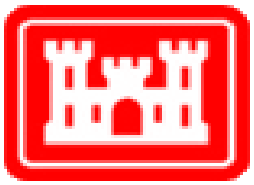
2017 WATER QUALITY MONITORING PROMPTON RESERVOIR PROMPTON, PENNSYLVANIA



U.S. Army Corps of Engineers
Philadelphia District
Environmental Resources Branch

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2017 Water Quality Monitoring
Prompton Reservoir
Prompton, Pennsylvania

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1.0 INTRODUCTION

1.1 PURPOSE OF THE MONITORING PROGRAM

The U.S. Army Corps of Engineers (USACE) manages Prompton Reservoir located in northeastern Pennsylvania within the Delaware River Basin. Prompton Reservoir provides flood control to downstream communities on the Lackawaxen River. Additionally, the reservoir provides important habitat for fish, waterfowl, and other wildlife, and recreational opportunities through fishing and boating. Because of the broad range of uses and demands that Prompton Reservoir serves, the USACE monitors water quality to compare with state water quality standards and to diagnose other problems that commonly effect reservoir health such as nutrient enrichment and toxic loadings. This report summarizes the results of monthly water quality monitoring at Prompton Reservoir for May to September 2017.

1.2 DESCRIPTION OF PROMPTON RESERVOIR

Prompton Reservoir was designed to provide flood control to downstream communities along the Lackawaxen River. A second authorized project purpose is recreation. The reservoir is located about 3 miles northwest of Honesdale, Pennsylvania, and dams a drainage area of 59.7 square miles. The primary surface water input to Prompton Reservoir originates from the West Branch of the Lackawaxen River. The reservoir is approximately 3 miles long and is about 30 feet deep at the face of the dam near the township of Prompton, Pennsylvania.

1.3 ELEMENTS OF THE STUDY

The USACE, Philadelphia District, has been monitoring water quality of Prompton Reservoir since 1975. Over this time, the yearly monitoring designs have evolved to address new concerns such as health of public drinking water and contamination of sediments. The 2017 monitoring program follows that in most recent years and includes the following major elements:

- Monthly water quality monitoring of reservoir and tributaries - to evaluate compliance with Pennsylvania state water quality standards and potential public health concerns; and

- Monthly profile samples for temperature, dissolved oxygen, chlorophyll, pH, turbidity, and conductivity at all stations in the reservoir and watershed.

2.0 METHODS

2.1 PHYSICAL STRATIFICATION MONITORING

Physical stratification monitoring of the water column at Prompton Reservoir was conducted five times between 10 May and 06 September 2017 (Table 2-1). Physical stratification parameters included temperature, dissolved oxygen (DO), pH, turbidity, and conductivity. Monitoring was conducted at four fixed stations located throughout the Prompton Reservoir watershed (Fig. 2-1). Surface water quality was monitored upstream of the lake at station PR-1S and downstream of the dam at station PR-4S (Fig. 2-1). Stations within the reservoir, PR-2 and PR-3, were monitored at 5-foot intervals from the surface to the bottom. All water quality parameters were measured with a calibrated YSI 6600 V2-4 water quality meter.

The results of stratification monitoring were compared to water quality standards authorized by the Pennsylvania Department of Environmental Protection (PADEP: Chapter 93 Water Quality Standards, 2000), where applicable. The water quality standard for DO is a minimum concentration of 5 mg/L and that for pH is an acceptable range from 6 to 9. All of the water quality data collected during physical stratification monitoring is summarized in Appendix A.

2.2 WATER COLUMN CHEMISTRY MONITORING

Water column chemistry monitoring of the water column at Prompton Reservoir was conducted five times between 10 May and 06 September 2017 (Table 2-1). Water samples were collected at four fixed stations within the reservoir watershed (Fig. 2-1). Surface water samples were collected at stations upstream (PR-1S) and downstream (PR-4S) of the reservoir. Surface, middle, and bottom water samples were collected at main reservoir body stations (PR-2 and PR-3). Surface water samples were collected by opening the sample containers approximately 1 foot below the water's surface. Middle and bottom water samples were collected with a Van Dorn design horizontal water sampler.

Water samples from all depths were analyzed for ammonia (NH3), nitrite (NO2), nitrate (NO3), total kjeldahl nitrogen (TKN), soluble phosphorus (DP), total phosphorus (TP), orthophosphate (PO4), total dissolved solids (TDS), total suspended solids (TSS), biochemical oxygen demand (BOD), alkalinity (ALK) and total organic carbon (TOC). Table 2-2 summarizes the water quality parameters, laboratory methods and reporting detection limits, state water quality standards, and allowable maximum hold times for each during the 2017 monitoring period. Laboratory reporting sheet are provided in Appendix B.

Table 2-1. Prompton Reservoir water quality monitoring schedule for 2017

Date of Sample Collection	Physical Stratification Monitoring (All Stations)	Water Column Chemistry Monitoring (All Stations)	Trophic State Determination (PR-3)	Coliform Bacteria Monitoring (All Surface Stations)
10 May	X	X	X	X
21 June	X	X	X	X
19 July	X	X	X	X
16 August	X	X	X	X
06 September	X	X	X	X

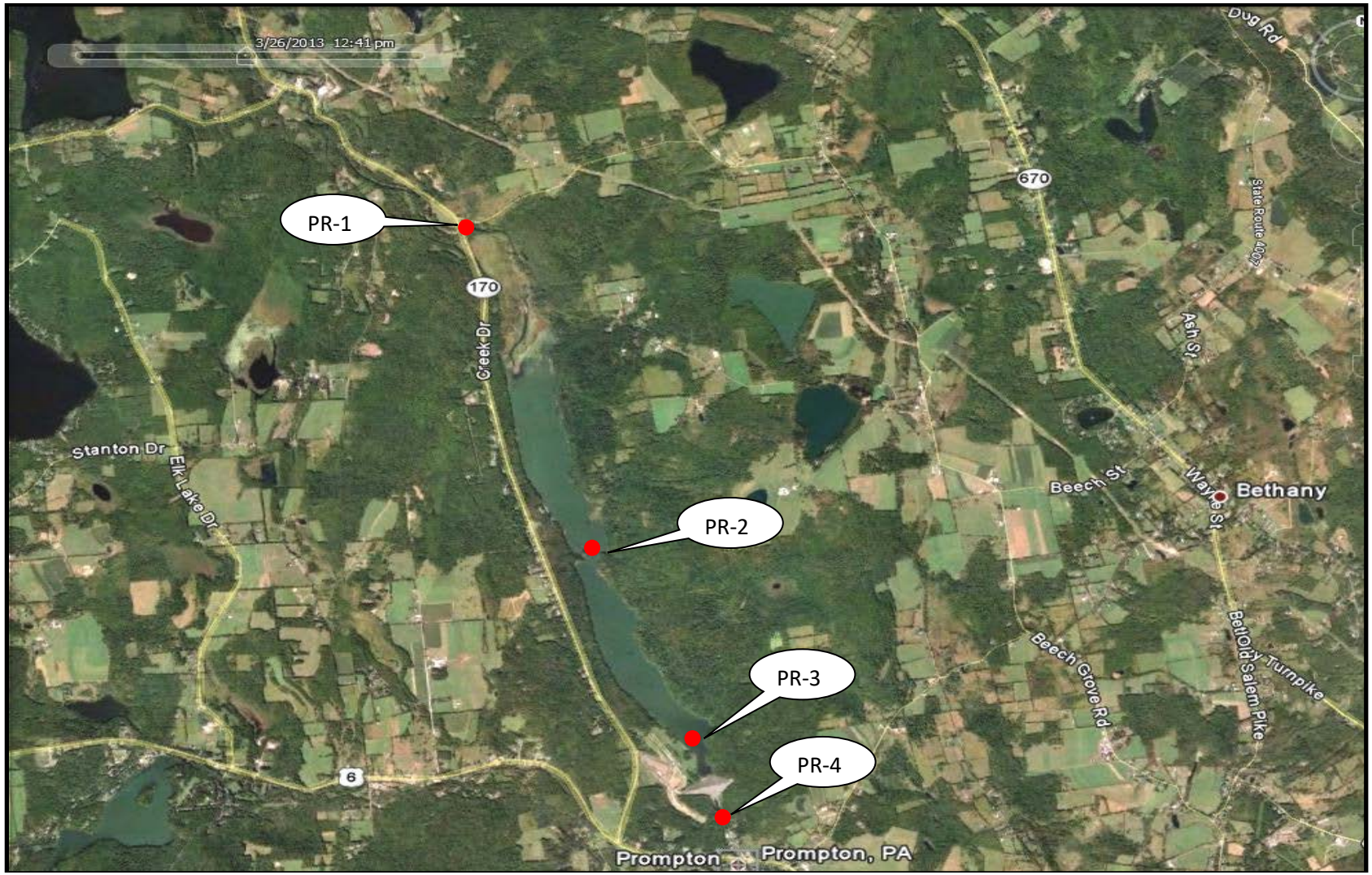

Figure 2-1. Location map for Prompton Reservoir and water quality monitoring stations in 2017.

Table 2-2. Water quality test methods, detection limits, state regulatory criteria, and sample holding times for water quality parameters monitored at Prompton Reservoir in 2017.

Parameter	(2) Method	Reporting Limit	PADEP Surface Water Quality Criteria	Allowable Hold Times (Days)
Total Alkalinity	SM-20 2320B	1.0 mg/L	Min. 20 mg/L $CaCO_3$	14
Biochemical Oxygen Demand (BOD)	SM-20 5210B	2.0 mg/L	None	2
Total Phosphorus	SM-20 4500-PE	0.01 mg/L	None	28
Dissolved/Ortho-Phosphate	SM-20 4500-PE	0.01 mg/L	None	28
Soluble/Dissolved Phosphorus	SM-20 4500-PE	0.05 mg/L	None	28
(3) Total Organic Carbon (TOC)	SM-20 5310C	1.0 mg/L	None	14
(3) Total Inorganic Carbon (TIC)	SM-20 5310B	NA	None	NA
Total Carbon (TOC + TIC)	SM-20 5310B	NA	None	NA
(1) Chlorophyll *a*	YSI Probe	-------	None	
Total Kjeldahl Nitrogen	351.2 MCAWW	0.25 mg/L	None	28
Ammonia	D6919-03	0.05 mg/L	Temp. and pH dependent	28
Nitrate	MCAWW 353.2	0.05 mg/L	Maximum 10 mg/L (nitrate + nitrite)	28
Nitrite	MCAWW 353.2	0.05 mg/L		28
Total Dissolved Solids	SM-20 2540C	5 mg/L	Maximum 750 mg/L	7
Total Suspended Solids	SM-20 2540D	3.0 mg/L	None	7

(1) Chlorophyll *a* samples were recorded using a YSI 6600 with a chlorophyll sensor.
(2) Laboratory Methods Reference:
MCAWW- "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SM-20- "Standard Methods for the Examination of Water and Wastewater", 22nd Edition, 2012.
SW846- "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", 3rd. Edition, November 1986 and updates.
NA- Total Inorganic Carbon and Total Carbon were not sampled in 2017

2.3 TROPHIC STATE DETERMINATION

The trophic state of Prompton Reservoir was determined by methods outlined by Carlson (1977) and EPA (1983). In general, these methods calculate trophic state indices (TSIs) independently for measures of total phosphorus, chlorophyll *a*, and secchi disk depth. Surface water measures of total phosphorus and chlorophyll *a* from chemistry monitoring were used independently in the calculations of monthly TSIs (Table-2-1). Secchi disk depth was measured monthly at station PR-3 and used for the TSI calculation. Trophic state determinations were calculated only for Station PR-3 within the reservoir.

2.4 RESERVOIR BACTERIA MONITORING

Monitoring for coliform bacteria contaminants was conducted at Promtpon Reservoir five times between 10 May and 06 September 2017. Surface water samples were collected in the same manner as for chemical parameter samples, and analyzed for total coliform and fecal coliform contamination. Table 2-3 presents the test methods, detection limits, PADEP standards, and sample holding times for the bacteria parameters monitored at Prompton Reservoir in 2017. The bacteria analytical method was based on a membrane filtration technique. All of the samples were analyzed within their maximum allowable hold times.

Monthly coliform bacteria counts were compared to the PADEP single sample and swimming beach water quality standard for bacteria. The multiple beach sample standards is defined as a maximum geometric mean of 200 colonies/100-ml based on five samples collected on different days within a 30-day period. Application of this standard is not necessary at Prompton reservoir because swimming and other human/water contact recreation is prohibited in the reservoir. However, it is used in evaluating the bacteria results.

Table 2-3. Water quality test methods, detection limits, PADEP standards, and sample holding times for bacteria parameters monitored at Prompton Reservoir in 2017

Parameter	Total coliform/E-Coli	Fecal coliform
Test method	SM 9223B	SM9222D
Min. Detection limit	1 clns/100mls	2 clns/100-mls
PADEP standard	None	Geometric Mean < 200 clns/100-mls (application of this standard is conservative because swimming is not permitted in the reservoir)
Maximum allowable holding time	30 hours	30 hours
Achieved holding time	<30 hours	<30 hours

3.0 RESULTS AND DISCUSSION

3.1 STRATIFICATION MONITORING

The following sections summarize the results of water quality monitoring for physical and chemical parameters: temperature, dissolved oxygen (DO), and pH. For each parameter, seasonal and spatial patterns of surface water quality measured throughout the watershed, and seasonal and depth related patterns of the lake water column based on measures from the deepest portion of the reservoir (station PR-3) are described. The discussion on stratification is focused on station PR-3 as water quality problems related to depth are generally most severe in deeper water habitats, thus the evaluation will be a conservative one. All of the physical/chemical parameters were measured with a calibrated YSI 6600 V2-4 water quality monitoring probe and are presented in Appendix A.

3.1.1 Temperature

Temperature is the primary influencing factor on water density, affects the solubility of many chemicals compounds, and can therefore influence the effect of pollutants on aquatic life. Increased temperatures elevate the metabolic oxygen demand, in conjunction with reduced oxygen solubility, and can impact many species. Vertical stratification patterns naturally occurring in lakes affect the distribution of dissolved and suspended compounds.

Temperature of the tributary and downstream surface waters of Prompton Reservoir generally followed a similar pattern during 2017. Maximum temperatures were recorded during the July sampling (Fig. 3-1). Upstream temperatures at station PR-1S were cooler than downstream release temperatures throughout most of the sampling season with an average temperature of 17.1°C and range from 11.79°C in May to 21.54°C in July. Downstream temperatures at station PR-4S averaged 18.30°C and ranged from 12.63°C in May to 21.47°C in July. The warmer downstream temperatures likely result from thermally warmed waters being released from the reservoir. The surface water temperature (0-5 feet) of the reservoir was generally greater than the upstream and downstream stations as a result of in-lake thermal warming. Surface temperatures for the sampling period at reservoir body station PR-3 near the outlet works of the dam averaged 21.67°C and ranged from 27.61°C in July to 12.45°C in May.

Prompton Reservoir was stratified with respect to temperature in 2017 (Fig. 3-2). In June, the onset of stratification was observed with surface temperatures (24.47°C) approximately 13.74°C warmer than the lower water column (10.73°C). The onset of de-stratification was evident in late August. August sampling showed a noticeable cooling of surface waters.

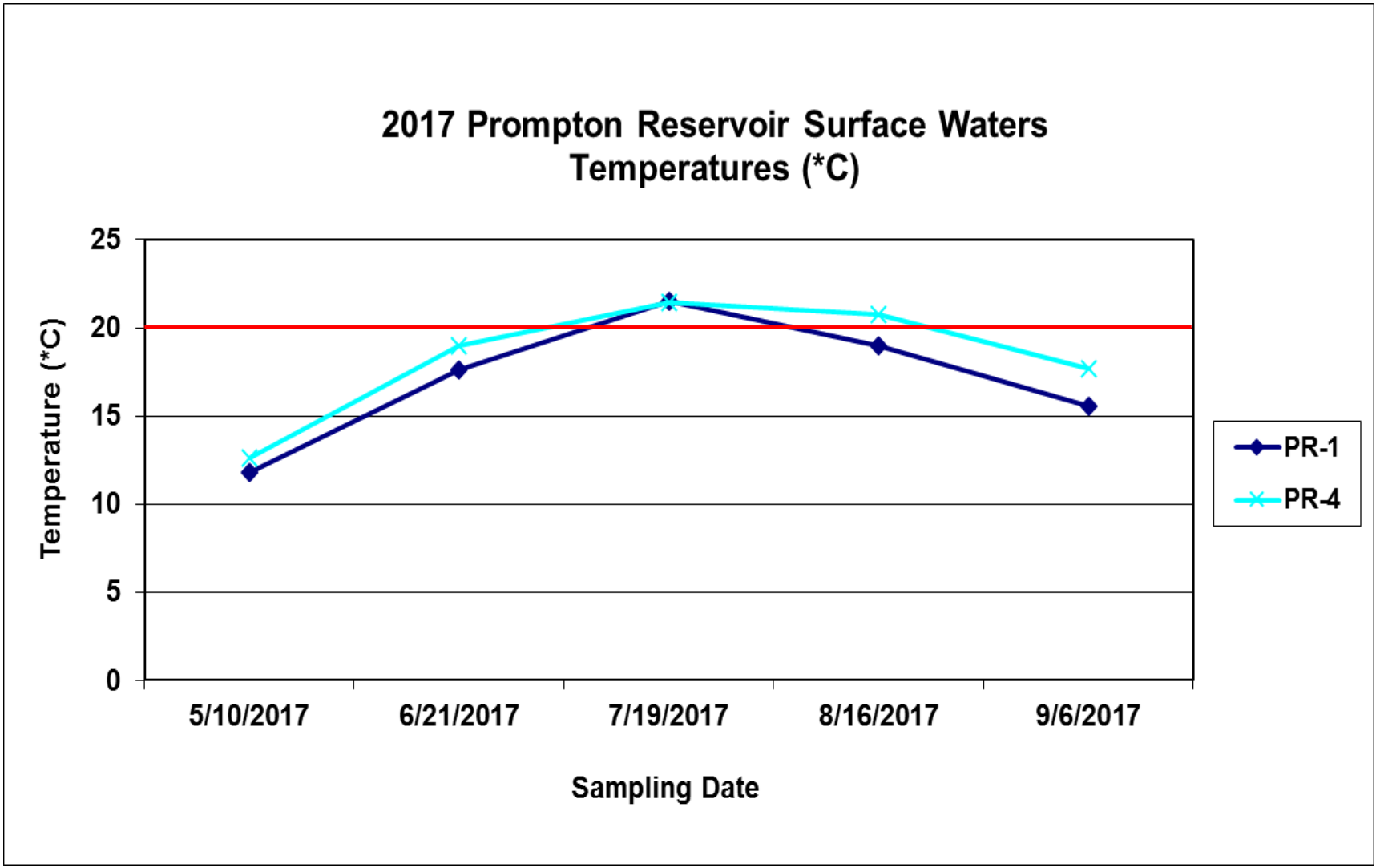

Figure 3-1. Temperature in tributary and outflow surface waters of Prompton Reservoir during 2017. See Appendix A for a summary of plotted values. The coldwater species preference temperature of 20°C is shown as a red line comparison.

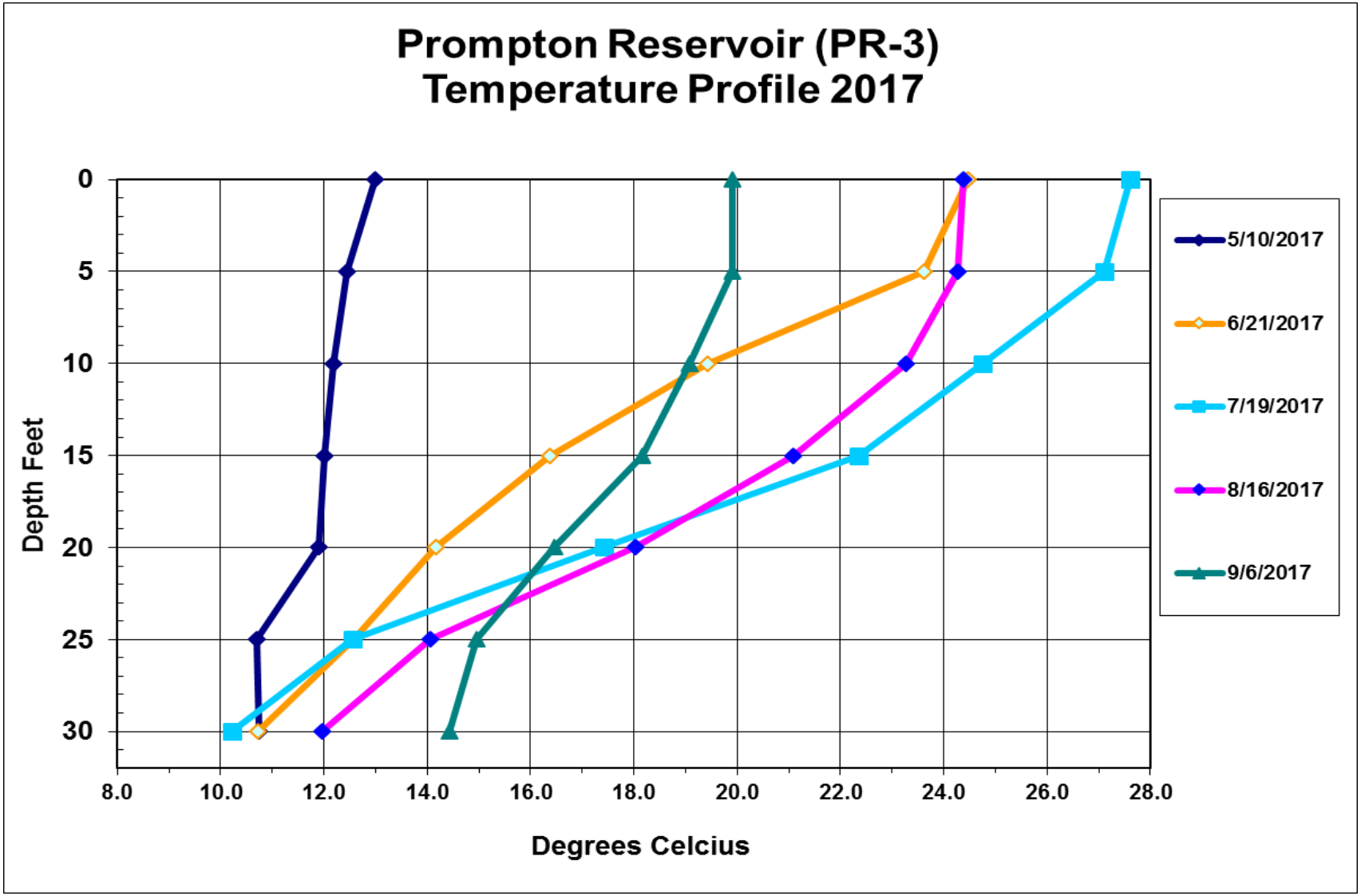

Figure 3-2. Temperature stratification of Prompton Reservoir during 2017 from water quality measured at station PR-3. See Appendix A for a summary of plotted values.

3.1.2 Dissolved Oxygen

Dissolved oxygen (DO) is the measure of the amount of DO in water. Typically, DO concentrations in surface waters are less than 10 mg/L. Dissolved Oxygen concentrations are subject to diurnal and seasonal fluctuations that can be influenced, in part, by temperature, river discharge, and photosynthetic activity. Dissolved Oxygen is essential to the respiratory metabolism of most aquatic organisms. It affects the availability and solubility of nutrients and subsequently the productivity of aquatic ecosystems. Low levels of oxygen can facilitate the release of nutrients from bottom sediments.

Dissolved oxygen (DO) in the inflow and outflow tributary surface waters of Prompton Reservoir generally followed a similar seasonal pattern throughout the 2017 sampling season (Fig. 3-3). Waters released from the reservoir and measured at station PR-4S had consistently lower dissolved oxygen levels then reservoir inflows at tributary station PR-1S. The greatest difference of DO readings was recorded on 19 July when inflow (PR-1S) DO was 8.31 mg/L and outflow (PR-4S) DO was 5.87 mg/L. Dissolved oxygen concentrations upstream (PR-1S) ranged from 10.25 mg/L in May to 8.31 mg/L in July with an average seasonal reading of 9.17 mg/L. Dissolved oxygen concentrations downstream (PR-4S) ranged from 5.87 mg/L in July to 10.16 mg/L in May with an average seasonal reading of 7.56 mg/L.

The stratification of Prompton Reservoir influenced the distribution of DO in the water column during 2017 (Fig. 3-4). In May, the influence of the onset of stratification was apparent, as DO concentrations decreased from 9.41 mg/L at the surface to 6.37 mg/L at the bottom. From June and continuing through September, the lower water column from approximately 15 feet to the bottom was severely depleted of oxygen with concentrations less than 5 mg/L. The release of waters downstream containing lower DO concentrations had some lowering effect on DO levels recorded at downstream station PR-4S. However, the re-aeration of the released waters through the dam conduit system elevated DO concentrations above state criteria.

DO concentrations in the water column of Prompton Reservoir were in compliance with PADEP water quality standards from May through September. The Pennsylvania water quality standard for DO is a minimum concentration of 5 mg/L in the epilimnion of stratified lakes. The health of aquatic ecosystems can be impaired by low DO concentrations in the water column. Hypoxia, or conditions of DO concentrations less than 2 mg/L, is generally accepted as the threshold at which the most severe effects on biota occur. In 2017, the lower water column of Prompton was affected by hypoxia. Hypoxic water was encountered in June through September and commonly occupied the lower half of the water column from a 15 foot depth continuing to the bottom. Hypoxia in the lower water column is a symptom of eutrophication. Nutrients in the water column feed explosive algal growth at the surface photic zone. Dead and decaying algae sink to lower levels of the water column and during the process of decay; oxygen is removed from the water.

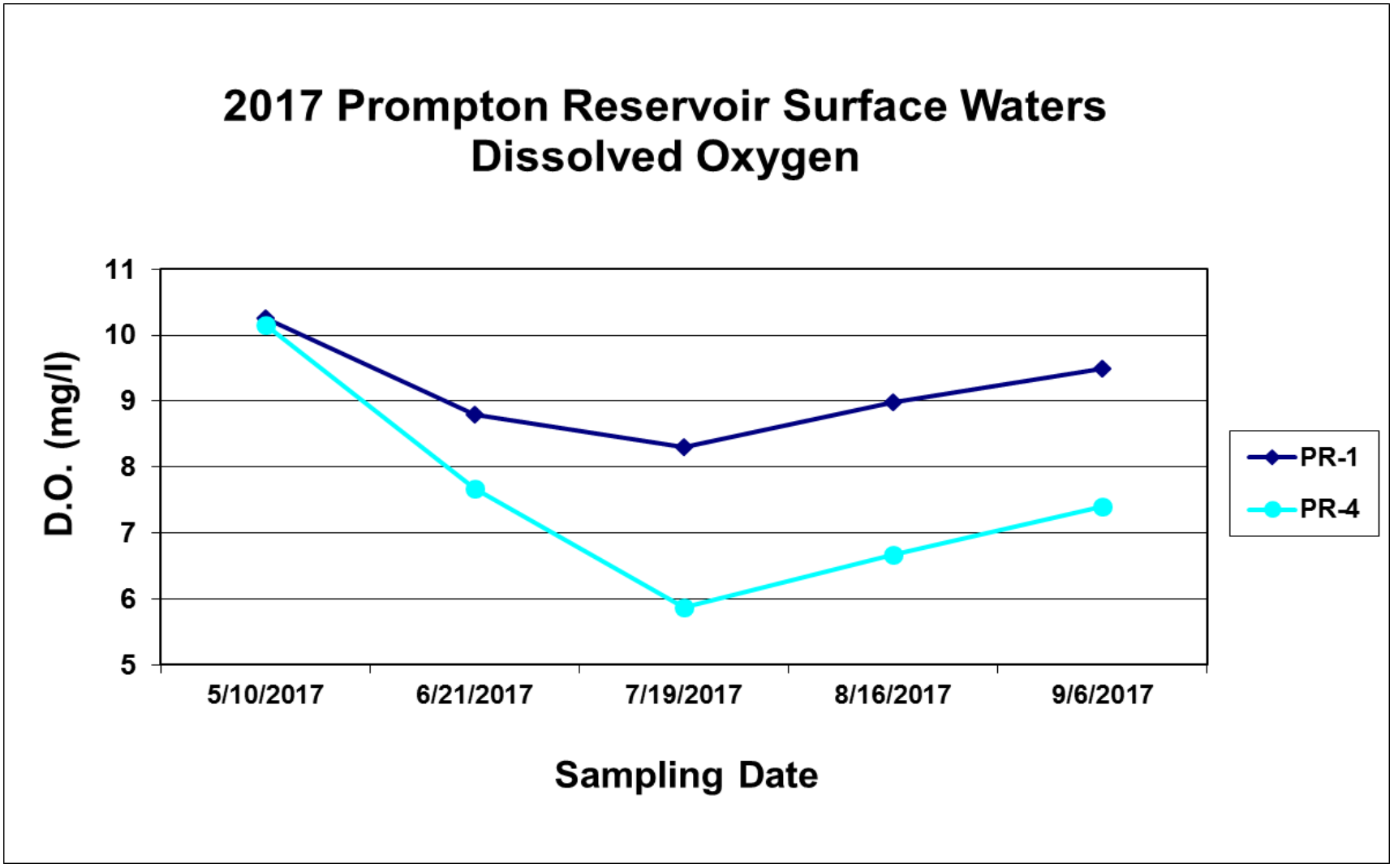

Figure 3-3. Dissolved oxygen in tributary surface waters of Prompton Reservoir during 2017. PADEP minimum DO standard is 5 mg/L. See Appendix A for a summary of plotted values.

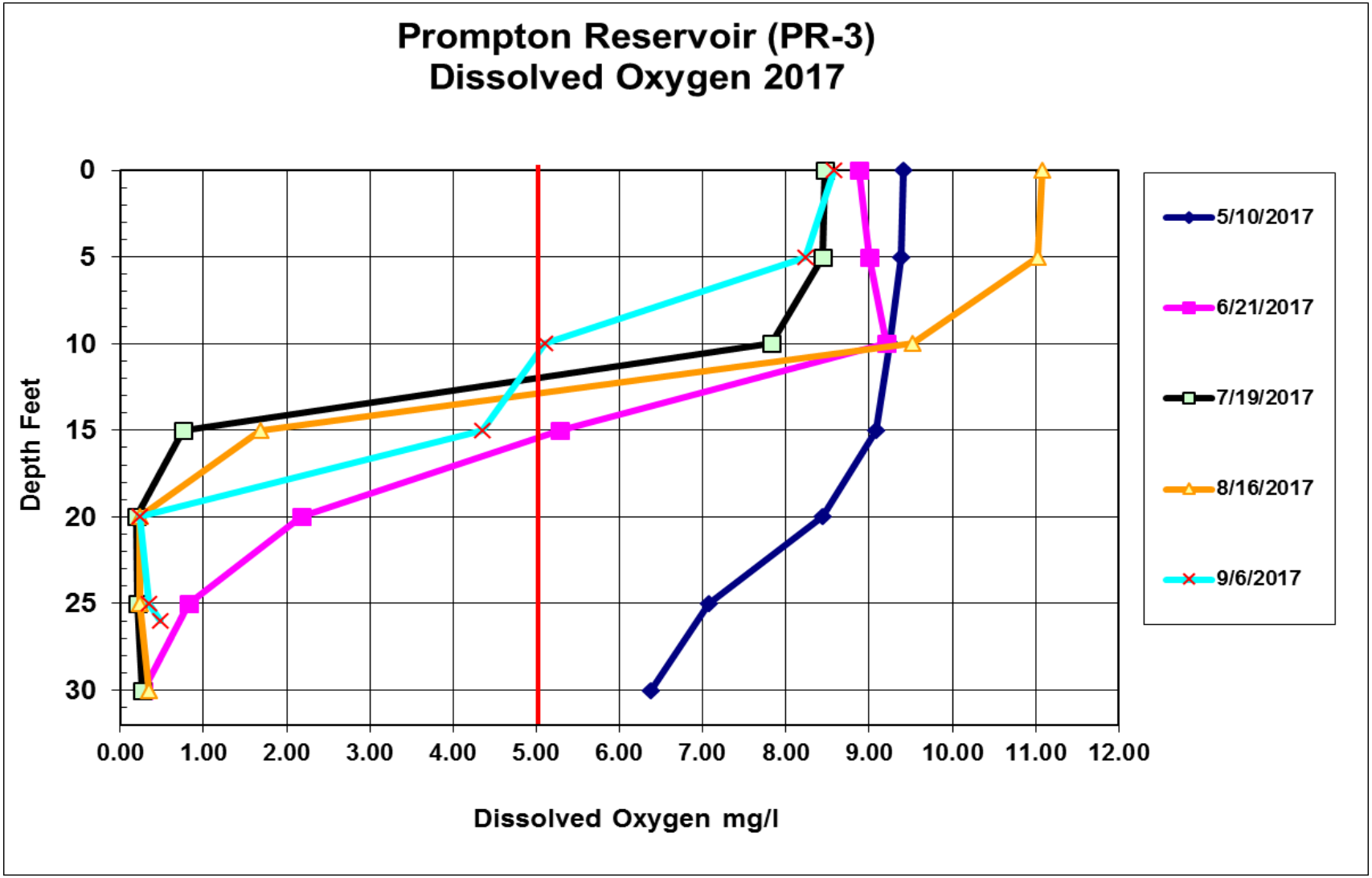

Figure 3-4. Dissolved oxygen stratification of Prompton Reservoir during 2017 from water quality measured at station PR-3. The PADEP minimum DO standard is 5 mg/L. See Appendix A for a summary of plotted value

3.1.3 pH

PH is the measure of the hydrogen –ion concentration in the water. A pH below 7 is considered acidic and a pH above 7 is basic. The pH scale is 0-14 with the lower numbers being more acidic and the higher numbers being more basic. High pH values tend to facilitate solubilization of ammonia, salts, and heavy metals. Low pH levels tend to increase carbonic acid and carbon dioxide concentrations. Lethal effects of pH on aquatic life typically occur below pH 4.5 and above pH 9.5.

Measures of pH in the surface water tributary stations PR-1S and PR-4S at Prompton Reservoir ranged from 6.47 in May to 7.48 in June (Fig. 3-5). The seasonal pH average for PR-1S and PR-4S were 7.17 and 6.76, respectively.

The water column of Prompton Reservoir maintained a relatively stable pH through most of the sampling season in 2017 with higher lake surface water pH seen in June, July and August (Fig. 3-6). In general the development of stratification and increase in surface temperatures during this time period is reflected with an increase in pH at the surface while the lower water column remained relatively constant. This was seen especially during August when the upper water column ranged as high as 8.52 and the bottom waters had a reading of 6.82. The elevated pH in surface waters of the reservoir during summer periods is most likely due to algal blooms. As a function of increased productivity, algae remove CO_2 from the water column. Since dissolved CO_2 is slightly acidic, its reduction in the water column is manifested by an increase in pH.

The surface waters of the Prompton Reservoir lake stations were in compliance with PADEP standards for pH during 2017. The water quality standard for pH is a range of acceptability from 6 to 9. Near surface water readings in July and August exceeded the pH 9.0 criteria.

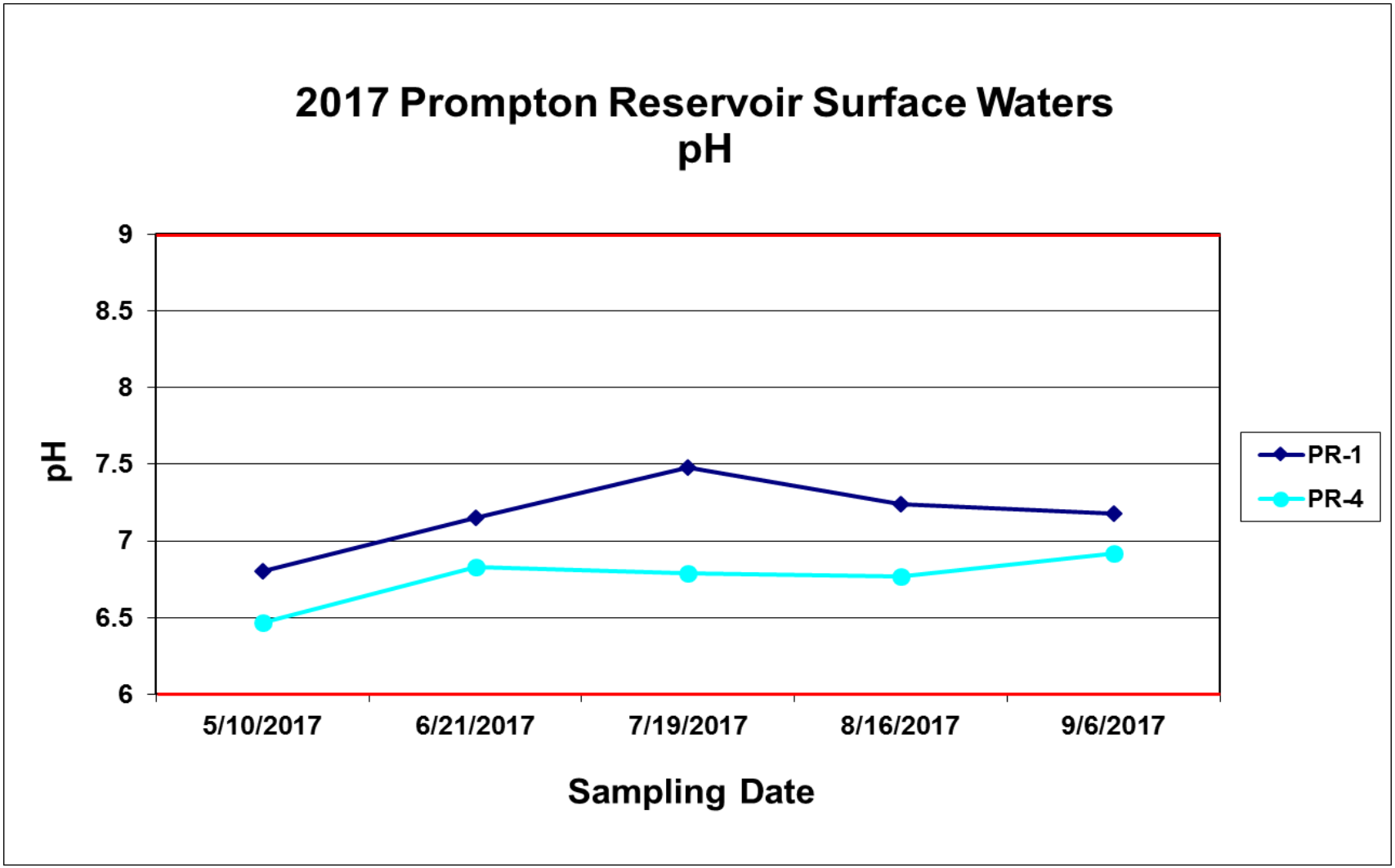

Figure 3-5. Measures of pH in tributary and outflow surface waters of Prompton Reservoir during 2017. PADEP minimum and maximum pH standards are 6 and 9, respectively. See Appendix A for a summary of plotted values.

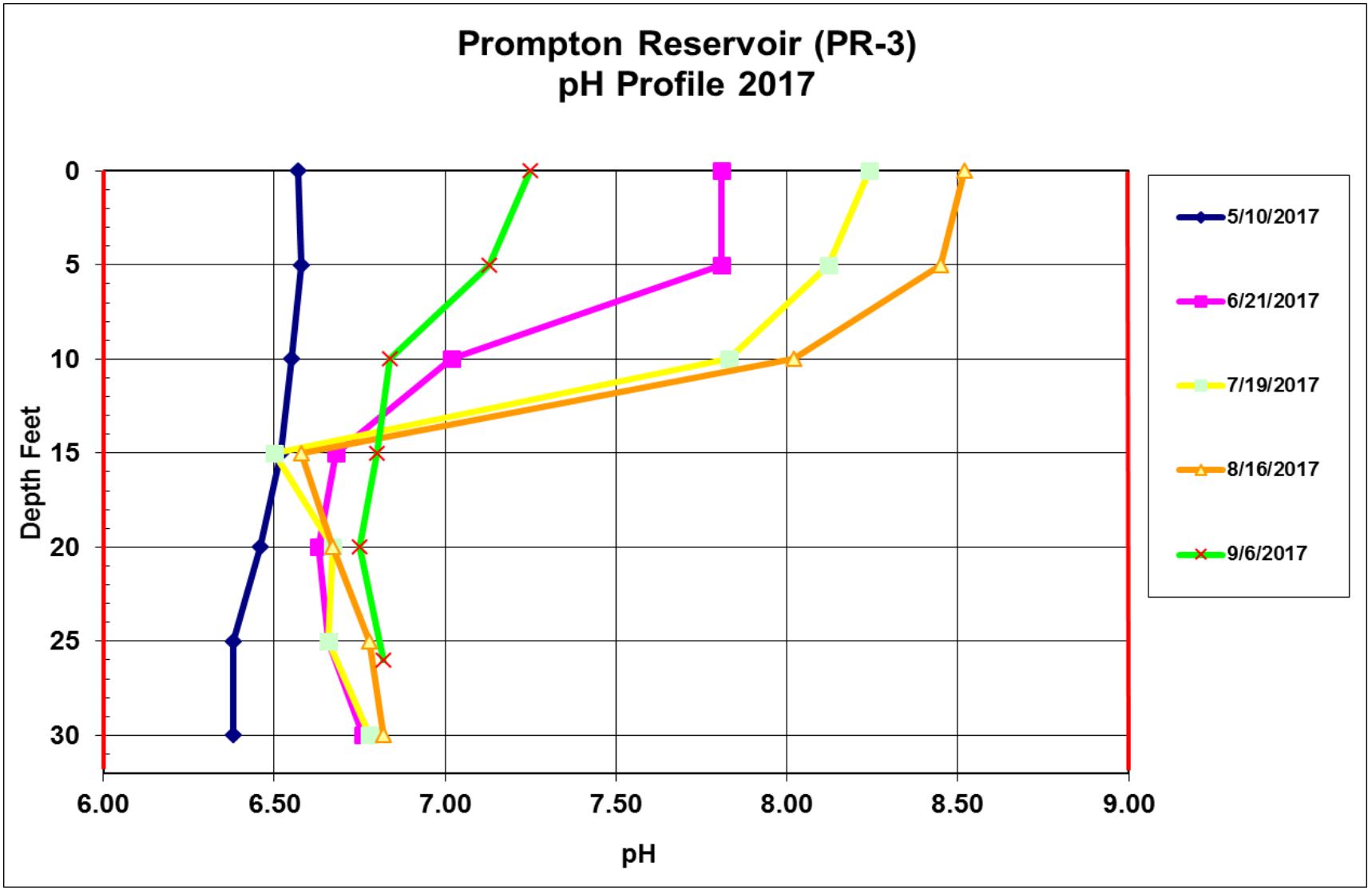

Figure 3-6. Stratification of pH at Prompton Reservoir during 2017, from water quality measured at station PR-3. PADEP minimum and maximum pH standards are 6 and 9, respectively. See Appendix A for a summary of plotted values.

3.2 WATER COLUMN CHEMISTRY MONITORING

The following sections describe temporal, spatial, and depth related patterns for water quality parameters measured at Prompton Reservoir during 2017 (Table 3-2).

3.2.1 Ammonia

Total Ammonia (NH3) is a measure of the most reduced inorganic form of nitrogen in water and includes dissolved ammonia and the ammonium ion. Ammonia is a small component of the nitrogen cycle but as an essential plant nutrient, it contributes to the trophic status of a water body. Excess ammonia contributes to eutrophication of water bodies. This can result in excessive algal growths and impacts on recreation and drinking water supplies. In high concentrations, ammonia is toxic to aquatic life.

Ammonia in the water column of Prompton Reservoir was low during 2017 (Table 3-2). Concentrations measured at many surface and middle water column stations were less than the reporting limit (0.05 mg/L). The highest concentration (2.48 mg/L) was measured in August in the bottom waters of the deeper portion of the reservoir located at station PR-3B. Concentrations in the bottom waters at station PR-3B throughout the sampling season averaged 1.00 mg/L. Increased ammonia is characteristic of low dissolved oxygen environments in stratified lakes resulting from the decomposition of organic materials. Prompton Reservoir experienced these conditions from July through September of 2017 resulting in elevated levels of Ammonia in the deeper areas of the reservoir. In 2017, Prompton Reservoir was in compliance with the PADEP water quality standard for ammonia, which is dependent on temperature and pH (Table 3-1).

Table 3-1. PADEP ammonia nitrogen criteria (Pennsylvania Code, Title 25, Chapter 93, 2002). Specific ammonia criteria dependent on temperature and pH (units in mg/L).

PH	10 °C	15 °C	20 °C	25 °C	30 °C
6.50	25.5	17.4	12.0	8.4	5.9
6.75	23.6	16.0	11.1	7.7	5.5
7.00	20.6	14.0	9.7	6.8	4.8
7.25	16.7	11.4	7.8	5.5	3.9
7.50	12.4	8.5	5.9	4.1	2.9
7.75	8.5	5.8	4.0	2.8	2.0
8.00	5.5	5.8	4.0	2.8	2.0
8.25	3.4	2.3	1.6	1.2	0.9
8.50	2.0	1.4	1.0	0.7	0.6
8.75	1.2	0.9	0.6	0.5	0.4
9.00	0.8	0.5	0.4	0.3	0.3
9.25	0.36	0.24	0.17	0.12	0.08
9.50	0.20	0.13	0.10	0.07	0.05

Table 3-2. Summary of surface, middle, and bottom water quality monitoring data for Prompton Reservoir in 2017

Station	Date	ALK mg/L	BOD5 mg/L	DISS-P mg/L	NH3 mg/L	NO2 mg/L	NO3 mg/L	PO4 mg/L	TDS mg/L	TKN mg/L	TOC mg/L	TP mg/L	TSS mg/L
PR-1S	5/10/2017	16	<2	<.05	<.05	<.05	0.15	<.01	14	<.25	3.2	0.02	<3
	6/21/2017	24	<2	<.05	<.05	<.05	0.2	<.01	40	0.35	3.5	<.01	<3
	7/19/2017	32	<2	<.05	<.05	<.05	0.15	<.01	61	0.29	2.2	0.01	<3
	8/16/2017	31	<2	<.05	<.05	<.05	0.18	<.01	58	0.32	3.1	0.01	<3
	9/6/2017	27	<2	<.05	<.05	<.05	0.15	<.01	61	0.35	2.9	0.01	10
	Mean	26.0	2	0.05	0.05	0.05	0.17	0.01	47	0.31	3.0	0.01	4.4
	Stdev	6.4	0	0.00	0	0	0.02	0.00	20	0.04	0.5	0.00	3.1
	Max	32	2	0.05	0.05	0.05	0.2	0.01	61	0.35	3.5	0.02	10
	Min	16	2	0.05	0.05	0.05	0.15	0.01	14	0.25	2.2	0.01	3
	No. of Det.	5	0	0	0	0	5	0	5	4	5	4	1
PR-2S	5/10/2017	15	<2	<.05	<.05	<.05	0.11	<.01	26	0.34	3.9	0.02	3
	6/21/2017	20	<2	<.05	<.05	<.05	<.05	<.01	58	0.8	3.9	<.01	3
	7/19/2017	32	4	<.05	<.05	<.05	<.05	<.01	51	0.78	3.4	<.01	5
	8/16/2017	33	4	<.05	<.05	<.05	<.05	<.01	53	0.97	4.3	<.01	7
	9/6/2017	27	<2	<.05	<.05	<.05	<.05	<.01	67	1.07	3.8	<.01	10
	Mean	25.4	2.8	0.05	0.05	0.05	0.06	0.01	51	0.79	3.9	0.01	6
	Stdev	8	1	0.00	0	0	0.03	0.00	15	0.28	0.3	0.00	3
	Max	33	4	0.05	0.05	0.05	0.11	0.01	67	1.07	4.3	0.02	10
	Min	15	2	0.05	0.05	0.05	0.05	0.01	26	0.34	3.4	0.01	3
	No. of Det.	5	2	0	0	0	1	0	5	5	5	1	5

Table 3-2 continued. Summary of surface, middle, and bottom water quality monitoring data for Prompton Reservoir in 2017

Station	Date	ALK mg/L	BOD5 mg/L	DISS-P mg/L	NH3 mg/L	NO2 mg/L	NO3 mg/L	PO4 mg/L	TDS mg/L	TKN mg/L	TOC mg/L	TP mg/L	TSS mg/L
PR-2M	5/10/2017	16	<2	<.05	<.05	<.05	0.11	<.01	28	0.27	4.1	0.02	<3
	6/21/2017	24	<2	<.05	<.05	<.05	0.12	<.01	52	0.39	4.1	<.01	4
	7/19/2017	28	<2	<.05	<.05	<.05	<.05	<.01	44	0.57	3.3	<.01	<3
	8/16/2017	27	3	<.05	<.05	<.05	<.05	<.01	46	0.8	3.9	<.01	5
	9/6/2017	27	3	<.05	0.08	<.05	<.05	<.01	43	0.65	3.6	<.01	8
	Mean	24	2	0.05	0.06	0.05	0.08	0.01	43	0.54	3.8	0.01	4.6
	Stdev	5	1	0	0.01	0	0.04	0	9	0.21	0.3	0.00	2
	Max	28	3	0.05	0.08	0.05	0.12	0.01	52	0.8	4.1	0.02	8
	Min	16	2	0.05	0.05	0.05	0.05	0.01	28	0.27	3.3	0.01	3
	No. of Det.	5	2	0	1	0	2	0	5	5	5	1	3
PR-2B	5/10/2017	16	<2	<.05	<.05	<.05	0.11	<.01	43	0.28	3.8	0.03	<3
	6/21/2017	25	<2	<.05	0.16	<.05	0.11	<.01	49	0.45	4.2	0.02	4
	7/19/2017	30	<2	<.05	0.14	<.05	<.05	<.01	71	0.82	3.5	0.02	46
	8/16/2017	29	<2	<.05	0.06	<.05	<.05	<.01	70	0.54	4	0.02	<3
	9/6/2017	31	<2	<.05	0.16	<.05	<.05	<.01	49	0.72	3.3	0.01	3
	Mean	26	2	0.05	0.11	0.05	0.07	0.01	56	0.56	3.8	0.02	12
	Stdev	6	0	0.00	0.05	0	0.03	0.00	13	0.21	0.4	0.01	19
	Max	31	2	0.05	0.16	0.05	0.11	0.01	71	0.82	4.2	0.03	46
	Min	16	2	0.05	0.05	0.05	0.05	0.01	43	0.28	3.3	0.01	3
	No. of Det.	5	0	0	4	0	2	0	5	5	5	5	3

Table 3-2 continued. Summary of surface, middle, and bottom water quality monitoring data for Prompton Reservoir in 2017

Station	Date	ALK mg/L	BOD5 mg/L	DISS-P mg/L	NH3 mg/L	NO2 mg/L	NO3 mg/L	PO4 mg/L	TDS mg/L	TKN mg/L	TOC mg/L	TP mg/L	TSS mg/L
PR-3S	5/10/2017	16	<2	<.05	<.05	<.05	0.11	<.01	38	0.29	4.1	0.02	3
	6/21/2017	23	<2	<.05	<.05	<.05	<.05	<.01	46	0.43	3.9	0.01	3
	7/19/2017	30	2	<.05	<.05	<.05	<.05	<.01	31	0.84	3.6	0.01	3
	8/16/2017	34	3	<.05	<.05	<.05	<.05	<.01	69	0.84	4.4	0.01	6
	9/6/2017	27	<2	<.05	<.05	<.05	<.05	<.01	64	0.89	3.9	0.02	7
	Mean	26	2.2	0.05	0.05	0.05	0.06	0.01	50	0.66	4.0	0.01	4
	Stdev	7	0.4	0	0	0	0.03	0.00	16	0.28	0.3	0.01	2
	Max	34	3	0.05	0.05	0.05	0.11	0.01	69	0.89	4.4	0.02	7
	Min	16	2	0.05	0.05	0.05	0.05	0.01	31	0.29	3.6	0.01	3
	No. of Det.	5	2	0	0	0	1	0	5	5	5	5	5
PR-3M	5/10/2017	15	<2	<.05	<.05	<.05	0.11	<.01	38	<.25	3.6	0.02	<3
	6/21/2017	20	<2	<.05	<.05	<.05	<.05	<.01	39	0.47	4.1	0.01	3
	7/19/2017	32	10	<.05	0.08	<.05	<.05	<.01	63	0.52	3	0.02	<3
	8/16/2017	26	2	<.05	<.05	<.05	<.05	<.01	69	0.68	4.1	0.02	4
	9/6/2017	27	3	<.05	<.05	<.05	<.05	<.01	47	0.86	3.8	0.02	8
	Mean	24	3.8	0.05	0.06	0.05	0.06	0.01	51	0.56	3.7	0.02	4
	Stdev	7	3.5	0	0	0	0	0.00	14	0.23	0.5	0.00	2
	Max	32	10	0.05	0.08	0.05	0.11	0.01	69	0.86	4.1	0.02	8
	Min	15	2	0.05	0.05	0.05	0.05	0.01	38	0.25	3	0.01	3
	No. of Det.	5	3	0	1	0	1	0	5	4	5	5	3

Table 3-2 continued. Summary of surface, middle, and bottom water quality monitoring data for Prompton Reservoir in 2017

Station	Date	ALK mg/L	BOD5 mg/L	DISS-P mg/L	NH3 mg/L	NO2 mg/L	NO3 mg/L	PO4 mg/L	TDS mg/L	TKN mg/L	TOC mg/L	TP mg/L	TSS mg/L
PR-3B	5/10/2017	16	<2	<.05	0.17	<.05	0.15	<.01	40	0.92	3.9	0.09	30
	6/21/2017	33	<2	<.05	0.45	<.05	<.05	<.01	46	0.85	4.5	0.06	10
	7/19/2017	54	<2	<.05	1.16	<.05	<.05	<.01	98	2.1	7.5	0.06	6
	8/16/2017	70	5	<.05	2.48	<.05	<.05	<.01	131	4.07	12.2	0.07	55
	9/6/2017	44	5	<.05	0.75	<.05	<.05	<.01	53	1.44	4.7	0.06	21
	Mean	43	3	0.05	1.00	0.05	0.07	0.01	74	1.88	6.6	0.07	24
	Stdev	20	2	0.00	0.90	0	0.04	0.00	39	1.32	3.4	0.01	20
	Max	70	5	0.05	2.48	0.05	0.15	0.01	131	4.07	12.2	0.09	55
	Min	16	2	0.05	0.17	0.05	0.05	0.01	40	0.85	3.9	0.06	6
	No. of Det.	5	2	0	5	0	1	0	5	5	5	5	5
PR-4S	5/10/2017	14	<2	<.05	<.05	<.05	0.11	<.01	34	0.44	4.4	0.07	4
	6/21/2017	22	<2	<.05	0.06	<.05	0.07	<.01	35	0.53	4.6	0.05	7
	7/19/2017	35	3	<.05	0.15	<.05	0.16	<.01	64	0.67	2.9	0.04	3
	8/16/2017	30	<2	<.05	0.12	<.05	0.15	<.01	60	0.87	4.3	0.06	3
	9/6/2017	29	<2	<.05	0.13	<.05	0.12	<.01	59	0.62	4	0.03	<3
	Mean	26	2.2	0.05	0.10	0.05	0.12	0.01	50	0.63	4.04	0.05	4
	Stdev	8	0.45	0.00	0.04	0	0.04	0.00	15	0.16	0.7	0.02	2
	Max	35	3	0.05	0.15	0.05	0.16	0.01	64	0.87	4.6	0.07	7
	Min	14	2	0.05	0.05	0.05	0.07	0.01	34	0.44	2.9	0.03	3
	No. of Det.	5	1	0	4	0	5	0	5	5	5	5	4

< Laboratory analysis result was less than the method or reporting limits.

3.2.2 Nitrite and Nitrate

Nitrite (NO2) is a measure of a form of nitrogen that occurs as an intermediate in the nitrogen cycle. It is unstable and can rapidly be oxidized to nitrate or reduced to nitrogen gas. Nitrite is a source of nutrients for plants and can be toxic to aquatic life in relatively low concentrations. In 2017, nitrite concentrations in the waters of Prompton Reservoir measured at all stations and depths were less than the reporting limit of 0.05 mg/L (Table 3-2).

Nitrate (NO3) is the measure of the most oxidized and stable form of nitrogen. It is the principal form of combined nitrogen in natural waters. Nitrate is the primary form of nitrogen used by plants as a nutrient to stimulate plant growth. In 2017, nitrate concentrations in the lake waters of Prompton Reservoir measured at all stations and depths were often less than the reporting limit of 0.05 mg/L (Table 3-2). Higher readings were seen in the lake tributary inflow waters (PR-1s). The maximum nitrate measure of 0.12 mg/L was collected at station PR-1S in early June. This upstream tributary station also maintained the highest seasonal mean concentration of 0.17 mg/L.

Prompton Reservoir was in compliance with the PADEP water quality standard for nitrite and nitrate during 2017. The standard is a summed concentration of nitrite and nitrate of less than 10 mg/L. Throughout the monitoring period, a maximum summed concentration for all stations and depths of 0.25 mg/L was measured at the upstream tributary surface water station PR-1S on 21 June.

3.2.3 Total Kjeldahl Nitrogen

Total kjeldahl nitrogen (TKN) is a measure of organic nitrogen that includes ammonia. Organic nitrogen is not immediately available for biological activity and is therefore not available for plant growth until decomposition to inorganic form occurs. Total kjeldahl nitrogen was uniformly low in the water column of Prompton Reservoir during 2017 (Table 3-2) although all samples except two were greater than the laboratory reporting limit of 0.25 mg/L. The highest single sample concentration of 4.07 mg/L and seasonal mean concentration of 1.88 mg/L were measured in the bottom water sample at station PR-3B.

3.2.4 Total Phosphorus

Total phosphorus (TP) is a measure of both organic and inorganic forms of phosphorus. It is an essential plant nutrient and is often the most limiting nutrient to plant growth in freshwater systems. Inputs of phosphorus are the prime contributing factors to eutrophication in most freshwater systems. Phosphorus bound to bottom sediments in lakes can be released when oxygen levels are depleted in bottom waters. This phosphorus then becomes available for plant growth.

EPA guidance for nutrient criteria in lakes and reservoirs suggests a minimum concentration for total phosphorus of 0.01-mg/L (EPA 2000). Lakes and reservoirs exceeding this concentration are more likely to experience algal bloom problems during the growing

season. Many of the deep water measures for total phosphorus taken at Prompton Reservoir were greater than the 0.01 mg/L reporting limit (Table 3-2). The highest single concentration of 0.09 mg/L was measured in the lake bottom waters at station PR-3B on 10 May. Higher concentrations of phosphorus in the lower water column are characteristic of temperature-stratified lakes. Low DO conditions in deeper waters create a reducing chemical environment that can mobilize phosphorus from bottom sediment. Prompton Reservoir experiences these conditions annually. Lower measurements of TP in lake surface waters are likely a product of algal phosphorus uptake during photosynthesis.

3.2.5 Dissolved Phosphorus

Dissolved phosphorus (Diss P) concentrations measured at all stations and depths in the water column of Prompton Reservoir were less than the reporting limit of 0.05 mg/L (Table 3-2).

3.2.6 Dissolved Phosphate

Orthophosphate (PO4) is a measure of the inorganic oxidized form of soluble phosphorus. This form of phosphorus is the most readily available for uptake during photosynthesis. In freshwater environments, dissolved phosphate is usually a limiting nutrient and is readily taken up by freshwater plants and algae. In 2017, dissolved phosphate concentrations were low with all measured concentrations below the reporting limit of 0.01 mg/L.

3.2.7 Total Dissolved Solids

Total dissolved solids (TDS) is a measure of the amount of non-filterable dissolved material in the water. Dissolved salts such as sulfate, magnesium, chloride, and sodium contribute to elevated levels. Total dissolved solids in the water column of Prompton Reservoir stayed consistently low during 2017. Concentrations measured at all stations and depths ranged from 14 to 131 mg/L throughout the monitoring period (Table 3-2). Total dissolved solids measured at Prompton Reservoir in 2017 were in compliance with PADEP water quality standards. The Pennsylvania standard for TDS is concentrations less than 500 mg/L as a monthly average with a maximum concentration of 750 mg/L.

3.2.8 Total Suspended Solids

Total suspended solids (TSS) is a measure of the amount of filterable particulate matter that is suspended within the water column. High concentrations increase the turbidity of the water and can hinder photosynthetic activity, result in damage to fish gills, and cause impairment to spawning habitat (smothering). During 2017, total suspended solids (TSS) concentrations at all stations and depths ranged between less than the reporting limit of 3.0 mg/L to 55 mg/L (Table 3-2). The highest single sample measure of 55 mg/L was measured in the bottom waters of station PR-3B on 16 August. Uncharacteristically higher readings in bottom water samples can be attributed to sample collection error caused by disturbing bottom sediments inadvertently during sampling and those suspended materials being included in the sample. The 16 August TSS sample at station PR-3B may reflect this sampling error.

3.2.9 Biochemical Oxygen Demand

Five-day biochemical oxygen demand (BOD5) is a measure of the oxygen-depleting burden imposed by organic material present in water. It measures the rate of oxygen uptake by organisms in the water sample over a period of time. It is an indicator of the quality of a water body and the degree of pollution by biodegradable organic matter can therefore be inferred. The five-day biochemical oxygen demand and commonly accepted water quality inferences are as follows:

- 1-2 mg/L is associated with very clean water and little biodegradable wastes;
- 3-5 mg/L is associated with moderately clean water with some biodegradable wastes;
- 6-9 mg/L is associated with fairly polluted water, many bacteria, and much biodegradable wastes;
- 10+ mg/L is associated with very polluted water and large amounts of biodegradable wastes.

Biochemical oxygen demand concentrations in the waters of Prompton Reservoir were consistently low at all but one station in all months sampled (Table 3-2). Ten of forty individual samples collected during the season were greater than the 2.0 mg/L reporting limit. The maximum BOD measure for all stations and depths was 10.0 mg/L collected at station PR-3M on 19 July. The next closest sample result of 5.0 mg/L was collected at station PR-3B. In considering the overall frequency of samples showing higher readings, it is inferred that Prompton Reservoir and its associated tributaries contained moderately clean waters with some biodegradable wastes in 2017.

3.2.10 Alkalinity

Alkalinity (Alk) is a measure of the acid-neutralizing capacity of water. Waters that have high alkalinity values are considered undesirable because of excessive hardness and high concentrations of sodium salts. Water with low alkalinity has little capacity to buffer acidic inputs and is susceptible to acidification (low pH). The PADEP standard is a minimum concentration of 20-mg/L $CaCO_3$ except where natural conditions are less.

Alkalinity of the water's in Prompton Reservoir remained near or greater than the state minimum standard during the 2017 sampling season (Table 3-2). Concentrations measured at all stations and depths during the monitoring period ranged from 14.0 to 70.0 mg/L. The highest measure was taken at station PR-3B on 16 August. The natural alkalinity of water is largely dependent on the underlying geology and soils within the surrounding watershed. The alkalinity measured at Prompton Reservoir is likely a result of the regional geology and primary productivity. The reservoir waters and surrounding tributaries were in compliance with the PADEP alkalinity criteria in 2017.

3.2.11 Total Organic Carbon

Total organic carbon (TOC) is a measure of the dissolved and particulate organic carbon in water. The bulk of organic carbon in water is composed of humic substances and partly

degraded animal and plant materials. High levels of organic carbon coincide with a lowering of dissolved oxygen concentrations. Carbon is a nutrient required for biological processes. Total organic carbon in the water column of Prompton Reservoir was present in low concentrations during 2017 (Table 3-2). Concentrations of TOC at all stations and depths ranged from 2.2 mg/L to 12.2 mg/L.

3.2.12 Chlorophyll *a*

Chlorophyll a is the measure of the plant chlorophyll a primary pigment which helps plants get energy from light. It is found in most plants, algae, and cyanobacteria. Chlorophyll a measures increase in relation to algal densities in a water body. In all months sampled in 2017, chlorophyll *a* concentrations in the tributary and outflow stream surface waters were low relative to in-lake concentrations (Appendix A). Concentrations measured in upstream and downstream stream surface waters averaged 2.14 ug/L. Concentrations were consistently higher at the in-lake surface stations where algal productivity would be expected to also be higher. Concentrations at lake stations PR-2 and PR-3, from 0-5 feet of depth, ranged between 1.9 ug/L and 9.6 ug/L with a seasonal average of 4.88 ug/L. Chlorophyll a readings were collected using a YSI 6600 V2-4 chlorophyll sensor.

3.3 TROPHIC STATE DETERMINATION

Carlson's (1977) trophic state index (TSI) is a method of quantitatively expressing the magnitude of eutrophication for a lake. The trophic state analysis calculates separate indices for eutrophication based on measures of total phosphorus, chlorophyll *a*, and secchi disk. Index values for each parameter range on the same scale from 0 (least enriched) to 100 (most enriched). The resulting indices can also be compared to qualitative threshold values that correspond to levels of eutrophication. Classification of Prompton Reservoir was based on a single sample taken each month at station PR-3 during the sampling season.

TSIs calculated for measures of secchi disk depth classified Prompton Reservoir as eutrophic in May (54.65), June (52.27), July (53.87), August (57.99) and September (57.99) (Fig. 3-7). TSIs calculated for measures of total phosphorus classified Prompton Reservoir as oligotrophic in June (37.35), July (37.35) and August (37.35), and mesotrophic in May (47.35) and September (47.35). TSI's calculated for measures of chlorophyll *a* classified Prompton Reservoir as oligotrophic in September (36.90), eutrophic in May (50.10) and June (53.57), and mesotrophic in July (44.91) and August (42.61). Chlorophyll a was measured with a YSI 6600 V2-4 chlorophyll sensor.

Carlson (1977) warned against averaging TSI values estimated for different parameters, and instead suggested giving priority to chlorophyll *a* in the summer and to phosphorus in the spring, fall, and winter. With this in mind, the trophic state of the reservoir based on TSI's was in the mesotrophic range during most of the 2017 sampling period.

The EPA (1983) also provides criteria for defining the trophic conditions of lakes of the north-temperate zone based on concentrations of total phosphorus, chlorophyll *a*, and secchi depth (Table 3-3). Taking into account the general agreement between the EPA classifications

with that of the Carlson (1977) calculated TSI values, the trophic condition of Prompton Reservoir would be considered mesotrophic and borderline eutrophic during most of the sampling season.

Table 3-3. EPA trophic classification criteria and monthly measures for Prompton Reservoir in 2017.

Water Quality Variable	Oligo-trophic	Meso-trophic	Eutrophic	10 May	21 June	19 July	16 August	06 September
Total phos. (ppb)	<10	10-20	>20	20	<10	<10	<10	20
Chlorophyll (ppb)	<4	4-10	>10	7.3	10.4	4.3	3.4	1.9
Secchi depth (m)	>4	2-4	<2	1.45	1.71	1.53	1.15	1.15

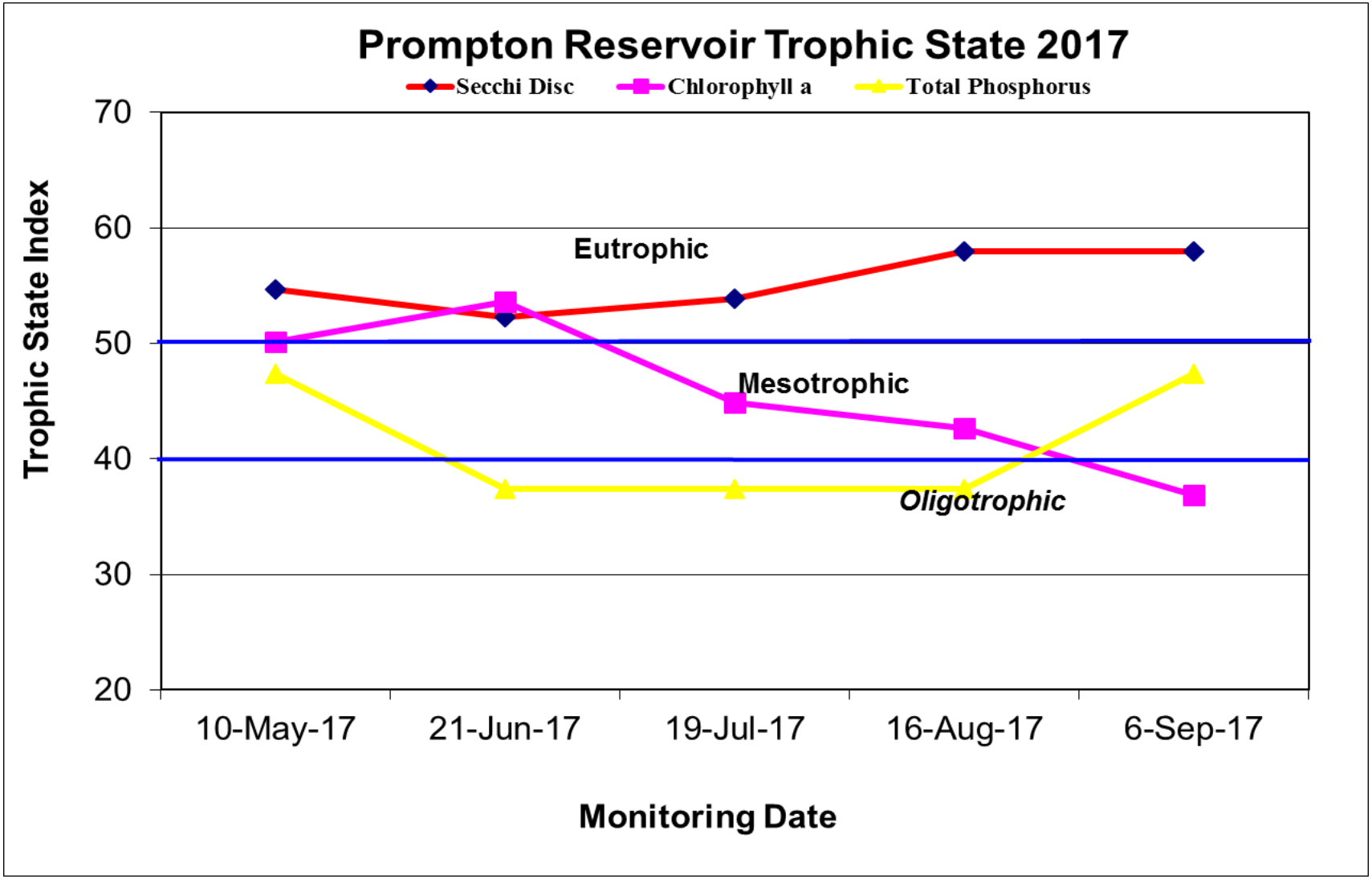

Figure 3-7. Trophic state indices calculated from secchi disk depth, concentrations of chlorophyll *a*, and total phosphorus measured in surface waters of Prompton Reservoir during 2017.

3.4 RESERVOIR BACTERIA MONITORING

Two forms of coliform bacteria contamination were monitored in the tributary and lake surface waters at Prompton Reservoir during 2017 including total and fecal coliform (Table 3-4). Total coliform includes *escherica coliform* (*E. coli*) and related bacteria that are associated with fecal discharges. Fecal coliform bacteria are a subgroup of the total coliform and are normally associated with waste derived from human and other warm-blooded animals and indicate the presence of fecal contamination but not the associated risk.

Total coliform contamination of Prompton Reservoir was relatively high during the 2017 monitoring period with many counts exceeding the method counting limit of 2400 colonies/100-ml. Total coliform values for all stations ranged from greater than the method counting limit of 2400 colonies/100-ml to 130 colonies/100-ml. Higher counts were typically measured in the lake tributary and outflow waters. Bacteria in natural waters are common and their presence in the sample is not necessarily a human health concern.

With respect to PADEP water quality standards, fecal coliform bacteria contamination was low at Prompton Reservoir during 2017. The PADEP standard for fecal coliform bacteria during the swimming season (from 1 May to 30 September) is a geometric mean not greater than 200 colonies/100-ml calculated for not less than five fecal coliform samples collected over a consecutive thirty day period. Given that our regular monitoring was completed on one day, single sample results were compared to the Pennsylvania Department of Health single sample standard of <1000 colonies/100-ml. No fecal coliform samples exceeded this standard. Routinely higher readings were seen at the upstream tributary station (PR-1S) and downstream outflow station (PR-4S). The higher upstream readings were not reflected in the reservoir surface water samples within the lake. Water contact recreation is not permitted at Prompton Reservoir.

Table 3-4. Bacteria counts (colonies/100 ml) at Prompton Reservoir during 2017. Shaded values exceed the Pennsylvania Department of Health water quality standard for bathing beaches. NS = Not Sampled in 2017

STATION	DATE	Total Coliform (TC)		Fecal Coliform (FC)		Escherichia coli	
PR-1S	5/10/2017		2000		16		NS
	6/21/2017	>	2400		88		NS
	7/19/2017	>	2400		58		NS
	8/16/2017	>	2400		90		NS
	9/06/2017	>	2400		160		NS
PR-2S	5/10/2017		1300		15		NS
	6/21/2017		1100		30		NS
	7/19/2017		130		2		NS
	8/16/2017		610	<	2		NS
	9/06/2017	>	2400		2		NS
PR-3S	5/10/2017		440		8		NS
	6/21/2017		360		2		NS
	7/19/2017		2000	<	2		NS
	8/16/2017		440	<	2		NS
	9/06/2017		2400		2		NS
PR-4S	5/10/2017		2400		21		NS
	6/21/2017	>	2400		92		NS
	7/19/2017	>	2400		23		NS
	8/16/2017	>	2400		30		NS
	9/06/2017	>	2400		15		NS

4.0 REFERENCES

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APPENDIX A

STRATIFICATION DATA TABLES

2017 Prompton WQ Profile Summary

Station	Date	Time	Depth	Temp	DO	DO	pH	pHmV	ORP	Turbidity	Chloro.	SpCond
	M/D/Y	hh:mm:ss	ft	C	%	mg/L		mV	mV	NTU	ug/L	mS/cm
PR-1S Upstream	5/10/2017	14:32:11	0.5	11.79	94.7	10.25	6.8	-53.9	141.7	3.2	3.4	0.05
	6/21/2017	11:43:18	0.5	17.61	92.1	8.79	7.15	-73.2	108.2	3.3	1.2	0.073
	7/19/2017	11:22:30	0.5	21.54	94.2	8.31	7.48	-92.2	65	1.9	1.4	0.094
	8/16/2017	11:38:59	0.5	19	96.9	8.99	7.24	-78.7	59.4	2.9	0.5	0.089
	9/6/2017	11:45:51	0.5	15.56	95.3	9.49	7.18	-74.9	56.8	8.5	0	0.078
PR-2 Mid-Lake	5/10/2017	14:00:51	0.5	12.02	90.3	9.72	6.64	-45.5	145.9	6.7	4.9	0.044
		14:00:19	5	11.84	89.9	9.72	6.64	-45.2	146.8	6.8	4.8	0.044
		13:59:16	10	11.12	87.2	9.58	6.59	-42.6	149.9	7.8	5.5	0.043
		13:58:24	15	10.94	85.6	9.45	6.54	-40	153.1	20.8	5.3	0.043
		13:57:17	20	10.6	84.1	9.36	6.44	-34.3	161.6	**717.7**	4.6	0.043
PR-2 Mid-Lake	6/21/2017	12:24:35	0.5	23.96	106	8.93	7.7	-105	64.8	5.1	4.5	0.075
		12:23:29	5	23.13	102.7	8.79	7.57	-97.6	67.3	6.4	9.6	0.073
		12:21:40	10	19.09	66.7	6.18	6.79	-53.4	97.4	9.2	4.3	0.075
		12:19:36	15	16.29	38.4	3.76	6.72	-49.6	98.2	10.2	5.1	0.065
		12:18:17	20	15.13	20.3	2.04	6.73	-50	97.1	**101.7**	6.1	0.066
PR-2 Mid-Lake	7/19/2017	12:52:00	0.5	27.54	115	9.07	8.5	-152	-2.8	10.9	2.7	0.092
		12:51:28	5	26.64	111	8.9	8.44	-148	-10.2	9.6	6.3	0.090
		12:50:28	10	23.11	41.5	3.55	6.98	-64	37.1	7.6	2.9	0.086
		12:48:16	15	22.14	21.9	1.91	7.14	-73.1	-54.2	8.5	2.7	0.087
		12:47:22	20	20.76	4.1	0.37	7.27	-80.2	-229	**379.5**	0.2	0.092
PR-2 Mid-Lake	8/16/2017	12:45:44	0.5	24.33	139.6	11.68	8.93	-175	9.6	24.2	7.9	0.089
		12:44:13	5	23.88	122.1	10.3	8.61	-157	14	21	7.1	0.087
		12:42:51	10	22.02	40.2	3.51	7.09	-70	67.7	3.9	0.1	0.083
		12:40:40	15	21.2	36.5	3.24	7.21	-76.6	61.7	21.1	1.4	0.084
		12:41:03	20	20.91	34.5	3.08	7.18	-75.4	62.7	9.5	0.3	0.084
PR-2 Mid-Lake	9/6/2017	12:52:25	0.5	20.07	96.4	8.76	7.29	-81.5	28.4	28.7	5.5	0.079
		12:51:07	5	19.4	63.3	5.83	6.88	-58.4	50	11.1	1.9	0.079
		12:50:07	10	18.81	55.4	5.16	6.86	-56.9	47	10.4	1.5	0.078
		12:49:07	15	17.67	51.7	4.93	6.85	-56.6	40.7	10.3	1.5	0.081
		12:47:25	20	17.17	45.1	4.35	6.86	-57	21.3	12.6	0	0.083

2017 Prompton WQ Profile Summary

Station	Date	Time	Depth	Temp	DO	DO	pH	pHmV	ORP	Turbidity	Chloro.	SpCond
	M/D/Y	hh:mm:ss	ft	C	%	mg/L		mV	mV	NTU	ug/L	mS/cm
PR-3 Upstream of Dam Secchi 1.45 M	5/10/2017	13:36:49	0.5	12.99	89.3	9.41	6.57	-41.7	106.9	7.6	4.9	0.045
		13:35:42	5	12.45	87.9	9.38	6.58	-41.9	105	9.3	8.6	0.045
		13:34:42	10	12.18	86.2	9.25	6.55	-40.5	104.8	7.8	8.5	0.044
		13:34:04	15	12	84.4	9.09	6.52	-39	105	8.5	8.3	0.044
		13:33:01	20	11.91	78.2	8.44	6.46	-35.4	106.6	9.3	7.8	0.044
		13:32:10	25	10.69	63.6	7.07	6.38	-31.5	110	19.2	4.5	0.045
		13:23:01	30	10.74	57.5	6.37	6.38	-31.2	71	**80.5**	**17.2**	0.045
PR-3 Upstream of Dam Secchi 1.71 M	6/21/2017	12:47:58	0.5	24.47	106.5	8.88	7.81	-112	22.4	3.8	4	0.075
		12:47:02	5	23.61	106.2	9	7.81	-111	15	4.8	6.8	0.073
		12:45:05	10	19.43	100	9.2	7.02	-66.4	34.6	7.8	20.5	0.065
		12:43:30	15	16.38	54	5.28	6.68	-47.4	28.7	6.8	18.4	0.057
		12:41:53	20	14.17	21.1	2.17	6.63	-44.5	-4.4	8.2	4.8	0.057
		12:40:33	25	12.57	7.7	0.82	6.66	-46.5	-48.7	5.4	4.3	0.061
		12:39:06	30	10.73	2.5	0.27	6.76	-51.7	-101	**13.9**	4.5	0.085
PR-3 Upstream of Dam Secchi 1.53 M	7/19/2017	12:35:08	0.5	27.61	107.5	8.47	8.24	-137	2.1	7.3	2.5	0.090
		12:34:20	5	27.1	106.1	8.44	8.12	-130	-2.2	7.8	3.9	0.089
		12:32:57	10	24.75	94.2	7.82	7.83	-112	-13.8	14.7	6.4	0.083
		12:30:44	15	22.36	8.7	0.76	6.5	-36.5	-82.9	4.7	3.2	0.087
		12:29:23	20	17.41	2.1	0.2	6.67	-46.9	-180	2.6	3.3	0.101
		12:28:22	25	12.55	1.9	0.21	6.66	-46.6	-168	4.3	4.3	0.086
		12:27:28	30	10.21	2.3	0.26	6.78	-53	-178	14.5	4.9	0.171
PR-3 Upstream of Dam Secchi 1.15	8/16/2017	12:27:13	0.5	24.39	132.6	11.08	8.52	-152	1.7	16.5	3	0.088
		12:26:31	5	24.28	131.6	11.02	8.45	-148	-3	22.5	3	0.088
		12:25:03	10	23.27	111.6	9.52	8.02	-123	-12.9	13.2	4.3	0.083
		12:23:10	15	21.08	19	1.69	6.58	-41.5	-36.6	3.5	1.4	0.082
		12:22:00	20	18.04	2.5	0.23	6.67	-46.7	-86.4	5.9	4.6	0.096
		12:20:31	25	14.06	2.4	0.24	6.78	-52.8	-155	16.7	3.6	0.112
		12:19:13	30	11.97	3.2	0.34	6.82	-55.3	-155	**197.7**	**14.1**	0.131
PR-3 Upstream of Dam Secchi 1.15	9/6/2017	12:35:32	0.5	19.9	94.2	8.58	7.25	-79.1	18.8	25.6	3.2	0.078
		12:34:22	5	19.9	90.3	8.23	7.13	-72.1	15	24.3	2.6	0.078
		12:33:03	10	19.08	55.1	5.1	6.84	-56.3	11	6.9	0	0.079
		12:31:48	15	18.17	46.1	4.35	6.8	-53.7	-5.5	5.9	0	0.079
		12:29:38	20	16.47	2.5	0.24	6.75	-51.4	-80.6	18.3	0	0.093
		12:27:52	25	14.96	3.5	0.35	6.82	-55.1	-130	16.4	1	0.13
		12:26:54	30	14.43	4.7	0.48	6.82	-55.1	-122	11.1	0.7	0.132
PR-4S Dam Outfall	5/10/2017	12:43:36	0.5	12.63	95.6	10.16	6.47	-36	160	8.8	6.3	0.045
	6/21/2017	11:28:21	0.5	18.98	82.6	7.67	6.83	-55.7	120.8	4.4	4.6	0.064
	7/19/2017	11:12:00	0.5	21.47	66.5	5.87	6.79	-53	92.5	2.7	3.1	0.090
	8/16/2017	11:27:29	0.5	20.77	74.6	6.68	6.77	-52.1	74.2	8.4	0.9	0.084
	9/6/2017	11:33:38	0.5	17.66	77.6	7.4	6.92	-60.8	78.9	5	0	0.079

APPENDIX B

LABORATORY CUSTODY SHEETS

Certificate of Analysis

M.J. Reider Associates, Inc.

ENVIRONMENTAL TESTING LABORATORY
U.S. EPA/PA DEP #06-00003

Laboratory No.: 7007297
Report: 05/22/17
Lab Contact: Richard Wheeler

Attention: David Wertz
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Arlington, VA 22201

Project Info: 6225 - Seasonal Monthly Reservoirs-Prompton

Lab ID: 7007297-01 **Collected By:** Client **Sampled:** 05/10/17 14:30 **Received:** 05/10/17 14:30
Sample Desc: PR-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.15	mg/l	0.05	EPA 353.2	05/10/17 19:02		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:03		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	14	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	3.2	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	16	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	2000	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

Lab ID: 7007297-02 **Collected By:** Client **Sampled:** 05/10/17 13:50 **Received:** 05/10/17 14:30
Sample Desc: PR-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:03		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:03		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.34	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	26	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	15	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	1300	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

Lab ID: 7007297-03 **Collected By:** Client **Sampled:** 05/10/17 13:50 **Received:** 05/10/17 14:30
Sample Desc: PR-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:04		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:04		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.27	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	28	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.1	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007297-04 **Collected By:** Client **Sampled:** 05/10/17 13:50 **Received:** 05/10/17 14:30
Sample Desc: PR-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:07		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:07		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.28	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.03	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	43	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	3.8	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007297-05 **Collected By:** Client **Sampled:** 05/10/17 13:15 **Received:** 05/10/17 14:30
Sample Desc: PR-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:08		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:08		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.29	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	38	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.1	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	8	/100ml	2	SM 9222 D	05/10/17 18:05		TNS
Total Coliform	440	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

Lab ID: 7007297-06 **Collected By:** Client **Sampled:** 05/10/17 13:15 **Received:** 05/10/17 14:30
Sample Desc: PR-3 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:09		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:09		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	38	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	3.6	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007297-07 **Collected By:** Client **Sampled:** 05/10/17 13:15 **Received:** 05/10/17 14:30
Sample Desc: PR-3 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	0.17	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.15	mg/l	0.05	EPA 353.2	05/10/17 19:10		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:10		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.92	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.09	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	40	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	30	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007297-08 **Collected By:** Client **Sampled:** 05/10/17 12:40 **Received:** 05/10/17 14:30
Sample Desc: PR-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	05/10/17 19:12		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:13		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.44	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.07	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	34	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.4	mg/l	0.5	SM 5310 C	05/17/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	21	/100ml	2	SM 9222 D	05/10/17 18:05		TNS
Total Coliform	2400	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

Notes and Definitions

C-05 The sample did not meet the minimum DO depletion of at least 2 mg/L.

G-11 The sample was filtered after it was received at the laboratory.

M.J. Reider Associates, Inc.
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Chain of Custody

7007297

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton
Report To: Tetra Tech - Gregory Wacik - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Philadelphia, PA 19107
Invoice To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201

Comments:

Collected By : (Full Name) G. WACIK

7007297-01 PR-1 Surface NAP NAP M M NAP NAP NAP
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 230

A - Pl 250ml NP, zero hdspc
B - Pl Liter NP
C - Sterile_Pl 250ml NaThio
D - Pl 500ml H2SO4
E - Pl 500ml NP
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7007297-02 PR-2 Surface NAP NAP M M NAP NAP NAP
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 150

A - Pl 250ml NP, zero hdspc
B - Pl Liter NP
C - Sterile_Pl 250ml NaThio
D - Pl 500ml H2SO4
E - Pl 500ml NP
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

CHL 05/10/17
7007297-03 PR-2 Mid-Depth NAP NAP M M NAP NAP
BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 150

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	Date/Time	Received By	Date/Time
	3:45 5/10/17		05/10/17 1555
Relinquished By	Date/Time	Received at Laboratory By	Date/Time
			05/10/17 1720

Sample Kit Prepared By:	Date/Time

Sample Temp (°C): 8°C
Samples on Ice? (Yes) No NA
Approved By: CHL
Entered By:

Report Template:

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 05/01/17 12:42:20PM

7007297

M.J. Reider Associates, Inc.

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : G. WACIK
(Full Name)

7007297-04 PR-2 Deep NAP NAP NAP NAP NAP

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 1150

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc

7007297-05 PR-3 Surface NAP NAP NAP NAP NAP NAP NAP

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 115

A - Pl 250ml NP, zero hdspc
B - Pl Liter NP
C - Sterile_Pl 250ml NaThio
D - Pl 500ml H2SO4
E - Pl 500ml NP
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7007297-06 PR-3 Mid-Depth NAP NAP NAP NAP

BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H
Alk 2320B, PO4-P H, TDS, TKN, NH3-N, TOC, TSS

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 115

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc

	Date/Time		Date/Time
Relinquished By	5/10/17 345	Received By	05/10/17 1555
Relinquished By		Received at Laboratory By	05/10/17 1720

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	8°C
Samples on Ice?	(Yes) No NA
Approved By:	CHL
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 05/01/17 12:42:20PM

Report Template:

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : G. WACIK
(Full Name)

7007297-07 PR-3 Deep JU JU NAP NAP NAP

NO2 353.2, NO3 353.2, O-PO4 H, BOD, PO4-D(H)
NH3-N, TOC, TSS, Alk 2320B, PO4-P H, TDS, TKN

Matrix: Non-Potable Water
Type: Grab

Date: 5/10/17
Time: 1115

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc

7007297-08 PR-4 Surface NAP NAP JU JU NAP NAP NAP

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water
Type: Grab

Date: 5/10/17
Time: 1240

A - Pl 250ml NP, zero hdspc
B - Pl Liter NP
C - Sterile_Pl 250ml NaThio
D - Pl 500ml H2SO4
E - Pl 500ml NP
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	Date/Time	Received By	Date/Time
See attached.			05/10/17 1555
			05/10/17 1720

Relinquished By	Date/Time	Received at Laboratory By	Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	8°C
Samples on Ice?	(Yes) No NA
Approved By:	CHL
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 05/01/17 12:42:20PM

Report Template:

MJRA Terms & Conditions

All samples submitted must be accompanied by signed documentation representing a Chain of Custody (COC). The COC Record acts as a contract between the client and MJRA. Signing the COC form gives approval for MJRA to perform the requested analyses and is an agreement to pay for the cost of such analyses**.** COC Records must be completed in black or blue indelible ink (must not run when wet). COC documentation begins at the time of sample collection. Client is required to document all sample details prior to releasing samples to MJRA. All samples must be placed on ice immediately after sampling and shipped or delivered to the laboratory in a manner that will maintain the sample temperature above freezing and below 6C (loose ice is preferred)**.**

Sample Submission, Sample Acceptance & Sampling Containers

Included on the COC must be the sample description, date and time of collection (including start and stop for composites), container size and type, preservative information, sample matrix, indication of whether the sample is a grab or composite, number of containers & a list of the tests to be performed. Poor sample collection technique, inappropriate sampling containers and/or improper sample preservation may lead to sample rejection. Suitable sample containers, labels, and preservatives (as applicable), along with blank COCs are provided at no additional cost.

Turnaround Times (TAT)

Average TAT for test results range from 5 to 15 working days depending on the specific analyses and time of year submitted. Faster turnaround times (*RUSH TAT) may be available depending on the current workload in a particular department and the nature of the analyses requested. We encourage you to verify requests for expedited sample results with one of our Technical Directors prior to sample submittal. Without confirmation from a Technical Director, your results may not be completed by your deadline. *RUSH TAT Surcharges are applied for expedited turnaround times.

Analytical Results, Sample Collection Integrity & Subcontracting

Analytical values are for the sample as submitted and relate only to the item tested. The value indicates a snapshot of the constituent content of the sample at the time of sample collection. Analytical results can be impacted by poor sample collection technique and/or improper preservation. All sample collection completed by MJRA was performed in accordance with applicable regulatory protocols or as specified in customer specific sampling plans. Constituent content will vary over time based on the matrix of the sample and the physical and chemical changes to its environment. All sample results and laboratory reports are strictly confidential. Results will not be available to anyone except the primary client or authorized party representing the client unless MJRA receives additional permissions from the client. When necessary, MJRA will subcontract certain analyses to a third party accredited laboratory. If client prohibits subcontracting, it must be provided in writing and include instruction on how to proceed with client samples that require third party analyses.

Payment Terms

Payment Terms are Net 30 days. Prices are subject to change without notice. A standing monthly charge of 1.5% of the clients over-30-day-unpaid balance may be added to the balance after 30 days and each month thereafter (day 31, 61, 91 etc.). The laboratory accepts all major credit cards, ACH transactions, checks and cash. New clients must pay for all services rendered prior to sample collection and/or in some cases report processing. Clients must contact the MJRA accounting department to pursue a credit-based account. MJRA reserves the right to terminate the client's credit account and to refuse to perform additional services on a credit basis if any balance is outstanding for more than 60 days.

Warranty & Litigation

MJRA does not guarantee any results of its services but has agreed to use its best efforts, in accordance with the standards and practices of the industry, to cause such results to be accurate and complete. We disclaim any other warranties, expressed or implied, including a warranty of fitness for a particular purpose and warranty of merchantability. Clients agree that they shall reimburse MJRA for any and all fees, cost and litigation expenses, including reasonable attorney fees incurred by MJRA in obtaining payment for the services rendered. All costs associated with compliance with any subpoena for documents, testimony, or any other purpose relating to work performed by MJRA, for a client, shall be paid by that client. MJRA's aggregate liability for negligent acts and omissions and of an intentional breach by MJRA will not exceed the fee paid for the services. Client agrees to indemnify and hold MJRA harmless for any and all liabilities in excess of said amount. Neither MJRA nor the client shall be liable to the other for special, incidental consequential or punitive liability or damages included but not limited to those arising from delay, loss of use, loss of profits or revenues. MJRA will not be liable to the client unless the client has notified MJRA of the discovery of the alleged negligent act, error, omissions or breach within 30 days of the

Reviewed and Approved by:

Richard Wheeler
Project Manager

Certificate of Analysis

M.J. Reider Associates, Inc.
ENVIRONMENTAL TESTING LABORATORY
U.S. EPA/PA DEP #06-00003

Laboratory No.: 7010000
Report: 06/29/17
Lab Contact: Richard Wheeler

Attention: David Wertz
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Arlington, VA 22201

Project Info: 6225 - Seasonal Monthly Reservoirs-Prompton

Lab ID: 7010000-01 **Collected By:** Client **Sampled:** 06/21/17 11:50 **Received:** 06/21/17 17:25
Sample Desc: PR-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	24	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.20	mg/l	0.05	EPA 353.2	06/22/17 18:36		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:57		RES
Nitrogen, Total Kjeldahl (TKN)	0.35	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	40	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	3.5	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	88	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

Lab ID: 7010000-02 **Collected By:** Client **Sampled:** 06/21/17 12:30 **Received:** 06/21/17 17:25
Sample Desc: PR-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	20	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	06/22/17 18:37		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:58		RES
Nitrogen, Total Kjeldahl (TKN)	0.80	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	58	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	30	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	1100	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

Lab ID: 7010000-03 **Collected By:** Client **Sampled:** 06/21/17 12:30 **Received:** 06/21/17 17:25
Sample Desc: PR-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	24	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.12	mg/l	0.05	EPA 353.2	06/22/17 18:40		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:59		RES
Nitrogen, Total Kjeldahl (TKN)	0.39	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	52	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.1	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7010000-04 **Collected By:** Client **Sampled:** 06/21/17 12:30 **Received:** 06/21/17 17:25
Sample Desc: PR-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	25	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.16	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	06/22/17 18:41		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:01		RES
Nitrogen, Total Kjeldahl (TKN)	0.45	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	49	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.2	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7010000-05 **Collected By:** Client **Sampled:** 06/21/17 12:45 **Received:** 06/21/17 17:25
Sample Desc: PR-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	23	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	06/22/17 18:42		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:02		RES
Nitrogen, Total Kjeldahl (TKN)	0.43	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	46	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	06/21/17 18:00		TNS
Total Coliform	360	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

Lab ID: 7010000-06 **Collected By:** Client **Sampled:** 06/21/17 12:45 **Received:** 06/21/17 17:25
Sample Desc: PR-3 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	20	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	06/22/17 18:43		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:03		RES
Nitrogen, Total Kjeldahl (TKN)	0.47	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	39	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.1	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7010000-07 **Collected By:** Client **Sampled:** 06/21/17 12:45 **Received:** 06/21/17 17:25
Sample Desc: PR-3 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	33	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.45	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	06/22/17 18:44		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:04		RES
Nitrogen, Total Kjeldahl (TKN)	0.85	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.06	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	46	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.5	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	10	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7010000-08 **Collected By:** Client **Sampled:** 06/21/17 12:45 **Received:** 06/21/17 17:25
Sample Desc: PR-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	22	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.06	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	06/22/17 18:44		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:07		RES
Nitrogen, Total Kjeldahl (TKN)	0.53	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.05	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	35	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.6	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	7	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	92	/100ml	2	SM 9222 D	06/21/17 18:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

Notes and Definitions

C-05 The sample did not meet the minimum DO depletion of at least 2 mg/L.

G-11 The sample was filtered after it was received at the laboratory.

M.J. Reider Associates, Inc.
107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7010000

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton
Report To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201
Invoice To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201

Collected By : (Full Name) Gregory LOACIK

Comments:

7010000-01 PR-1 Surface NAL — NS
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 1150

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

7010000-02 PR-2 Surface NAL NS
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 1230

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	6/21/17 1520 Date/Time	Received By	062117 1515 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062117 1725 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	20.6
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 06/06/17 12:21:31PM

Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory Wark

7010000-03 PR-2 Mid-Depth

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1730

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7010000-04 PR-2 Deep

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1230

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7010000-05 PR-3 Surface

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	6/21/17 1520 Date/Time	Received By	062117 1515 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062117 1725 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	20.6
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	

Printed: 06/06/17 12:21:31PM

Report Template: MJR Workorder COC 15

7010000

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory Waeik

7010000-06 PR-3 Mid-Depth

BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H
Alk 2320B, PO4-P H, TDS, TKN, NH3-N, TOC, TSS

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7010000-07 PR-3 Deep

NO2 353.2, NO3 353.2, O-PO4 H, BOD, PO4-D(H)
NH3-N, TOC, TSS, Alk 2320B, PO4-P H, TDS, TKN

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7010000-08 PR-4 Surface

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 6/21/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	6/21/17 1520 Date/Time	Received By	062117 1515 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062117 1725 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	20.6
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 06/06/17 12:21:31PM

Report Template: wko WorkOrder COC 15

MJRA Terms & Conditions

All samples submitted must be accompanied by signed documentation representing a Chain of Custody (COC). The COC Record acts as a contract between the client and MJRA. Signing the COC form gives approval for MJRA to perform the requested analyses and is an agreement to pay for the cost of such analyses**.** COC Records must be completed in black or blue indelible ink (must not run when wet). COC documentation begins at the time of sample collection. Client is required to document all sample details prior to releasing samples to MJRA. All samples must be placed on ice immediately after sampling and shipped or delivered to the laboratory in a manner that will maintain the sample temperature above freezing and below 6C (loose ice is preferred)**.**

Sample Submission, Sample Acceptance & Sampling Containers

Included on the COC must be the sample description, date and time of collection (including start and stop for composites), container size and type, preservative information, sample matrix, indication of whether the sample is a grab or composite, number of containers & a list of the tests to be performed. Poor sample collection technique, inappropriate sampling containers and/or improper sample preservation may lead to sample rejection. Suitable sample containers, labels, and preservatives (as applicable), along with blank COCs are provided at no additional cost.

Turnaround Times (TAT)

Average TAT for test results range from 5 to 15 working days depending on the specific analyses and time of year submitted. Faster turnaround times (*RUSH TAT) may be available depending on the current workload in a particular department and the nature of the analyses requested. We encourage you to verify requests for expedited sample results with one of our Technical Directors prior to sample submittal. Without confirmation from a Technical Director, your results may not be completed by your deadline. *RUSH TAT Surcharges are applied for expedited turnaround times.

Analytical Results, Sample Collection Integrity & Subcontracting

Analytical values are for the sample as submitted and relate only to the item tested. The value indicates a snapshot of the constituent content of the sample at the time of sample collection. Analytical results can be impacted by poor sample collection technique and/or improper preservation. All sample collection completed by MJRA was performed in accordance with applicable regulatory protocols or as specified in customer specific sampling plans. Constituent content will vary over time based on the matrix of the sample and the physical and chemical changes to its environment. All sample results and laboratory reports are strictly confidential. Results will not be available to anyone except the primary client or authorized party representing the client unless MJRA receives additional permissions from the client. When necessary, MJRA will subcontract certain analyses to a third party accredited laboratory. If client prohibits subcontracting, it must be provided in writing and include instruction on how to proceed with client samples that require third party analyses.

Payment Terms

Payment Terms are Net 30 days. Prices are subject to change without notice. A standing monthly charge of 1.5% of the clients over-30-day-unpaid balance may be added to the balance after 30 days and each month thereafter (day 31, 61, 91 etc.). The laboratory accepts all major credit cards, ACH transactions, checks and cash. New clients must pay for all services rendered prior to sample collection and/or in some cases report processing. Clients must contact the MJRA accounting department to pursue a credit-based account. MJRA reserves the right to terminate the client's credit account and to refuse to perform additional services on a credit basis if any balance is outstanding for more than 60 days.

Warranty & Litigation

MJRA does not guarantee any results of its services but has agreed to use its best efforts, in accordance with the standards and practices of the industry, to cause such results to be accurate and complete. We disclaim any other warranties, expressed or implied, including a warranty of fitness for a particular purpose and warranty of merchantability. Clients agree that they shall reimburse MJRA for any and all fees, cost and litigation expenses, including reasonable attorney fees incurred by MJRA in obtaining payment for the services rendered. All costs associated with compliance with any subpoena for documents, testimony, or any other purpose relating to work performed by MJRA, for a client, shall be paid by that client. MJRA's aggregate liability for negligent acts and omissions and of an intentional breach by MJRA will not exceed the fee paid for the services. Client agrees to indemnify and hold MJRA harmless for any and all liabilities in excess of said amount. Neither MJRA nor the client shall be liable to the other for special, incidental consequential or punitive liability or damages included but not limited to those arising from delay, loss of use, loss of profits or revenues. MJRA will not be liable to the client unless the client has notified MJRA of the discovery of the alleged negligent act, error, omissions or breach within 30 days of the

Reviewed and Approved by:

Richard Wheeler
Project Manager

Certificate of Analysis

M.J. Reider Associates, Inc.
ENVIRONMENTAL TESTING LABORATORY
U.S. EPA/PA DEP #06-00003

Laboratory No.: 7011017
Report: 07/27/17
Lab Contact: Richard Wheeler

Attention: David Wertz
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Arlington, VA 22201

Project Info: 6225 - Seasonal Monthly Reservoirs-Prompton

Lab ID: 7011017-01 **Collected By:** Client **Sampled:** 07/19/17 11:30 **Received:** 07/19/17 16:50
Sample Desc: PR-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	32	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.15	mg/l	0.05	EPA 353.2	07/20/17 9:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:06		RES
Nitrogen, Total Kjeldahl (TKN)	0.29	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	61	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	2.2	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	58	/100ml	2	SM 9222 D	07/19/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

Lab ID: 7011017-02 **Collected By:** Client **Sampled:** 07/19/17 13:00 **Received:** 07/19/17 16:50
Sample Desc: PR-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	32	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	4	mg/l	2	SM 5210 B	07/20/17		ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:22		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:07		RES
Nitrogen, Total Kjeldahl (TKN)	0.78	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	51	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	3.4	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	5	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	07/19/17 17:20		TNS
Total Coliform	130	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

Lab ID: 7011017-03 **Collected By:** Client **Sampled:** 07/19/17 13:00 **Received:** 07/19/17 16:50
Sample Desc: PR-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	28	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:23		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:08		RES
Nitrogen, Total Kjeldahl (TKN)	0.57	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	44	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	3.3	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011017-04 **Collected By:** Client **Sampled:** 07/19/17 13:00 **Received:** 07/19/17 16:50
Sample Desc: PR-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	30	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.14	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:24		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:11		RES
Nitrogen, Total Kjeldahl (TKN)	0.82	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	71	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	3.5	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	46	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011017-05 **Collected By:** Client **Sampled:** 07/19/17 12:45 **Received:** 07/19/17 16:50
Sample Desc: PR-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	30	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	2	mg/l	2	SM 5210 B	07/20/17		ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:24		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:12		RES
Nitrogen, Total Kjeldahl (TKN)	0.84	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	31	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	3.6	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	07/19/17 17:32		TNS
Total Coliform	2000	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

Lab ID: 7011017-06 **Collected By:** Client **Sampled:** 07/19/17 12:45 **Received:** 07/19/17 16:50
Sample Desc: PR-3 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	32	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.08	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	10	mg/l	2	SM 5210 B	07/20/17		ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:25		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:13		RES
Nitrogen, Total Kjeldahl (TKN)	0.52	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	3.0	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011017-07 **Collected By:** Client **Sampled:** 07/19/17 12:45 **Received:** 07/19/17 16:50
Sample Desc: PR-3 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	54	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	1.16	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:26		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:14		RES
Nitrogen, Total Kjeldahl (TKN)	2.10	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.06	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	98	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	7.5	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	6	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011017-08 **Collected By:** Client **Sampled:** 07/19/17 11:15 **Received:** 07/19/17 16:50
Sample Desc: PR-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	35	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.15	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	3	mg/l	2	SM 5210 B	07/20/17		ALD
Nitrogen, Nitrate	0.16	mg/l	0.05	EPA 353.2	07/20/17 9:29	C-21	RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:17		RES
Nitrogen, Total Kjeldahl (TKN)	0.67	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.04	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	2.9	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	23	/100ml	2	SM 9222 D	07/19/17 17:32		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

Notes and Definitions

C-05 The sample did not meet the minimum DO depletion of at least 2 mg/L.

C-21 The nitritate matrix spike and matrix spike dup were outside the acceptable range of 90-110% at 156.6% and 153.6%.

G-11 The sample was filtered after it was received at the laboratory.

M.J. Reider Associates, Inc.
107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7011017

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton
Report To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201
Invoice To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201

Comments:

Collected By : (Full Name) Gregory Wack

7011017-01 PR-1 Surface

Matrix: Non-Potable Water Date: 7/19/17
Type: Grab Time: 1130

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s NO
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

7011017-02 PR-2 Surface

Matrix: Non-Potable Water Date: 7/19/17
Type: Grab Time: 1300

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s NO
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	7/19/17 1530 Date/Time	Received By	7/19/17 1530 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/19/17 1650 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	24.5
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	

Printed: 6/15/2017 8:03:40AM

Report Template: WRO WorkOrder COC 15

M.J. Reider Associates, Inc.

7011017

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory Wacik

7011017-03 PR-2 Mid-Depth

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1300

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7011017-04 PR-2 Deep

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1300

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7011017-05 PR-3 Surface

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	7/19/17 1530 Date/Time	Received By	7/19/17 1530 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/19/17 1650 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	24.5
Samples on Ice?	(Yes) No NA
Approved By:	BD
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 6/15/2017 8:03:40AM

Report Template: WKO WorkOrder COC ls

M.J. Reider Associates, Inc.

7011017

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory WACIK

7011017-06 PR-3 Mid-Depth

NAP **BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H**
Alk 2320B, PO4-P H, TDS, TKN, NH3-N, TOC, TSS

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7011017-07 PR-3 Deep

NAP **NO2 353.2, NO3 353.2, O-PO4 H, BOD, PO4-D(H)**
NH3-N, TOC, TSS, Alk 2320B, PO4-P H, TDS, TKN

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1245

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7011017-08 PR-4 Surface

NAP **BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s** TNO
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1115

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	Date/Time	Received By	Date/Time
	7/19/17 1536	BS	7/19/17 1530
		BS	7/19/17 1650

Received at Laboratory By

Sample Kit Prepared By:	Date/Time

Sample Temp (°C): 24.5
Samples on Ice? Yes No NA
Approved By:
Entered By:

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 6/15/2017 8:03:40AM

Report Template: wko WorkOrder COC ls

MJRA Terms & Conditions

All samples submitted must be accompanied by signed documentation representing a Chain of Custody (COC). The COC Record acts as a contract between the client and MJRA. Signing the COC form gives approval for MJRA to perform the requested analyses and is an agreement to pay for the cost of such analyses**.** COC Records must be completed in black or blue indelible ink (must not run when wet). COC documentation begins at the time of sample collection. Client is required to document all sample details prior to releasing samples to MJRA. All samples must be placed on ice immediately after sampling and shipped or delivered to the laboratory in a manner that will maintain the sample temperature above freezing and below 6C (loose ice is preferred)**.**

Sample Submission, Sample Acceptance & Sampling Containers

Included on the COC must be the sample description, date and time of collection (including start and stop for composites), container size and type, preservative information, sample matrix, indication of whether the sample is a grab or composite, number of containers & a list of the tests to be performed. Poor sample collection technique, inappropriate sampling containers and/or improper sample preservation may lead to sample rejection. Suitable sample containers, labels, and preservatives (as applicable), along with blank COCs are provided at no additional cost.

Turnaround Times (TAT)

Average TAT for test results range from 5 to 15 working days depending on the specific analyses and time of year submitted. Faster turnaround times (*RUSH TAT) may be available depending on the current workload in a particular department and the nature of the analyses requested. We encourage you to verify requests for expedited sample results with one of our Technical Directors prior to sample submittal. Without confirmation from a Technical Director, your results may not be completed by your deadline. *RUSH TAT Surcharges are applied for expedited turnaround times.

Analytical Results, Sample Collection Integrity & Subcontracting

Analytical values are for the sample as submitted and relate only to the item tested. The value indicates a snapshot of the constituent content of the sample at the time of sample collection. Analytical results can be impacted by poor sample collection technique and/or improper preservation. All sample collection completed by MJRA was performed in accordance with applicable regulatory protocols or as specified in customer specific sampling plans. Constituent content will vary over time based on the matrix of the sample and the physical and chemical changes to its environment. All sample results and laboratory reports are strictly confidential. Results will not be available to anyone except the primary client or authorized party representing the client unless MJRA receives additional permissions from the client. When necessary, MJRA will subcontract certain analyses to a third party accredited laboratory. If client prohibits subcontracting, it must be provided in writing and include instruction on how to proceed with client samples that require third party analyses.

Payment Terms

Payment Terms are Net 30 days. Prices are subject to change without notice. A standing monthly charge of 1.5% of the clients over-30-day-unpaid balance may be added to the balance after 30 days and each month thereafter (day 31, 61, 91 etc.). The laboratory accepts all major credit cards, ACH transactions, checks and cash. New clients must pay for all services rendered prior to sample collection and/or in some cases report processing. Clients must contact the MJRA accounting department to pursue a credit-based account. MJRA reserves the right to terminate the client's credit account and to refuse to perform additional services on a credit basis if any balance is outstanding for more than 60 days.

Warranty & Litigation

MJRA does not guarantee any results of its services but has agreed to use its best efforts, in accordance with the standards and practices of the industry, to cause such results to be accurate and complete. We disclaim any other warranties, expressed or implied, including a warranty of fitness for a particular purpose and warranty of merchantability. Clients agree that they shall reimburse MJRA for any and all fees, cost and litigation expenses, including reasonable attorney fees incurred by MJRA in obtaining payment for the services rendered. All costs associated with compliance with any subpoena for documents, testimony, or any other purpose relating to work performed by MJRA, for a client, shall be paid by that client. MJRA's aggregate liability for negligent acts and omissions and of an intentional breach by MJRA will not exceed the fee paid for the services. Client agrees to indemnify and hold MJRA harmless for any and all liabilities in excess of said amount. Neither MJRA nor the client shall be liable to the other for special, incidental consequential or punitive liability or damages included but not limited to those arising from delay, loss of use, loss of profits or revenues. MJRA will not be liable to the client unless the client has notified MJRA of the discovery of the alleged negligent act, error, omissions or breach within 30 days of the

Reviewed and Approved by:

Richard Wheeler
Project Manager

Certificate of Analysis

M.J. Reider Associates, Inc.
ENVIRONMENTAL TESTING LABORATORY
U.S. EPA/PA DEP #06-00003

Laboratory No.: 7013228
Report: 08/22/17
Lab Contact: Richard Wheeler

Attention: David Wertz
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Arlington, VA 22201

Project Info: 6225 - Seasonal Monthly Reservoirs-Prompton

Lab ID: 7013228-01 **Collected By:** Client **Sampled:** 08/16/17 11:40 **Received:** 08/16/17 16:36
Sample Desc: PR-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	31	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.18	mg/l	0.05	EPA 353.2	08/17/17 8:29		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:28		RES
Nitrogen, Total Kjeldahl (TKN)	0.32	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	58	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	3.1	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	90	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

Lab ID: 7013228-02 **Collected By:** Client **Sampled:** 08/16/17 12:40 **Received:** 08/16/17 16:36
Sample Desc: PR-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	33	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	4	mg/l	2	SM 5210 B	08/16/17		EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:30		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:29		RES
Nitrogen, Total Kjeldahl (TKN)	0.97	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	4.3	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	7	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	610	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

Lab ID: 7013228-03 **Collected By:** Client **Sampled:** 08/16/17 12:40 **Received:** 08/16/17 16:36
Sample Desc: PR-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	3	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:31		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:30		RES
Nitrogen, Total Kjeldahl (TKN)	0.80	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	46	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	5	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013228-04 **Collected By:** Client **Sampled:** 08/16/17 12:40 **Received:** 08/16/17 16:36
Sample Desc: PR-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	29	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	0.06	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:32		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:33		RES
Nitrogen, Total Kjeldahl (TKN)	0.54	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	70	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	4.0	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013228-05 **Collected By:** Client **Sampled:** 08/16/17 12:15 **Received:** 08/16/17 16:36
Sample Desc: PR-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	34	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	3	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:35		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:34		RES
Nitrogen, Total Kjeldahl (TKN)	0.84	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	69	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	4.4	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	6	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	08/16/17 17:30		TNS
Total Coliform	440	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

Lab ID: 7013228-06 **Collected By:** Client **Sampled:** 08/16/17 12:15 **Received:** 08/16/17 16:36
Sample Desc: PR-3 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	26	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:36		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:35		RES
Nitrogen, Total Kjeldahl (TKN)	0.68	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	69	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	4.1	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	4	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013228-07 **Collected By:** Client **Sampled:** 08/16/17 12:15 **Received:** 08/16/17 16:36
Sample Desc: PR-3 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	70	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	2.48	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	5	mg/l	2	SM 5210 B	08/16/17		EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:37		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:36		RES
Nitrogen, Total Kjeldahl (TKN)	4.07	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.07	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	131	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	12.2	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	55	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013228-08 **Collected By:** Client **Sampled:** 08/16/17 11:25 **Received:** 08/16/17 16:36
Sample Desc: PR-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	30	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	0.12	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.15	mg/l	0.05	EPA 353.2	08/17/17 8:38		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:39		RES
Nitrogen, Total Kjeldahl (TKN)	0.87	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.06	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	60	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	4.3	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	30	/100ml	2	SM 9222 D	08/16/17 17:30		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

Notes and Definitions

C-05 The sample did not meet the minimum DO depletion of at least 2 mg/L.

M.J. Reider Associates, Inc.
107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7013228

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6225 - Seasonal Monthly Reservoirs-Prompton
Report To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201
Invoice To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201
Project Notes: Contact Greg Wacik 610-597-9780

Comments:

Collected By : (Full Name) Gregory Wacik

7013228-01 PR-1 Surface

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s (NAP, AH, TNS)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 8/16/17
Type: Grab Time: 1140

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

7013228-02 PR-2 Surface

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s (NAP, AH, TNS)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 8/16/17
Type: Grab Time: 1240

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	8/16/17 1500 Date/Time	Received By	08/16/17 1520 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/16/17 1636 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	12.2°C
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 7/7/2017 6:38:39AM

Report Template: wko WorkOrder COC is

7013228

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory Wacik

7013228-03 PR-2 Mid-Depth

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water
Type: Grab
Date: 8/16/17
Time: 1240

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7013228-04 PR-2 Deep

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water
Type: Grab
Date: 8/16/17
Time: 1240

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7013228-05 PR-3 Surface

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water
Type: Grab
Date: 8/16/17
Time: 1215

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	8/16/17 1500 Date/Time	Received By	08/16/17 1520 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/16/17 1636 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	16.9°C
Samples on Ice?	Yes No NA
Approved By:	CHL
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

7013228

M.J. Reider Associates, Inc.

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) Gregory Wacik

7013228-06 PR-3 Mid-Depth

BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H

Alk 2320B, PO4-P H, TDS, TKN, NH3-N, TOC, TSS

Matrix: Non-Potable Water **Date:** 8/16/17

Type: Grab **Time:** 1215

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
✓ D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7013228-07 PR-3 Deep

NO2 353.2, NO3 353.2, O-PO4 H, BOD, PO4-D(H)

NH3-N, TOC, TSS, Alk 2320B, PO4-P H, TDS, TKN

Matrix: Non-Potable Water **Date:** 8/16/17

Type: Grab **Time:** 1215

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
✓ D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7013228-08 PR-4 Surface

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s

Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 8/16/17

Type: Grab **Time:** 1125

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
✓ E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

	Date/Time		Date/Time
Relinquished By	8/16/17 1500	Received By	08/16/17 1520
Relinquished By		Received at Laboratory By	08/16/17 1636

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	16.9°C
Samples on Ice?	(Yes) No NA
Approved By:	CHL
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

MJRA Terms & Conditions

All samples submitted must be accompanied by signed documentation representing a Chain of Custody (COC). The COC Record acts as a contract between the client and MJRA. Signing the COC form gives approval for MJRA to perform the requested analyses and is an agreement to pay for the cost of such analyses**.** COC Records must be completed in black or blue indelible ink (must not run when wet). COC documentation begins at the time of sample collection. Client is required to document all sample details prior to releasing samples to MJRA. All samples must be placed on ice immediately after sampling and shipped or delivered to the laboratory in a manner that will maintain the sample temperature above freezing and below 6C (loose ice is preferred)**.**

Sample Submission, Sample Acceptance & Sampling Containers

Included on the COC must be the sample description, date and time of collection (including start and stop for composites), container size and type, preservative information, sample matrix, indication of whether the sample is a grab or composite, number of containers & a list of the tests to be performed. Poor sample collection technique, inappropriate sampling containers and/or improper sample preservation may lead to sample rejection. Suitable sample containers, labels, and preservatives (as applicable), along with blank COCs are provided at no additional cost.

Turnaround Times (TAT)

Average TAT for test results range from 5 to 15 working days depending on the specific analyses and time of year submitted. Faster turnaround times (*RUSH TAT) may be available depending on the current workload in a particular department and the nature of the analyses requested. We encourage you to verify requests for expedited sample results with one of our Technical Directors prior to sample submittal. Without confirmation from a Technical Director, your results may not be completed by your deadline. *RUSH TAT Surcharges are applied for expedited turnaround times.

Analytical Results, Sample Collection Integrity & Subcontracting

Analytical values are for the sample as submitted and relate only to the item tested. The value indicates a snapshot of the constituent content of the sample at the time of sample collection. Analytical results can be impacted by poor sample collection technique and/or improper preservation. All sample collection completed by MJRA was performed in accordance with applicable regulatory protocols or as specified in customer specific sampling plans. Constituent content will vary over time based on the matrix of the sample and the physical and chemical changes to its environment. All sample results and laboratory reports are strictly confidential. Results will not be available to anyone except the primary client or authorized party representing the client unless MJRA receives additional permissions from the client. When necessary, MJRA will subcontract certain analyses to a third party accredited laboratory. If client prohibits subcontracting, it must be provided in writing and include instruction on how to proceed with client samples that require third party analyses.

Payment Terms

Payment Terms are Net 30 days. Prices are subject to change without notice. A standing monthly charge of 1.5% of the clients over-30-day-unpaid balance may be added to the balance after 30 days and each month thereafter (day 31, 61, 91 etc.). The laboratory accepts all major credit cards, ACH transactions, checks and cash. New clients must pay for all services rendered prior to sample collection and/or in some cases report processing. Clients must contact the MJRA accounting department to pursue a credit-based account. MJRA reserves the right to terminate the client's credit account and to refuse to perform additional services on a credit basis if any balance is outstanding for more than 60 days.

Warranty & Litigation

MJRA does not guarantee any results of its services but has agreed to use its best efforts, in accordance with the standards and practices of the industry, to cause such results to be accurate and complete. We disclaim any other warranties, expressed or implied, including a warranty of fitness for a particular purpose and warranty of merchantability. Clients agree that they shall reimburse MJRA for any and all fees, cost and litigation expenses, including reasonable attorney fees incurred by MJRA in obtaining payment for the services rendered. All costs associated with compliance with any subpoena for documents, testimony, or any other purpose relating to work performed by MJRA, for a client, shall be paid by that client. MJRA's aggregate liability for negligent acts and omissions and of an intentional breach by MJRA will not exceed the fee paid for the services. Client agrees to indemnify and hold MJRA harmless for any and all liabilities in excess of said amount. Neither MJRA nor the client shall be liable to the other for special, incidental consequential or punitive liability or damages included but not limited to those arising from delay, loss of use, loss of profits or revenues. MJRA will not be liable to the client unless the client has notified MJRA of the discovery of the alleged negligent act, error, omissions or breach within 30 days of the

Reviewed and Approved by:

Richard Wheeler
Project Manager

Certificate of Analysis

M.J. Reider Associates, Inc.
ENVIRONMENTAL TESTING LABORATORY
U.S. EPA/PA DEP #06-00003

Laboratory No.: 7016204
Report: 09/19/17
Lab Contact: Richard Wheeler

Attention: David Wertz
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Arlington, VA 22201

Project Info: 6225 - Seasonal Monthly Reservoirs-Prompton

Lab ID: 7016204-01 **Collected By:** Client **Sampled:** 09/06/17 11:50 **Received:** 09/06/17 16:44
Sample Desc: PR-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.15	mg/l	0.05	EPA 353.2	09/07/17 16:35		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:40		RES
Nitrogen, Total Kjeldahl (TKN)	0.35	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	61	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	2.9	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	10	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	160	/100ml	2	SM 9222 D	09/06/17 17:45		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

Lab ID: 7016204-02 **Collected By:** Client **Sampled:** 09/06/17 13:00 **Received:** 09/06/17 16:44
Sample Desc: PR-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:36		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:41		RES
Nitrogen, Total Kjeldahl (TKN)	1.07	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	67	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	3.8	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	10	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	09/06/17 17:45		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

Lab ID: 7016204-03 **Collected By:** Client **Sampled:** 09/06/17 13:00 **Received:** 09/06/17 16:44
Sample Desc: PR-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	0.08	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	3	mg/l	2	SM 5210 B	09/07/17		EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:37		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:42		RES
Nitrogen, Total Kjeldahl (TKN)	0.65	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	43	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	3.6	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	8	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016204-04 **Collected By:** Client **Sampled:** 09/06/17 13:00 **Received:** 09/06/17 16:44
Sample Desc: PR-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	31	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	0.16	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:39		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:45		RES
Nitrogen, Total Kjeldahl (TKN)	0.72	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	49	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	3.3	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016204-05 **Collected By:** Client **Sampled:** 09/06/17 12:30 **Received:** 09/06/17 16:44
Sample Desc: PR-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:40		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:46		RES
Nitrogen, Total Kjeldahl (TKN)	0.89	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	3.9	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	7	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	09/06/17 17:45		PLW
Total Coliform	2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

Lab ID: 7016204-06 **Collected By:** Client **Sampled:** 09/06/17 12:30 **Received:** 09/06/17 16:44
Sample Desc: PR-3 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	27	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	3	mg/l	2	SM 5210 B	09/07/17	C-21	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:41		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:46		RES
Nitrogen, Total Kjeldahl (TKN)	0.86	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	47	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	3.8	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	8	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016204-07 **Collected By:** Client **Sampled:** 09/06/17 12:30 **Received:** 09/06/17 16:44
Sample Desc: PR-3 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	44	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	0.75	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	5	mg/l	2	SM 5210 B	09/07/17		EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:42		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:47		RES
Nitrogen, Total Kjeldahl (TKN)	1.44	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.06	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	4.7	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	21	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016204-08 **Collected By:** Client **Sampled:** 09/06/17 11:40 **Received:** 09/06/17 16:44
Sample Desc: PR-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	29	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	0.13	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.12	mg/l	0.05	EPA 353.2	09/07/17 16:45	C-21a	RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:50		RES
Nitrogen, Total Kjeldahl (TKN)	0.62	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.03	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	59	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	4.0	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	15	/100ml	2	SM 9222 D	09/06/17 17:45		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

Notes and Definitions

C-05 The sample did not meet the minimum DO depletion of at least 2 mg/L.

C-21 The duplicate RPD was outside of the accceptable criteria of 20% at 40%

C-21a The nitrate matrix spike and matrix spike dup recoveries were outside the acceptable range of 90-110% at 113% and 113%.

G-11 The sample was filtered after it was received at the laboratory.

M.J. Reider Associates, Inc.
107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7016204

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton
Report To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201
Invoice To: Tetra Tech - David Wertz - USACE, Phila Dist. Env.Resources Branch 100 Penn Square E., Arlington, VA 22201

Project Notes: Contact Greg Wacik 610-597-9780

Comments:

Collected By : GREG WACIK
(Full Name)

7016204-01 PR-1 Surface DW DLW RES AH NH

Matrix: Non-Potable Water Date: 9/6/17
Type: Grab Time: 1150

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

7016204-02 PR-2 Surface DW DLW RES AH NH

Matrix: Non-Potable Water Date: 9/6/17
Type: Grab Time: 1300

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	9/6/17 3:15 Date/Time	Received By	9/6/17 1520 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/6/17 1644 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C): 3	
Samples on Ice? Yes No NA	
Approved By:	
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 8/7/2017 12:00:05PM

Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) GREG WACIK

7016204-03 PR-2 Mid-Depth

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 9/6/17
Type: Grab **Time:** 1300

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7016204-04 PR-2 Deep

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water **Date:** 9/6/17
Type: Grab **Time:** 1300

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7016204-05 PR-3 Surface

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water **Date:** 9/6/17
Type: Grab **Time:** 1230

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	9/6/17 3:15 Date/Time	Received By	9/6/17 1520 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/6/17 1644 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C): 3	
Samples on Ice? Yes No NA	
Approved By:	
Entered By:	

Printed: 8/7/2017 12:00:05PM

Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

7016204

Client Code: 3157 **Client:** Tetra Tech

Project Manager: Richard Wheeler **Project:** 6225 - Seasonal Monthly Reservoirs-Prompton

Comments:

Collected By : (Full Name) GREG WACIK

7016204-06 PR-3 Mid-Depth OWS KES AH

BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H
Alk 2320B, PO4-P H, TDS, TKN, NH3-N, TOC, TSS

Matrix: Non-Potable Water Date: 9/6/17
Type: Grab Time: 1230

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7016204-07 PR-3 Deep KES OWS AH

NO2 353.2, NO3 353.2, O-PO4 H, BOD, PO4-D(H)
NH3-N, TOC, TSS, Alk 2320B, PO4-P H, TDS, TKN

Matrix: Non-Potable Water Date: 9/6/17
Type: Grab Time: 1230

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7016204-08 PR-4 Surface OWS DLW KES AH DLW

BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 9/6/17
Type: Grab Time: 1140

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4
C - Pl 500ml NP
D - Pl Liter NP
E - Sterile_Pl 250ml NaThio
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc
H - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	9/6/17 3:15 Date/Time	Received By	9/6/17 1320 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/6/17 1044 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C): 5	
Samples on Ice? (Yes) No NA	
Approved By:	
Entered By:	

The Client, by signing (or having the client's agent sign), agrees to MJRA's Terms and Conditions and to pay for the above requested services including any additional associated fees incurred.

Printed: 8/7/2017 12:00:05PM

Report Template: wko WorkOrder COC ls

MJRA Terms & Conditions

All samples submitted must be accompanied by signed documentation representing a Chain of Custody (COC). The COC Record acts as a contract between the client and MJRA. Signing the COC form gives approval for MJRA to perform the requested analyses and is an agreement to pay for the cost of such analyses**.** COC Records must be completed in black or blue indelible ink (must not run when wet). COC documentation begins at the time of sample collection. Client is required to document all sample details prior to releasing samples to MJRA. All samples must be placed on ice immediately after sampling and shipped or delivered to the laboratory in a manner that will maintain the sample temperature above freezing and below 6C (loose ice is preferred)**.**

Sample Submission, Sample Acceptance & Sampling Containers

Included on the COC must be the sample description, date and time of collection (including start and stop for composites), container size and type, preservative information, sample matrix, indication of whether the sample is a grab or composite, number of containers & a list of the tests to be performed. Poor sample collection technique, inappropriate sampling containers and/or improper sample preservation may lead to sample rejection. Suitable sample containers, labels, and preservatives (as applicable), along with blank COCs are provided at no additional cost.

Turnaround Times (TAT)

Average TAT for test results range from 5 to 15 working days depending on the specific analyses and time of year submitted. Faster turnaround times (*RUSH TAT) may be available depending on the current workload in a particular department and the nature of the analyses requested. We encourage you to verify requests for expedited sample results with one of our Technical Directors prior to sample submittal. Without confirmation from a Technical Director, your results may not be completed by your deadline. *RUSH TAT Surcharges are applied for expedited turnaround times.

Analytical Results, Sample Collection Integrity & Subcontracting

Analytical values are for the sample as submitted and relate only to the item tested. The value indicates a snapshot of the constituent content of the sample at the time of sample collection. Analytical results can be impacted by poor sample collection technique and/or improper preservation. All sample collection completed by MJRA was performed in accordance with applicable regulatory protocols or as specified in customer specific sampling plans. Constituent content will vary over time based on the matrix of the sample and the physical and chemical changes to its environment. All sample results and laboratory reports are strictly confidential. Results will not be available to anyone except the primary client or authorized party representing the client unless MJRA receives additional permissions from the client. When necessary, MJRA will subcontract certain analyses to a third party accredited laboratory. If client prohibits subcontracting, it must be provided in writing and include instruction on how to proceed with client samples that require third party analyses.

Payment Terms

Payment Terms are Net 30 days. Prices are subject to change without notice. A standing monthly charge of 1.5% of the clients over-30-day-unpaid balance may be added to the balance after 30 days and each month thereafter (day 31, 61, 91 etc.). The laboratory accepts all major credit cards, ACH transactions, checks and cash. New clients must pay for all services rendered prior to sample collection and/or in some cases report processing. Clients must contact the MJRA accounting department to pursue a credit-based account. MJRA reserves the right to terminate the client's credit account and to refuse to perform additional services on a credit basis if any balance is outstanding for more than 60 days.

Warranty & Litigation

MJRA does not guarantee any results of its services but has agreed to use its best efforts, in accordance with the standards and practices of the industry, to cause such results to be accurate and complete. We disclaim any other warranties, expressed or implied, including a warranty of fitness for a particular purpose and warranty of merchantability. Clients agree that they shall reimburse MJRA for any and all fees, cost and litigation expenses, including reasonable attorney fees incurred by MJRA in obtaining payment for the services rendered. All costs associated with compliance with any subpoena for documents, testimony, or any other purpose relating to work performed by MJRA, for a client, shall be paid by that client. MJRA's aggregate liability for negligent acts and omissions and of an intentional breach by MJRA will not exceed the fee paid for the services. Client agrees to indemnify and hold MJRA harmless for any and all liabilities in excess of said amount. Neither MJRA nor the client shall be liable to the other for special, incidental consequential or punitive liability or damages included but not limited to those arising from delay, loss of use, loss of profits or revenues. MJRA will not be liable to the client unless the client has notified MJRA of the discovery of the alleged negligent act, error, omissions or breach within 30 days of the

Reviewed and Approved by:

Richard Wheeler
Project Manager