

May 22, 2019

Via Electronic Mail

Mr. Scott R. Williamson
Program Manager, Waterways & Wetlands Program
Pennsylvania Department of Environmental Protection
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110-8200

**Re: DEP HDD Re-Evaluation Report – Request for Additional Information
Waltonville Road Crossing 16" Horizontal Directional Drill Location (S3-0080-16)
Permit No. E22-617
Derry Township, Dauphin County**

Dear Mr. Williamson:

In compliance with the Corrected Stipulated Order dated August 10, 2017, a Re-evaluation Report for the above-referenced horizontal directional drill (HDD) was submitted to the Pennsylvania Department of Environmental Protection (Department) on February 19, 2019. In a letter dated March 22, 2019, the Department requested additional information. Please accept this letter as a response. Your requests are bolded below followed by Sunoco Pipeline, LP (SPLP) responses.

- 1. As required by Paragraph 4. and 5. of the Environmental Hearing Board's August 10, 2017 Corrected Stipulated Order, SPLP failed to fully utilize information gathered during the HDD of the 20-inch bore as part of the HDD Re-evaluation for the 16-inch pipeline. Please gather geologic and drilling information collected by various site personnel during the 20-inch bore that can be used to provide a summary confirmation of the geology at the site.**

This information should then be used to further describe why the chosen bore path for the 16-inch pipeline was determined and how such information has been used to minimize the potential for IR's to occur and as part of the discussion of construction alternatives, including why HDD activity is still the preferred and chosen methodology for pipeline construction at this location. Within the construction alternatives analysis, please provide an evaluation and discussion of other trenchless methodologies and why they are not a feasible alternative to HDD.

The inadvertent return (IR) information presented graphically on Figure 1 in Attachment 2 presents the plan and cross section views of IR events that occurred during the 20-inch HDD operations. This figure presents the events occurring during these HDD operations in relation to

the depth of profile and allows for correlation of actual drilling operations data collected during active drilling. SPLP utilized all the foregoing information obtained during drilling of the 20-inch HDD in our internal assessment and evaluation of the 16-inch HDD profile, and as required by paragraph 5 of the Corrected Stipulated Order, described and presented the results of this study in the HDD Re-Evaluation Report. Nevertheless, the Department has requested that SPLP provide additional details concerning the conditions associated with this HDD location and the conclusion to proceed with an HDD for the 16-inch line at this location along a revised profile. In the interest of working cooperatively with the Department, the following information is provided in response to the Department's request.

SPLP reviewed the daily drilling reports, the geotechnical investigations, the IR Restart Reports, and the HDD Inspection Daily Reports, paying extra attention to intervals/days in which a partial or full loss of returns or an IR occurred. Specifically, the depth of the bit was compared to the geotechnical investigations to determine if the pilot bit and/or reamer was advancing through an interval of bedrock that could be either highly fractured or weathered. Further, the annular and mud pressures were reviewed to identify any sudden changes in pressure while the pilot bit or reamer was being advanced, which could be utilized to approximate the competency of the bedrock.

Both IRs that occurred during the completion of the 20-inch pilot hole are classified as "punch-out" releases resulting from the reduced amount of cover as the pilot bit approached and passed through the bedrock/unconsolidated material interface. Typically, overburden materials have low integrity and lack the strength necessary to prevent the migration of drilling fluid; however, these materials are strong enough to require a rock cutting bit or reamer to clear the material out of the way which requires the circulation of drilling fluids. As a result, it is challenging to prevent "punch-out" releases from occurring when proceeding through overburden or weathered rock at shallow depths. To reduce the potential for IRs during the completion of the proposed 16-inch HDD pilot hole, the entry and exit angles have been increased to allow the profile to advance more quickly through the unconsolidated materials and into or out of the bedrock.

As mentioned in the Alternative Analysis of the Re-Evaluation Report, the HDD methodology was confirmed to be the preferred installation method because it will ultimately cause the least amount of direct impact to the environment. Changing the installation method to an open-cut would result in direct impacts to the forested wetlands and the stream overlying the HDD. Open-cut installation would result in 0.08 acres of stream, and 2.3 acres of forested wetlands being directly impacted. Furthermore, any dewatering required to maintain the open-cut trench could result in the potential discharge of cloudy water downstream, regardless of the utilization of filtration bags and mitigation structures. Re-routing the pipeline is also not a viable option because streams and wetlands would still need to be crossed, there would be additional direct impacts to infrastructure, and a new Greenfield corridor would need to be created. Based on these factors, the HDD method remains the best construction alternative for this location.

The only other possible construction methods not discussed in the Re-Evaluation Report include and FlexBor and Direct Pipe Bore.

SPLP contractors attempted three (3) FlexBors and partially completed two of these to replace HDDs on the Mariner Project. One FlexBor failed in the pilot phase and was replaced with a conventional bore under a highway and open-cut construction. The two partially successful FlexBors completed the pilot phases, but both had difficulties completing the reaming phase. SPLP's analysis is that this technology is not perfected for larger diameter bore attempts. Therefore, SPLP did not include this method in alternatives analysis section of the Re-Evaluation Report.

The Direct Pipe Bore method is also known as "microtunneling". This method of pipeline installation is a remote-controlled, continuously supported pipe jacking method. During the direct pipe installation, operations are managed by an operator in an above-ground control room alongside of the installation pit. Rock and soil cutting and removal occurs by drilling fluid injection through the cutting tool during rotation at the face of the bore, and the cuttings are forced into inlet holes in the crushing cone at the tool face for circulation to a recycling plant through a closed system. The entire operating system for this method of pipeline installation, including the cutting tool drive hydraulics, fluid injection, fluid return, and operating controls are enclosed inside the outside diameter bore pipe (or casing pipe) being installed. At the launching point/entry pit, the bore pipe is attached to a "jacking block" that hammers the bore pipe while the tool is cutting through the substrate or geology. The cutting tool face is marginally larger in diameter than the pipe it is attached to. As a result, there is minimal annulus space, which minimizes the potential for drilling fluid returns or the production of groundwater returning back to the point of entry.

SPLP's construction contractors have successfully completed one (1) Direct Pipe Bore approximately 925 ft in extent on the Mariner Pipeline project. The length of a crossing needed to avoid the direct impacts to streams and wetlands over this HDD alignment, however, is 2,241 ft, which exceeds the footage of successful completions by the contractors who possess this equipment and have employed it, and they are unwilling to attempt a Direct Pipe Bore of this length.

Based on the analysis of all alternatives, the HDD method remains the preferred option for this location.

2. Relating to the Analysis of well production zones and use of information obtained during construction of the 20-inch pipeline:

The re-evaluation fails to include evaluation of the information and data collected during pre- construction and during-construction water supply sampling that appears to have been conducted for private water supplies within 450 feet of the HDD.

Any private or public water supply data obtained within 450 feet or otherwise obtained in the vicinity of the 20-inch or proposed 16-inch HDD should be used and discussed as part of this HDD re-evaluation. This data should include but not be limited to any applicable water supply sampling data and any water supply complaints that SPLP may have obtained and received for water supplies within 450 of the HDD or within the general vicinity during construction of the 20-inch pipeline. The results of the SPLP's water supply sampling program, investigation, disposition of a complaint, and any correlation or non-correlation to SPLP's construction activities should be evaluated and discussed in the HDD re-evaluation report and used to demonstrate that the proposed 16-inch HDD activity will minimize the potential for IR's and impacts to water supplies. Please revise the re-evaluation report to include this information.

Per the Order, SPLP performed a site reconnaissance to locate any water supply wells within 450 feet of the Waltonville Road HDD. A total of six water wells were identified within the 450-foot radius and an additional five water wells and one spring were identified outside of the 450-foot search radius. All of the identified locations were sampled and are represented on Attachment 3 of the Hydrogeologic Re-Evaluation Report. Water quality samples were collected from the identified locations at various construction stages of the 20-inch HDD. Water quality samples were collected prior to the initiation of HDD activities, during the completion of the 20-inch HDD, and following the completion of the 20-inch HDD from one of the seven locations (WL-03022017-551-01). None of the parameters typically identified in samples impacted by drilling fluids (i.e., turbidity, total suspended solids, iron and manganese) were identified at concentrations higher than those observed in the pre-construction samples. Further, except for iron, none of the analyzed parameters were identified in the samples at concentrations exceeding the Department's established primary and secondary drinking water standards, and the concentrations of iron decreased over time. Two of the remaining locations (WL-03052018-639-01 and WL-06162017-475-01) were sampled twice, though both of these follow-up sampling events were conducted within 14 days of the original sampling event. No significant changes were observed in the parameters typically associated with impacts to groundwater resulting from drilling fluids. The remaining sampling locations were sampled on only one occasion as of the date of this response letter. However, it should be noted that the samples collected during the construction phase did not show elevated concentrations of the parameters associated with drilling fluid impacts. In several of the samples iron and/or manganese were identified above their respective secondary drinking water standards; however, this is likely the result of natural groundwater quality fluctuations and not reflective of drilling fluid impacts. Based on these findings, no impacts to groundwater quality have been identified or associated with the installation of the Waltonville Road 20-inch HDD. Summary tables containing the analytical results from the various water quality sampling events are provided in Attachment 1.

To date, no water well complaints have been received relative to the completion of the Waltonville 20-inch HDD, therefore, no groundwater investigations have been conducted. Based on the lack of any documented adverse impact to groundwater quality and absence of reported water well complaints, SPLP does not see the need to revise the report with respect to this issue.

Mr. Scott Williamson
Response to DEP Comments on S3-0080-16
May 22, 2019
Page 5

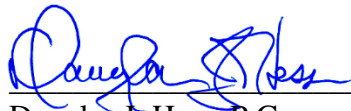
SPLP submits that we have been, and are, in complete compliance with the agreed terms and analysis requirements of the Order, as agreed to by the Department, and that no further analysis is required for the Department to consent to the start of this HDD. SPLP therefore requests that the Department approve the Re-Evaluation Report for the Waltonville Road Crossing HDD (S3-0080-16) as soon as possible.

Sincerely,



Larry J. Gremminger, CWB
Vice-President – Environmental, Health & Safety
Energy Transfer Partners
Mariner East 2 Pipeline Project

Pertaining to the practice of geology and information conveyed.



Douglas J. Hess, P.G.
License No. PG-000186-G
Skelly and Loy, Inc.
Director of Groundwater
and Site Characterization
Geo-Environmental Services

5/22/2019

Date

Attachments as stated.

Zimmerman Water Sample Analytical Results Summary

Parcel ID: 24-060-010 (1250 Shopes Church Road)
Well Location Map ID: WL-12152017-613-01 and SP-12152017-613-02

Parameter	Units	Sample Date: 12/15/2017	Sample Date: 12/15/2017 Spring Source	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 12152017-613-01	Sample I.D.: 12152017-613-02	
Coliform, fecal	col/100ml	<1	<1	-
E. Coli	MPN/100ml	<1	1.00	-
Coliform, total	MPN/100ml	<1	649	-
Dissolved Solids	mg/l	174	347	500
Suspended Solids	mg/l	ND	3.00	-
Hardness (colorimetric) as CaCO3	mg/l	106	127	-
Turbidity	NTU	0.439	0.771	-
Alkalinity	mg/l	71.6	36.2	-
pH	SU	7.36	6.72	-
Specific Conductance	umhos/cm	267	555	-
Bromide	mg/l	ND	ND	-
Chloride	mg/l	24.9	111	250
Sulfate	mg/l	5.09	17.5	250
Barium	mg/l	0.0376	0.245	2
Calcium	mg/l	30.4	30.6	-
Iron	mg/l	ND	ND	0.3
Magnesium	mg/l	5.03	11.7	-
Manganese	mg/l	ND	ND	0.05
Potassium	mg/l	1.93	5.48	-
Sodium	mg/l	11.5	48.8	-
Methane	mg/l	ND	ND	-
Ethane	mg/l	ND	ND	-
Ethene	mg/l	ND	ND	-
Propane	mg/l	ND	ND	-
Benzene	mg/l	ND	ND	0.005
Toluene	mg/l	ND	ND	1
Ethylbenzene	mg/l	ND	ND	0.7
Total Xylenes	mg/l	ND	ND	10
Residual Bentonite	-	NA	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Shissler Water Sample Analytical Results Summary

Parcel ID: 24-060-018 (1411 Shopes Church Road)
Well Location Map ID: WL-10022017-634-01

Parameter	Units	Sample Date: 10/2/2017	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 10022017-634-01	
Coliform, fecal	col/100ml	<1	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	4.10	-
Dissolved Solids	mg/l	166	500
Suspended Solids	mg/l	ND	-
Hardness (colorimetric) as CaCO3	mg/l	103	-
Turbidity	NTU	7.58	-
Alkalinity	mg/l	95.7	-
pH	SU	8.03	-
Specific Conductance	umhos/cm	232	-
Bromide	mg/l	ND	-
Chloride	mg/l	4.75	250
Sulfate	mg/l	8.38	250
Barium	mg/l	ND	2
Calcium	mg/l	29.5	-
Iron	mg/l	ND	0.3
Magnesium	mg/l	7.63	-
Manganese	mg/l	ND	0.05
Potassium	mg/l	ND	-
Sodium	mg/l	6.03	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
 2. SMCL - Maximum Secondary Contaminant Level
 3. NA - Not Analyzed
 4. ND - Not Detected
 5. col/100ml - colonies per 100 milliliters
 6. MPN/100ml - most probable number per 100 milliliters
 7. mg/l - milligrams per liter
 8. NTU - nephelometric turbidity units
 9. SU - standard units
 10. umhos/cm - micro ohms per centimeter
- Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Pollick Water Sample Analytical Results Summary

Parcel ID: 24-060-019 (1405 Shopes Church Road)
Well Location Map ID: WL-03052018-639-01

Parameter	Units	Sample Date: 3/5/2018	Sample Date: 3/16/2018	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 03052018-639-01	Sample I.D.: 03162018-628-01	
Coliform, fecal	col/100ml	<1	<1	-
E. Coli	MPN/100ml	<1	<1	-
Coliform, total	MPN/100ml	1.00	<1	-
Dissolved Solids	mg/l	139	121	500
Suspended Solids	mg/l	ND	ND	-
Hardness (colorimetric) as CaCO3	mg/l	81.1	83.2	-
Turbidity	NTU	0.332	1.08	-
Alkalinity	mg/l	47.2	47.2	-
pH	SU	6.56	6.80	-
Specific Conductance	umhos/cm	193	187	-
Bromide	mg/l	ND	ND	-
Chloride	mg/l	6.74	4.90	250
Sulfate	mg/l	12.5	11.6	250
Barium	mg/l	ND	ND	2
Calcium	mg/l	16.5	15.5	-
Iron	mg/l	ND	ND	0.3
Magnesium	mg/l	10.2	9.00	-
Manganese	mg/l	ND	ND	0.05
Potassium	mg/l	ND	ND	-
Sodium	mg/l	4.45	3.61	-
Methane	mg/l	ND	ND	-
Ethane	mg/l	ND	ND	-
Ethene	mg/l	ND	ND	-
Propane	mg/l	ND	ND	-
Benzene	mg/l	ND	ND	0.005
Toluene	mg/l	ND	ND	1
Ethylbenzene	mg/l	ND	ND	0.7
Total Xylenes	mg/l	ND	ND	10
Residual Bentonite	-	NA	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
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9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Fitzkee Water Sample Analytical Results Summary

Parcel ID: 24-060-025 (1421 Shopes Church Road)
Well Location Map ID: WL-02222018-630-01

Parameter	Units	Sample Date: 2/22/2018	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 02222018-630-02	
Coliform, fecal	col/100ml	<1	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	1.00	-
Dissolved Solids	mg/l	138	500
Suspended Solids	mg/l	ND	-
Hardness (colorimetric) as CaCO3	mg/l	80.9	-
Turbidity	NTU	1.65	-
Alkalinity	mg/l	71.1	-
pH	SU	7.47	-
Specific Conductance	umhos/cm	186	-
Bromide	mg/l	ND	-
Chloride	mg/l	2.43	250
Sulfate	mg/l	8.78	250
Barium	mg/l	0.0812	2
Calcium	mg/l	21.9	-
Iron	mg/l	ND	0.3
Magnesium	mg/l	5.39	-
Manganese	mg/l	ND	0.05
Potassium	mg/l	ND	-
Sodium	mg/l	7.43	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
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 3. NA - Not Analyzed
 4. ND - Not Detected
 5. col/100ml - colonies per 100 milliliters
 6. MPN/100ml - most probable number per 100 milliliters
 7. mg/l - milligrams per liter
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 9. SU - standard units
 10. umhos/cm - micro ohms per centimeter
- Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Fisher Water Sample Analytical Results Summary

Parcel ID: 24-060-077-000-0000 (1354 Shopes Church Road)
 Well Location Map ID: WL-03022017-551-01 and ST-04162019-520-01

Parameter	Units	Sample Date: 3/2/2017	Sample Date: 7/18/2017	Sample Date: 4/16/2019	Sample Date: 4/16/2019 Stream Source	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 03022017-551-01	Sample I.D.: 07182017-606-02	Sample I.D.: 04162019-520-02	Sample I.D.: 04162019-520-03	
Coliform, fecal	col/100ml	NA	NA	<1	488.4	-
E. Coli	MPN/100ml	NA	NA	<1	228.2	-
Coliform, total	MPN/100ml	NA	NA	<1	>2419.6	-
Dissolved Solids	mg/l	155	150	158	197	500
Suspended Solids	mg/l	12.2	ND	ND	5.06	-
Hardness (colorimetric) as CaCO3	mg/l	112	98.5	105	91.2	-
Turbidity	NTU	21.4	4.24	9.97	3.23	-
Alkalinity	mg/l	69.3	75.1	76.6	42.1	-
pH	SU	7.76	8.07	8.02	7.90	-
Specific Conductance	umhos/cm	242	223	248	303	-
Bromide	mg/l	ND	ND	ND	ND	-
Chloride	mg/l	20.5	14.1	18.1	42.4	250
Sulfate	mg/l	5.94	8.48	8.58	12.5	250
Barium	mg/l	0.0270	0.0292	0.0332	0.117	2
Calcium	mg/l	27.2	28.8	28.8	22.2	-
Iron	mg/l	3.82	0.705	0.855	0.121	0.3
Magnesium	mg/l	7.85	6.35	7.23	8.30	-
Manganese	mg/l	0.0225	0.0118	ND	0.0253	0.05
Potassium	mg/l	ND	ND	ND	3.62	-
Sodium	mg/l	7.18	7.02	7.68	18.1	-
Methane	mg/l	ND	ND	ND	ND	-
Ethane	mg/l	ND	ND	ND	ND	-
Ethene	mg/l	ND	ND	ND	ND	-
Propane	mg/l	ND	ND	ND	ND	-
Benzene	mg/l	ND	ND	ND	ND	0.005
Toluene	mg/l	ND	ND	ND	ND	1
Ethylbenzene	mg/l	ND	ND	ND	ND	0.7
Total Xylenes	mg/l	ND	ND	ND	ND	10
Residual Bentonite	-	NA	NA	NA	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

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 5. col/100ml - colonies per 100 milliliters
 6. MPN/100ml - most probable number per 100 milliliters
 7. mg/l - milligrams per liter
 8. NTU - nephelometric turbidity units
 9. SU - standard units
 10. umhos/cm - micro ohms per centimeter
- Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Drayer Water Sample Analytical Results Summary

Parcel ID: 24-060-078 (1301 Waltonville Road)

Well Location Map ID: WL-08292017-606-01

Parameter	Units	Sample Date: 8/29/2017	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 08292017-606-01	
Coliform, fecal	col/100ml	<1	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	<1	-
Dissolved Solids	mg/l	215	500
Suspended Solids	mg/l	ND	-
Hardness (colorimetric) as CaCO3	mg/l	147	-
Turbidity	NTU	0.375	-
Alkalinity	mg/l	91.4	-
pH	SU	6.82	-
Specific Conductance	umhos/cm	339	-
Bromide	mg/l	ND	-
Chloride	mg/l	21.7	250
Sulfate	mg/l	29.9	250
Barium	mg/l	0.0110	2
Calcium	mg/l	37.1	-
Iron	mg/l	ND	0.3
Magnesium	mg/l	15.4	-
Manganese	mg/l	ND	0.05
Potassium	mg/l	ND	-
Sodium	mg/l	6.74	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018

16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

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8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Memmi Water Sample Analytical Results Summary

Parcel ID: 24-061-018-000-0000 (1361 Shopes Church Road)
Well Location Map ID: WL-06162017-475-01

Parameter	Units	Sample Date: 6/16/2017	Sample Date: 6/30/2017	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 06162017-475-02	Sample I.D.: 06302017-477-01	
Coliform, fecal	col/100ml	NA	NA	-
E. Coli	MPN/100ml	NA	NA	-
Coliform, total	MPN/100ml	NA	NA	-
Dissolved Solids	mg/l	174	173	500
Suspended Solids	mg/l	ND	6.47	-
Hardness (colorimetric) as CaCO3	mg/l	98.9	107	-
Turbidity	NTU	0.220	0.617	-
Alkalinity	mg/l	69.2	70.0	-
pH	SU	6.75	6.81	-
Specific Conductance	umhos/cm	228	229	-
Bromide	mg/l	ND	ND	-
Chloride	mg/l	5.57	5.43	250
Sulfate	mg/l	14.5	14.0	250
Barium	mg/l	ND	ND	2
Calcium	mg/l	21.1	20.9	-
Iron	mg/l	ND	ND	0.3
Magnesium	mg/l	11.3	11.3	-
Manganese	mg/l	ND	ND	0.05
Potassium	mg/l	ND	ND	-
Sodium	mg/l	4.22	3.96	-
Methane	mg/l	ND	ND	-
Ethane	mg/l	ND	ND	-
Ethene	mg/l	ND	ND	-
Propane	mg/l	ND	ND	-
Benzene	mg/l	ND	ND	0.005
Toluene	mg/l	ND	ND	1
Ethylbenzene	mg/l	ND	ND	0.7
Total Xylenes	mg/l	ND	ND	10
Residual Bentonite	-	NA	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018
 16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Roush Water Sample Analytical Results Summary

Parcel ID: 24-061-029 (2168 Sand Hill Road)

Well Location Map ID: WL-02052019-551-01

Parameter	Units	Sample Date: 2/5/2019	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 02052019-551-01	
Coliform, fecal	col/100ml	<1	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	<1	-
Dissolved Solids	mg/l	374	500
Suspended Solids	mg/l	3.50	-
Hardness (colorimetric) as CaCO3	mg/l	283	-
Turbidity	NTU	3.89	-
Alkalinity	mg/l	161	-
pH	SU	6.66	-
Specific Conductance	umhos/cm	673	-
Bromide	mg/l	ND	-
Chloride	mg/l	110	250
Sulfate	mg/l	17.2	250
Barium	mg/l	ND	2
Calcium	mg/l	66.5	-
Iron	mg/l	0.493	0.3
Magnesium	mg/l	37.4	-
Manganese	mg/l	ND	0.05
Potassium	mg/l	1.31	-
Sodium	mg/l	17.8	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018

16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Gehret Well #1 Water Sample Analytical Results Summary

Parcel ID: 34-004-005 (2820 Waltonville Road)

Well Location Map ID: WL-08292017-606-05

Parameter	Units	Sample Date: 8/29/2017	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 08292017-606-04	
Coliform, fecal	col/100ml	2.00	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	>2419.6	-
Dissolved Solids	mg/l	205	500
Suspended Solids	mg/l	ND	-
Hardness (colorimetric) as CaCO ₃	mg/l	138	-
Turbidity	NTU	0.641	-
Alkalinity	mg/l	102	-
pH	SU	6.92	-
Specific Conductance	umhos/cm	294	-
Bromide	mg/l	ND	-
Chloride	mg/l	7.66	250
Sulfate	mg/l	16.0	250
Barium	mg/l	0.0128	2
Calcium	mg/l	29.9	-
Iron	mg/l	0.303	0.3
Magnesium	mg/l	16.5	-
Manganese	mg/l	0.128	0.05
Potassium	mg/l	ND	-
Sodium	mg/l	5.33	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018

16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL

Gehret Well #2 Water Sample Analytical Results Summary

Parcel ID: 34-004-006 (2820 Waltonville Road)

Well Location Map ID: WL-08292017-606-04

Parameter	Units	Sample Date: 8/29/2017 Property Owner's Well	PA DEP Drinking Water MCL/SMCL
		Sample I.D.: 08292017-606-03	
Coliform, fecal	col/100ml	<1	-
E. Coli	MPN/100ml	<1	-
Coliform, total	MPN/100ml	291	-
Dissolved Solids	mg/l	238	500
Suspended Solids	mg/l	165	-
Hardness (colorimetric) as CaCO ₃	mg/l	148	-
Turbidity	NTU	33.0	-
Alkalinity	mg/l	107	-
pH	SU	6.88	-
Specific Conductance	umhos/cm	308	-
Bromide	mg/l	ND	-
Chloride	mg/l	14.5	250
Sulfate	mg/l	27.0	250
Barium	mg/l	0.210	2
Calcium	mg/l	34.5	-
Iron	mg/l	31.5	0.3
Magnesium	mg/l	16.3	-
Manganese	mg/l	22.9	0.05
Potassium	mg/l	ND	-
Sodium	mg/l	8.48	-
Methane	mg/l	ND	-
Ethane	mg/l	ND	-
Ethene	mg/l	ND	-
Propane	mg/l	ND	-
Benzene	mg/l	ND	0.005
Toluene	mg/l	ND	1
Ethylbenzene	mg/l	ND	0.7
Total Xylenes	mg/l	ND	10
Residual Bentonite	-	NA	-

20-inch HDD construction dates: June 12, 2017 through April 11, 2018

16-inch HDD construction dates: Awaiting PA DEP authorization to start

Notes:

1. MCL - Maximum Primary Contaminant Level
2. SMCL - Maximum Secondary Contaminant Level
3. NA - Not Analyzed
4. ND - Not Detected
5. col/100ml - colonies per 100 milliliters
6. MPN/100ml - most probable number per 100 milliliters
7. mg/l - milligrams per liter
8. NTU - nephelometric turbidity units
9. SU - standard units
10. umhos/cm - micro ohms per centimeter

Concentrations that are bolded exceed or are equivalent to their respective PA DEP MCL/SMCL