicinity of MW-58 (triplet) and MW-80 (triplet)" (see page 92 of 2015 RIR).

In the January 2019 Progress Report, the 2018 groundwater analytical results were provided at the request of DEP, as briefly described below.

- The PCE results for MW-58 (triplet) reveal markedly different PCE conditions and ratios of CVOCs than is commonly observed at the Site. For example, MW-58A (open interval is 34 to 49 ft bgs) has a PCE concentration of 97.4 ug/L, but TCE is only 5.5 ug/L (see Table 1, attached for pertinent CVOC results; a complete summary of results was provided in the January 15, 2019 Progress Report 122, Table 6).

- Similarly, MW-81 and MW-82 have reported PCE at the same order of magnitude concentration as TCE in the sampling events performed.

By contrast, where PCE is even detected and quantified in groundwater on the former Bishop Tube property, the concentration of PCE is several orders of magnitude less than the comparable concentration of TCE. If the PCE observed in these far downgradient wells were sourced from the

former Bishop Tube property, one would expect the ratio of PCE to TCE to *decrease* from what is observed at the former Bishop Tube property given: 1) the physiochemical properties of PCE relative to TCE (i.e., PCE's higher Koc value would result in a greater retardation factor and therefore slower transport velocity as compared with TCE); and 2) the propensity for PCE to biotransform into TCE along the flow path.

In the February 2019 Progress Report, the BT Team advised DEP that on February 7, 2019, the BT Team received the compound-specific isotope analysis ("CSIA") analytical laboratory report for the September 2018 groundwater sampling event. In this progress report the BT Team advised DEP that "[a]dditional (non-Site-related) sources of CVOCs exist downgradient of the former Bishop Tube property. The nature and extent of these additional sources of CVOCs are neither characterized, nor does it appear that these conditions are subject to any active DEP investigation(s)" (see February 15, 2019 Progress Report 123).

As requested in DEP's March 19, 2019 letter, the CSIA results for the September 2018 groundwater sampling event are provided (see attached Table 1).[6] The BT Team has conducted an initial review of these data and expects to include a more complete interpretation of these data in the future RIR. The preliminary CSIA observations made by the BT Team that directly address DEP's question in its March 19 letter are presented below.

- The carbon isotope ratio results ($^{13}C/^{12}C$ ‰) for PCE for MW-58A are -35.6. This PCE carbon isotope ratio for MW-58A is isotopically lighter than all 17 other results from the 2018 CSIA groundwater sampling event.[7] This result demonstrates that the PCE observed in MW-58A cannot be attributed to releases on the former Bishop Tube property.

Collectively, the elevated concentrations of PCE in MW-58A, the anomalous ratio of PCE to other CVOCs in MW-58A, the isotopically distinct (light) PCE results for carbon isotope ratio for MW-58A, and the proximity of a dry cleaner and anomalous soil gas findings immediately upgradient of MW-58A all lead to a conclusion that one or more non-Site-related sources of CVOCs exist downgradient of the former Bishop Tube property.

Updated Schedule

Based on the above justification in support of implementation of the previously submitted March 1, 2019 Modeling WP, it is expected that the future RIR, inclusive of the 2D modeling results, will be submitted within 60-days after DEP approval of the workplan.[8] The BT Team previously agreed to submit the draft Feasibility Study ("FS") on May 16, which was anticipated to be concurrent with the submission date for the RIR. Despite previously expressed reservations[9], the BT Team agrees to submit the draft FS concurrent with the submission of the RIR. Assuming a timely response from DEP, the BT Team anticipates submission of both documents concurrently in June, with the actual due date based on the date of the Modeling WP approval.

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[6] These data are still subject to an internal quality assurance review and are considered draft until they are produced in the RIR.
[7] During the CSIA sampling and analysis event, certain monitoring wells were not analyzed for CSIA for PCE. This was due to the total results for PCE in a given monitoring well being non-detect or too low to allow for CSIA analysis of PCE.
[8] In its December 17, 2018 letter to DEP the BT Team agreed to complete an analytical model within 60 days of DEP approval of this workplan.
[9] The BT Team reiterates its assertion that submission of the FS prior to completion of the RIR is contrary to standard environmental practice. As unilaterally directed in DEP's December 3, 2018 letter and as clarified in this updated schedule, the BT Team agrees to submit a draft FS Report to DEP concurrently with the RIR.

If you have any questions or comments regarding the above, please call the undersigned at (856) 423-8800.

Sincerely,

ROUX ASSOCIATES, INC.

Gregory D. Martin, P.G.
Vice President/Principal Hydrogeologist

cc: Mr. Nagel, East Whiteland Township – E-mail
East Whiteland Township, Environmental Advisory Committee
Richard Staron, PADEP - E-mail
Bonnie McClennen, PADEP - E-mail
Mr. Patterson, PADEP - E-mail
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Table 1. CSIA and VOC Groundwater Analytical Results - September 2018. Bishop Tube Project Team; East Whiteland, Pennsylvania.

		Carbon ($^{13}C/^{12}C$, ‰)						Chlorine ($^{37}Cl/^{35}Cl$, ‰)					Hydrogen ($^{2}H/^{1}H$, ‰)
Sample ID	**Sample Date**	**TCE**	**cDCE**	**1,1,1-TCA**	**1,1-DCA**	**1,1-DCE**	**PCE**	**TCE**	**cDCE**	**1,1,1-TCA**	**1,1-DCE**	**PCE**	**TCE**
MW-15	**9/6/2018**	-28.5 ± 0.2	-35.6 ± 0.3	-28.6 ± 0.2	-43.7	-23.3 ± 0.5	-28.9 ± 0.5	1.0 ± 0.2	0.0 ± 0.1	-1.5 ± 0.1	14.3 ± 0.1	4.5 ± 0.1	—
MW-25C	**9/6/2018**	-18.0 ± 0.2	-30.8 ± 0.3	-25.8 ± 0.2	-38.3	-11.9 ± 0.5	—	2.3 ± 0.2	0.6 ± 0.1	0.9 ± 0.1	3.1 ± 0.1	—	1 ± 8
MW-26C	**9/6/2018**	-19.6 ± 0.2	-19.2 ± 0.3	—	—	—	-29.6 J ± 0.5	0.5 ± 0.2	-0.9 ± 0.1	—	—	-0.5 ± 0.1	—
MW-27B	**9/5/2018**	-22.6 ± 0.2	-27.7 ± 0.3	ND	—	—	-34.6 ± 0.5	0.9 ± 0.2	-1.3 ± 0.1	-1.8 ± 0.1	—	0.1 ± 0.1	—
MW-28B	**9/6/2018**	-25.0 ± 0.2	-36.5 ± 0.3	-29.3 ± 0.2	-40.2	-24.0 ± 0.5	-33.7 ± 0.5	1.6 ± 0.2	-0.5 ± 0.1	-1.7 ± 0.1	5.3 ± 0.1	26.8 J ± 0.1	—
MW-32	**9/4/2018**	-3.9 ± 0.2	-22.6 ± 0.3	-26.0 ± 0.2	-34.8	—	-29.4 ± 0.5	1.3 ± 0.2	-0.8 ± 0.1	1.2 ± 0.1	—	-3.7 ± 0.1	—
MW-44B	**9/7/2018**	-21.6 ± 0.2	-30.1 ± 0.3	-28.5 ± 0.2	-39.3	-21.3 ± 0.5	-29.1 ± 0.5	1.4 ± 0.2	-0.4 ± 0.1	0.1 ± 0.1	4.0 ± 0.1	0.3 ± 0.1	312 ± 8
MW-51B	**9/5/2018**	-19.5 ± 0.2	-22.6 ± 0.3	—	-34.5 J	—	-29.4 ± 0.5	0.9 ± 0.2	-1.6 ± 0.1	—	—	0.1 ± 0.1	445 ± 8
MW-53A	**9/6/2018**	-24.6 ± 0.2	-31.2 ± 0.3	-27.5 ± 0.2	-40.7	-18.4 ± 0.5	-31.2 ± 0.5	1.0 ± 0.2	0.4 ± 0.1	0.5 ± 0.1	5.7 ± 0.1	4.1 ± 0.1	—
MW-56	**9/4/2018**	-22.6 ± 0.2	-28.7 ± 0.3	-27.4 ± 0.2	-37.7	-20.3 ± 0.5	-29.5 ± 0.5	1.5 ± 0.2	0.1 ± 0.1	0.4 ± 0.1	5.8 ± 0.1	0.5 ± 0.1	—
MW-58A	**9/5/2018**	-14.5 ± 0.2	-26.3 ± 0.3	-25.7 ± 0.2	-36.3	—	-35.6 ± 0.5	0.6 ± 0.2	-2.5 ± 0.1	0.5 ± 0.1	—	-1.8 ± 0.1	—
MW-59A	**9/4/2018**	-14.5 ± 0.2	-26.1 ± 0.3	-25.8 ± 0.2	-33.4	-8.0 ± 0.5	—	2.8 ± 0.2	-0.4 ± 0.1	-2.6 ± 0.1	ND ± 0.1	—	220 ± 8
MW-61	**9/6/2018**	-23.5 ± 0.2	-30.7 ± 0.3	-28.3 ± 0.2	-38.4	-24.0 ± 0.5	-33.1 J ± 0.5	1.3 ± 0.2	-0.5 ± 0.1	-0.5 ± 0.1	8.2 ± 0.1	1.3 ± 0.1	—
MW-63	**9/5/2018**	-21.6 ± 0.2	-31.0 ± 0.3	-28.0 ± 0.2	-40	-21.7 ± 0.5	-29.4 ± 0.5	1.6 ± 0.2	-0.6 ± 0.1	0.3 ± 0.1	8.9 ± 0.1	2.3 ± 0.1	—
MW-64	**9/5/2018**	-34.1 ± 0.2	-37.4 ± 0.3	-20.4 ± 0.2	-39.6 J	-27.5 ± 0.5	—	0.1 ± 0.2	-1.6 ± 0.1	4.2 ± 0.1	1.5 ± 0.1	—	—
MW-72	**9/6/2018**	-35.3 ± 0.2	-36.3 ± 0.3	-29.3 ± 0.2	—	—	—	-0.7 ± 0.2	-0.4 ± 0.1	0.2 ± 0.1	—	—	—
MW-75B	**9/6/2018**	-18.4 ± 0.2	-36.6 ± 0.3	—	-32.4 J	—	-28.5 ± 0.5	0.9 ± 0.2	0.3 ± 0.1	—	—	-4.5 ± 0.1	—
MW-77	**9/7/2018**	-31.2 ± 0.2	-36.6 ± 0.3	-30.4 ± 0.2	—	—	—	0.1 ± 0.2	-0.6 ± 0.1	-2.4 ± 0.1	—	—	504 ± 8
MW-79A	**9/5/2018**	-18.5 ± 0.2	-39.6 ± 0.3	—	-34.5	—	-28.7 ± 0.5	1.1 ± 0.2	-1.0 ± 0.1	—	—	8.6 ± 0.1	—
MW-80C	**9/5/2018**	-5.4 ± 0.2	-29.6 ± 0.3	—	—	—	—	4.0 ± 0.2	-2.2 ± 0.1	—	—	—	236.0 ± 8
MW-81	**9/4/2018**	-0.7 ± 0.2	-15.3 ± 0.3	-25.4 ± 0.2	-37.7	-9.5 ± 0.5	-30.0 ± 0.5	5.0 ± 0.2	-1.2 ± 0.1	-2.6 ± 0.1	ND ± 0.1	-1.3 ± 0.1	—
MW-82B	**9/4/2018**	-6.1 ± 0.2	-16.2 ± 0.3	—	-33.3	—	-22.2 ± 0.5	1.6 ± 0.2	-0.1 ± 0.1	—	—	-2.3 ± 0.1	—
MW-84B	**9/4/2018**	11.4 ± 0.2	-21.5 ± 0.3	—	-1.6	—	—	4.4 ± 0.2	0.5 ± 0.1	—	—	—	—
PZ-8	**9/4/2018**	—	—	—	—	—	-25.8 J ± 0.5	—	—	—	—	-3.3 J ± 0.1	—
PZ-9	**9/4/2018**	—	—	—	—	—	-21.9 ± 0.5	—	—	—	—	-3.2 ± 0.1	—

Notes for CSIA:
— = Sample not analyzed.
ND = Not detected.
‰ = Per mil.
TCE = Trichloroethene.
cDCE = cis-1,2-Dichloroethene.
1,1,1,-TCA = 1,1,1-Trichloroethane.
1,1-DCA = 1,1-Dichloroethane.
1,1-DCE = 1,1-Dichloroethene.
PCE = Tetrachloroethene.
J = Positive control varies. See applicable laboratory report.

Table 1. CSIA and VOC Groundwater Analytical Results - September 2018. Bishop Tube Project Team; East Whiteland, Pennsylvania.

		Laboratory Analytical Results (µg/l)					
Sample ID	**Sample Date**	**TCE**	**cDCE**	**1,1,1-TCA**	**1,1-DCA**	**1,1-DCE**	**PCE**
MW-15	**9/6/2018**	2710	1510	2620	48.1	113	5.1
MW-25C	**9/6/2018**	15100	28500	6170	3040	836	100 U
MW-26C	**9/6/2018**	898000	5420	461	56	836	1430
MW-27B	**9/5/2018**	3400	137	8.8	5 U	5 U	54.8
MW-28B	**9/6/2018**	4400	2620	1850	106	78.1	18.2
MW-32	**9/4/2018**	7.7	15.9	11.7	3.4	0.87 J	1.3
MW-44B	**9/7/2018**	367	375	232	36.1	28.3	4.2
MW-51B	**9/5/2018**	156000	626	28.6	71.5	53.3	685
MW-53A	**9/6/2018**	2100	1790	764	147	151	11.7
MW-56	**9/4/2018**	605	510	393	57.1	68.5	4.3
MW-58A	**9/5/2018**	5.5	10.4	3.2	0.69 J	1 U	97.4
MW-59A	**9/4/2018**	76.5	72.7	16.8	11.5	8	1 U
MW-61	**9/6/2018**	747	348	718	42.5	122	11.3
MW-63	**9/5/2018**	1400	1360	916	128	111	12.9
MW-64	**9/5/2018**	15000	9670	363	48.6	107	25 U
MW-72	**9/6/2018**	60900	5330	692	32.7	27.4	31.8
MW-75B	**9/6/2018**	311000	1010	85.7	157	76.6	331
MW-77	**9/7/2018**	218000	5730	19300	260	597	396
MW-79A	**9/5/2018**	160000	1340	100 U	225	151	434
MW-80C	**9/5/2018**	33.4	13.8	1 U	1 U	1 U	1 U
MW-81	**9/4/2018**	7.8	17	17.3	7.2	2.5	7.5
MW-82B	**9/4/2018**	3.4	4.3	0.74 J	3.2	0.96 J	1.9
MW-84B	**9/4/2018**	5.3	19.4	1 U	0.83 J	1 U	1 U
PZ-8	**9/4/2018**	1 U	1 U	1 U	1 U	1 U	1.2
PZ-9	**9/4/2018**	1 U	1 U	1 U	1 U	1 U	1.3

Notes for VOC Analysis:
µg/l = Micrograms per liter.
U = Not detected above laboratory detection limit.
TCE = Trichloroethene.
cDCE = cis-1,2-Dichloroethene.
1,1,1,-TCA = 1,1,1-Trichloroethane.
1,1-DCA = 1,1-Dichloroethane.
1,1-DCE = 1,1-Dichloroethene.
PCE = Tetrachloroethene.
J = Result below the reporting limit (estimated value).