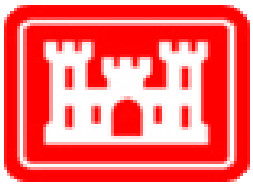
2017 WATER QUALITY MONITORING
BELTZVILLE RESERVOIR
LEHIGHTON, PENNSYLVANIA



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

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2017 Water Quality Monitoring
Beltzville Reservoir
Lehighton, Pennsylvania

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1.0 INTRODUCTION

1.1 PURPOSE OF THE MONITORING PROGRAM

The U.S. Army Corps of Engineers (USACE) manages Beltzville Reservoir located in east-central Pennsylvania within the Delaware River Basin. Beltzville Reservoir provides flood control and a dependable water supply to downstream communities along the Pohopoco Creek and Lehigh River. Additionally, the reservoir provides important habitat for fish, waterfowl, and other wildlife, and recreational opportunities through fishing, boating, and swimming. Due to the broad range of uses and demands that Beltzville 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 water quality monitoring at Beltzville Reservoir from 11 May to 07 September 2017.

1.2 DESCRIPTION OF BELTZVILLE RESERVOIR

Beltzville Reservoir was designed to provide flood control, water supply, and enhanced water quality to downstream communities along the Lehigh River. The damming of Pohopoco Creek approximately three miles upstream of its confluence with the Lehigh River formed the reservoir. The reservoir is located in Carbon County, 3 miles northeast of Lehighton and about 20 miles northwest of Allentown, Pennsylvania. The reservoir dams a drainage area of 96.3 square miles and can impound up to 13 billion gallons of water. The primary water source feeding into the lake is Pohopoco Creek as it flows southwest to the Lehigh River. Secondary water sources include Pine Run and Wild Creek, both entering the reservoir from the north. The reservoir is approximately 7 miles long and, when full, covers an area of 947 acres. The maximum depth of the lake is 140 feet near the face of the dam.

1.3 ELEMENTS OF THE STUDY

The USACE, Philadelphia District, has been monitoring the water quality of Beltzville Reservoir since 1975. Over this time, the yearly monitoring designs have evolved to address new concerns such as the health of public drinking water and contamination of reservoir bottom sediments. The 2017 monitoring program included the following major elements:

- Monthly water quality and bacteria surface water monitoring of reservoir and upstream sources to evaluate compliance with Pennsylvania state water quality standards and to evaluate the health of the reservoir ecosystem starting on 11 May and ending on 07 September 2017; and

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

2.0 METHODS

2.1 STRATIFICATION MONITORING

Physical stratification monitoring of the water column was conducted five times at Beltzville Reservoir between 11 May and 07 September 2017 (Table 2-1). Physical stratification parameters included depth, temperature, dissolved oxygen (DO), pH, turbidity, chlorophyll a, and conductivity. Physical stratification was monitored at seven fixed stations throughout the reservoir watershed (Fig. 2-1). Three stations were located within the reservoir body (BZ-3, BZ-6, and BZ-7) for which water quality was measured from the surface to the bottom in 5-foot increments. Surface water quality was measured at four stations, located in upstream source waters (BZ-2S on Pine Run, BZ-4S on Wild Creek, and BZ-5S on Pohopoco Creek) and BZ-1S downstream of the reservoir on Pohopoco Creek. The physical water quality parameters were measured with a calibrated YSI 6600 V2-4 water quality probe. For this report, all of the stratification monitoring results were summarized and compared to water quality standards enacted by the Pennsylvania Department of Environmental Protection (PADEP), where applicable.

2.2 WATER COLUMN CHEMISTRY MONITORING

Water column chemistry monitoring was conducted five times (once a month) at Beltzville Reservoir between 11 May and 07 September 2017 (Table 2-1). Water samples were collected at the seven fixed stations in the reservoir watershed (Fig. 2-1). Surface water samples were collected in release waters downstream of the reservoir (BZ-1S) and on upstream tributary sources Pine Run (BZ-2S), Wild Creek (BZ-4S), and Pohopoco Creek (BZ-5S). Surface, middle, and bottom water samples were collected at three reservoir stations (BZ-3, BZ-6, and BZ-7). Surface water samples were collected by opening sample containers approximately 1 foot below the water's surface. Middle and bottom water samples were collected with a Van Dorn design horizontal water bottle. MJ Reider Associates in Reading, Pennsylvania conducted the laboratory water sample analysis for 2017.

Water samples from all depths were analyzed for ammonia, nitrite, nitrate, total Kjeldahl nitrogen, total phosphorus, ortho-phosphate, soluble phosphorus, total dissolved solids, total suspended solids, biochemical oxygen demand, alkalinity, and total organic carbon. Table 2-2 summarizes the laboratory method detection limits, laboratory/Corps required reporting limits, state regulatory criteria, and allowable maximum hold times for each water quality parameter monitored**.**

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

Date of Sample Collection	Physical Stratification Monitoring (All Stations)	Water Column Chemistry Monitoring (All Stations)	BTEX Monitoring[2] (BZ-3 and -6)	Trophic State Assessment (BZ-6)	Coliform Bacteria Monitoring (All Surface Stations)	Drinking Water Monitoring[1]
11 May	X	X		X	X	
22 June	X	X		X	X	
20 July	X	X		X	X	
17 August	X	X		X	X	
07 September	X	X		X	X	

(1) Drinking water samples are sampled quarterly by personnel at each reservoir. This data has not been included within the reservoir water quality sampling report.

(2) BTEX sampling was not conducted in 2017 based on historically low and non-detectable levels of these parameters.

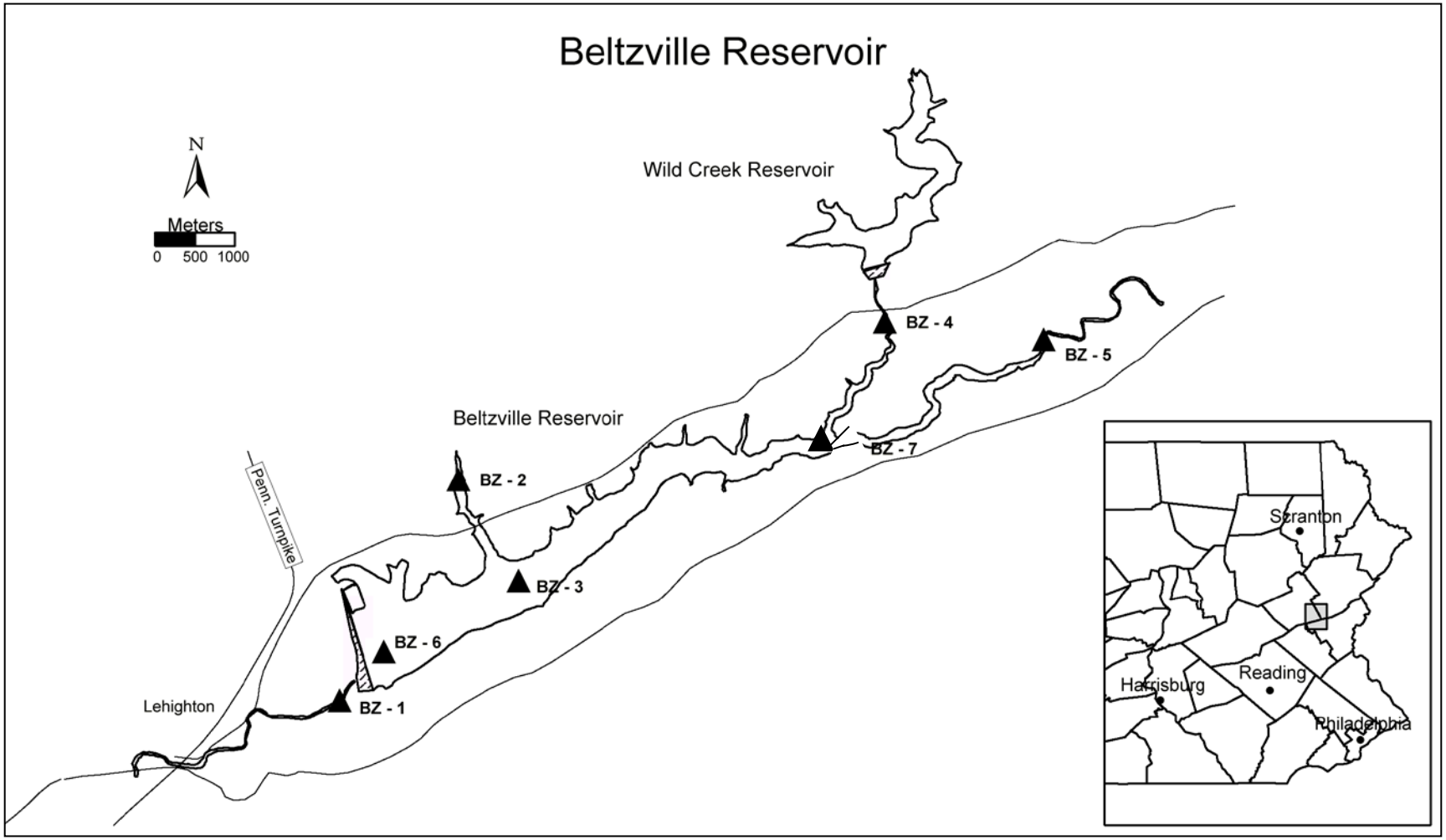

Figure 2-1. Beltzville Reservoir and the location of water quality monitoring stations in 2017.

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

Parameter	(2) Method	Reporting Limit	PADEP Surface Water Quality Criteria	Allowable Hold Times (Days)
Total Alkalinity	SM20 2320B	1.0 mg/L	Min. 20 mg/L $CaCO_3$	14
Biochemical Oxygen Demand (BOD)	SM20 5210B	2.0 mg/L	None	2
Total Phosphorus	SM20 4500-PE	0.01 mg/L	None	28
Diss./Ortho-Phosphate	SM20 4500-PE	0.01 mg/L	None	28
Soluble Phosphorus	SM-20 4500-PE	0.05 mg/L	None	28
Total Organic Carbon (TOC)	SM-20 5310C	1.0 mg/L	None	28
Total Inorganic Carbon (TIC) *	SM-20 5310B	NA	None	28
Total Carbon (TOC + TIC) *	SM-20 5310B	NA	None	28
(1) Chlorophyll *a*	YSI Probe	----	None	In SItu
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	SM20 2540C	5.0 mg/L	Maximum 750 mg/L	7
Total Suspended Solids	SM20 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.
* Total Inorganic Carbon and Total Carbon were not sampled for in 2017

2.3 TROPHIC STATE DETERMINATION

The trophic state of Beltzville Reservoir was determined by methods outlined by Carlson (1977). In general, this method calculated 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 determination of monthly trophic state (Table 2-1). Secchi disk depth was measured monthly at reservoir-body station BZ-6. Trophic state determinations were made using criteria defined by Carlson and EPA (1983) and calculated only for Station BZ-6 within the deepest portion of the reservoir.

2.4 RESERVOIR BACTERIA MONITORING

Monitoring for coliform bacteria contaminants was conducted five times at Beltzville Reservoir between 11 May and 07 September 2017 (Table 2-1). Surface water samples were collected at all seven stations and analyzed for total coliform and fecal coliform each month. The samples were collected in the same manner as the chemistry samples or approximately 1-foot below the surface of the water. Table 2-3 presents the test methods, detection limits, PADEP standards, and sample holding times for the bacteria parameters monitored at Beltzville 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.

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

Parameter	Total Coliform/E-coli	Fecal Coliform
Test method	SM 9223B	SM9222D
Detection limit	1 clns/100-mls	2 clns/100-mls
PADEP standard	None	Geometric mean < 200 clns/100-mls or a single sample reading of < 1000 clns/100-mls
Maximum allowable holding time	30 hours	30 hours
Achieved holding time	< 30 hours	< 30 hours

The PADEP monthly coliform bacteria standard is defined as a maximum geometric mean of 200 colonies/100-ml based on 5 consecutive samples collected on different days. In addition, a single sample standard of 1000 colonies/100-ml can also be used. These standards are most applicable at bathing beaches. Beltzville State Park maintains a bathing beach at Beltzville Reservoir and conducts bacteria sampling of that area. Given our logistical limitations (all monthly sampling conducted on one day) and the fact that water contact recreation is permitted within the reservoir, the coliform data collected by the Corps is compared to the single sample standard as a method of collecting and evaluating background coliform data on the main body of the reservoir. Although our sampling design does not fully meet PADEP guidelines for bathing beach monitoring, we feel that this interpretation of the coliform data meets the intent of the PADEP water quality standard for evaluating Beltzville Reservoir bacteria levels within the main reservoir body.

3.0 RESULTS AND DISCUSSION

3.1 STRATIFICATION MONITORING

The following sections summarize the water quality monitoring results of the physical and chemical parameters: temperature, dissolved oxygen, and pH. Seasonal and spatial patterns of surface water quality measured throughout the reservoir watershed, and seasonal and depth related patterns of the stratified lake water column based on measures from the deepest portion of the reservoir (station BZ-6 or the "Tower") are described. The discussion of stratification is focused on this station as water quality problems related to depth are generally most severe in deeper water habitats. Corps personnel collected the physical and chemical water quality data discussed herein over the monitoring period from May to September 2017. All of the parameters were measured with a calibrated YSI 6600 V2-4 water quality 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.

Temperatures of the tributary and downstream release surface waters generally followed a similar seasonal pattern throughout the watershed of Beltzville Reservoir during 2017 with maximum surface water temperatures seen in July at upstream stations (Fig. 3-1). The maximum upstream tributary station temperature of 24.92 °C was seen at station BZ-4S on 20 20 July. The maximum downstream release (BZ-1S) surface water temperature was 15.88 °C on 22 June. Upstream and downstream waters have a variety of environmental and anthropogenic factors potentially influencing surface water temperature. Station BZ-1S is directly influenced by Beltzville Reservoir releases that come from various locations in the water column and is dictated by reservoir release operations. Downstream release temperatures are managed to meet Pennsylvania State High Quality Cold Water Fishery standards. Station BZ-2S is a small well vegetated cold water tributary. Station BZ-4S is influenced by Wild Creek Reservoir releases upstream of Beltzville Reservoir and maintained the highest average tributary surface water temperatures throughout the sampling season. Station BZ-5S is located in an open water area were Pohopoco Creek enters Beltzville Reservoir. These factors, amongst others, result in the temperature variations in surface water temperatures at each tributary station shown in Figure 3.1.

Beltzville Reservoir was stratified with respect to temperature in 2017 (Fig. 3-2). The reservoir surface waters are warmed by the sun and account for warmer surface water temperatures recorded at lake stations (BZ-3, BZ-7, and BZ-6). In May, the onset of stratification was apparent with lake surface temperatures (13.63°C) approximately 7.23°C warmer than the lower water column (6.40°C). A strong stratification pattern was evident from May into September. In September, cooling surface temperatures and erosion of the epiliminion marked the onset of fall turnover and destratification within the reservoir.

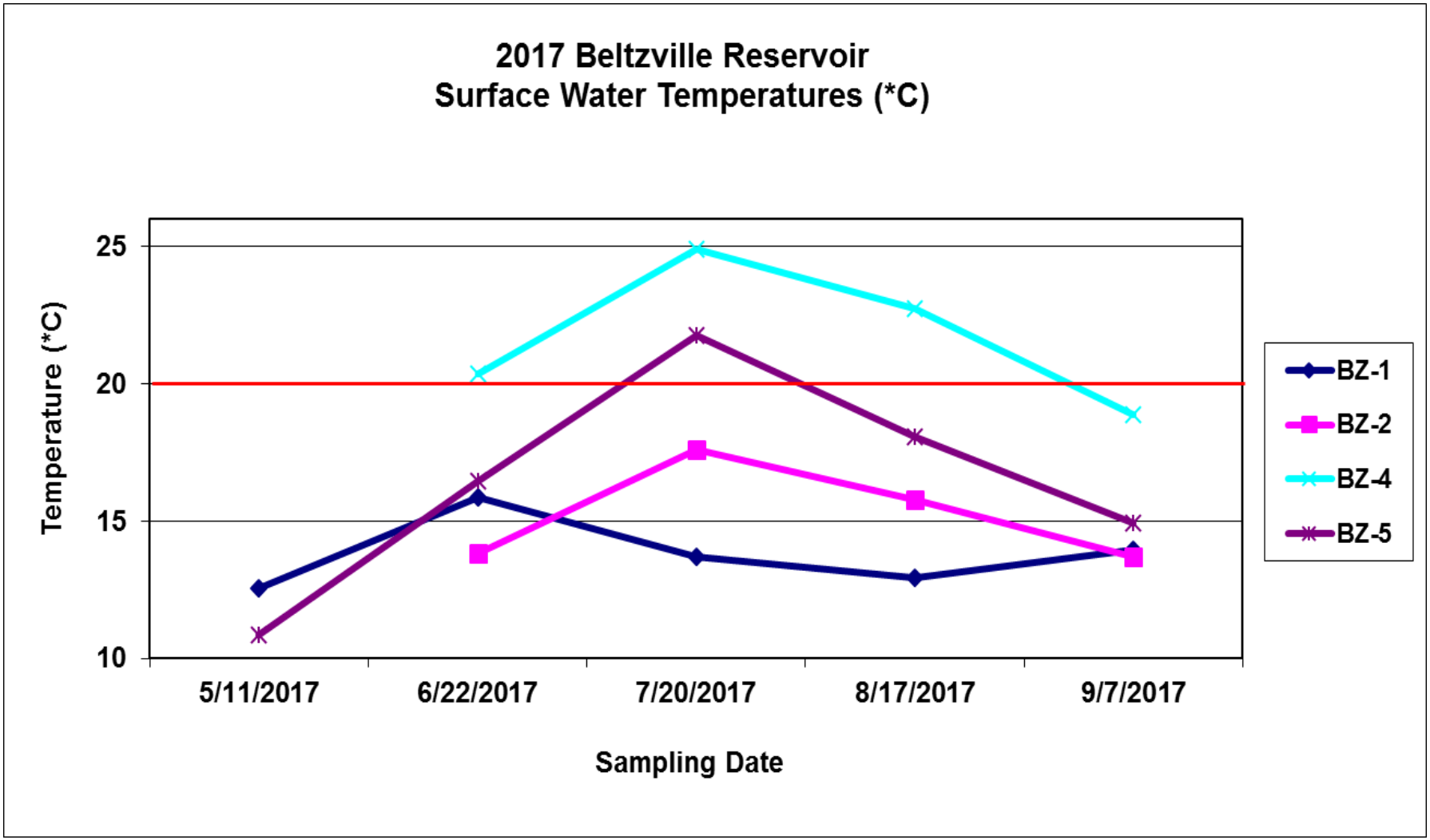

Figure 3-1. Tributary and downstream surface water temperature (°C) measured at Beltzville Reservoir in 2017. See Appendix A for Summary of plotted values. Station BZ-1 reflects releases surface water temperatures downstream of Beltzville Reservoir. The coldwater species preference temperature of 20°C is shown as a red line reference. No data collected at Stations BZ-2 and BZ-4 in May as a result of equipment failure.

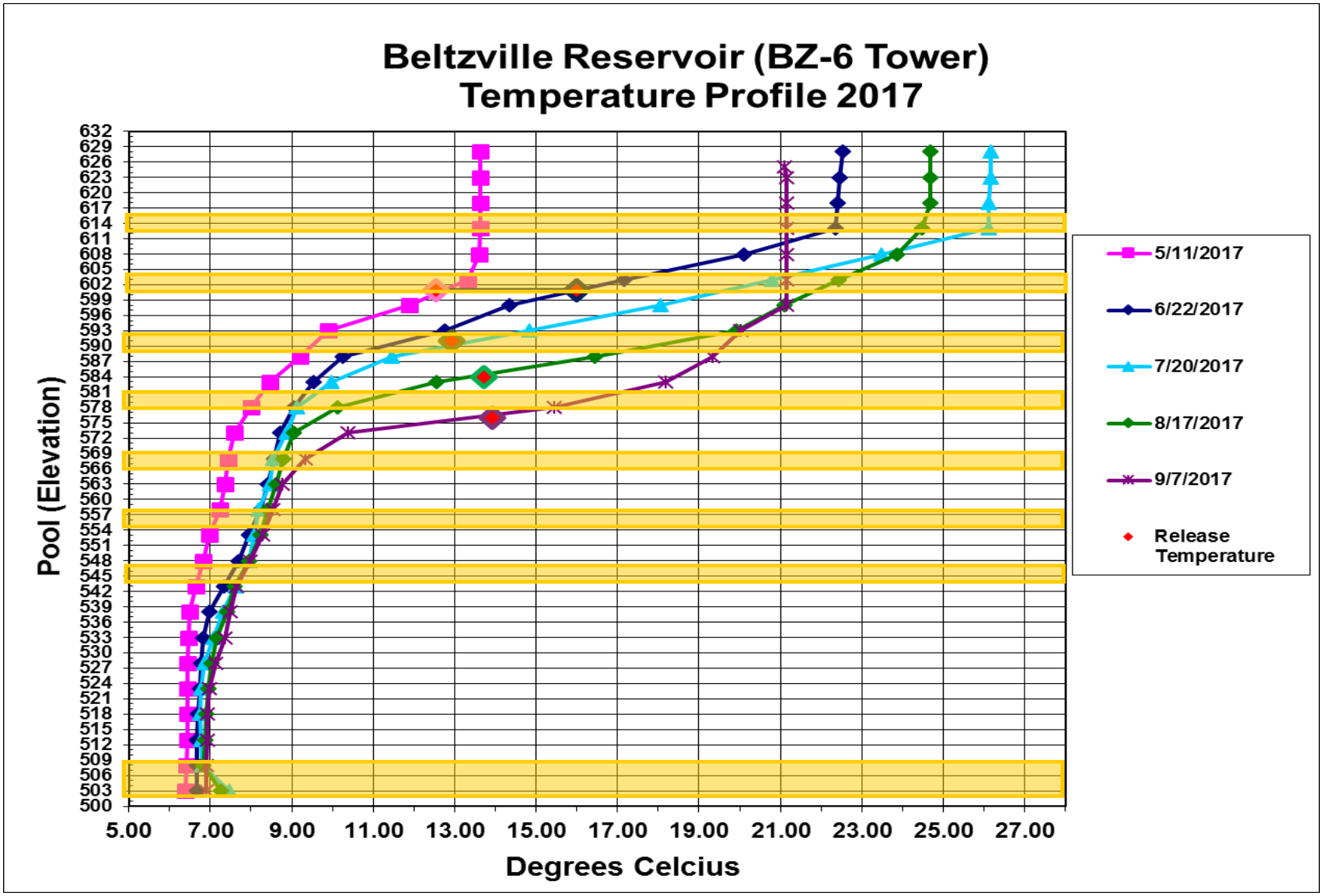

Figure 3-2. Lake temperature profile at station BZ-6 of Beltzville Reservoir in 2017. See Appendix A for summary of plotted values. The yellow bars represent the locations of water control gates in the Beltzville Reservoir control tower. Corresponding downstream release water temperatures at Station BZ-1S on each sampling date is also presented.

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 air and water 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 dissolved oxygen can facilitate the release of nutrients from bottom sediments.

Dissolved oxygen (DO) in the tributary and release surface waters remained primarily within an 8-11 mg/L range of values and followed a similar seasonal pattern throughout the watershed of Beltzville Reservoir during 2017 (Fig. 3-3). Dissolved oxygen concentrations downstream of the reservoir (BZ-1S) averaged 10.31 mg/L for the sampling season. The upstream tributary stations (BZ-2S, -4S, -5S) averaged 9.07 mg/L for the sampling season. The maximum DO reading of 11.05 mg/L occurred at BZ-5S on 11 May and a minimum reading of 7.87 mg/L occurred at BZ-4S on 20 July.

Dissolved Oxygen in the water column at station BZ-6 of Beltzville Reservoir from June through September, exhibited a metalimnetic oxygen minimum (negative heterograde curve) with concentrations decreasing, increasing and decreasing rapidly as measurements were taken from the surface to the lake bottom (Fig. 3-4). This general pattern has been observed at station BZ-6 in previous years and may be due to a lens of low oxygenated water passing through the reservoir from upstream sources, a result of portal operations at the reservoir tower, respiratory oxygen consumption, lake topography or some other factor or combination of factors.

DO concentrations in the water column of Beltzville Reservoir were in compliance with PADEP water quality standards during 2017. The state water quality standard for DO is a minimum concentration of 5-mg/L in the epilimnion of stratified lakes. As shown in Figure 3-4, concentrations falling below the standard were encountered in August and September, but were located below the epilimnion. DO concentrations measured in all surface waters of the reservoir were in compliance with the standard.

The health of aquatic ecosystems is impaired by low DO concentrations in the water column. Hypoxia, or conditions of DO less than 2 mg/L, is generally accepted as the threshold at which the most severe effects on biota occur. Bottom waters that are not mixed during stratification are depleted of oxygen primarily through biological respiration. In 2017, these conditions were seen in the water column at station BZ-6 in July, August, and September (Appendix A).

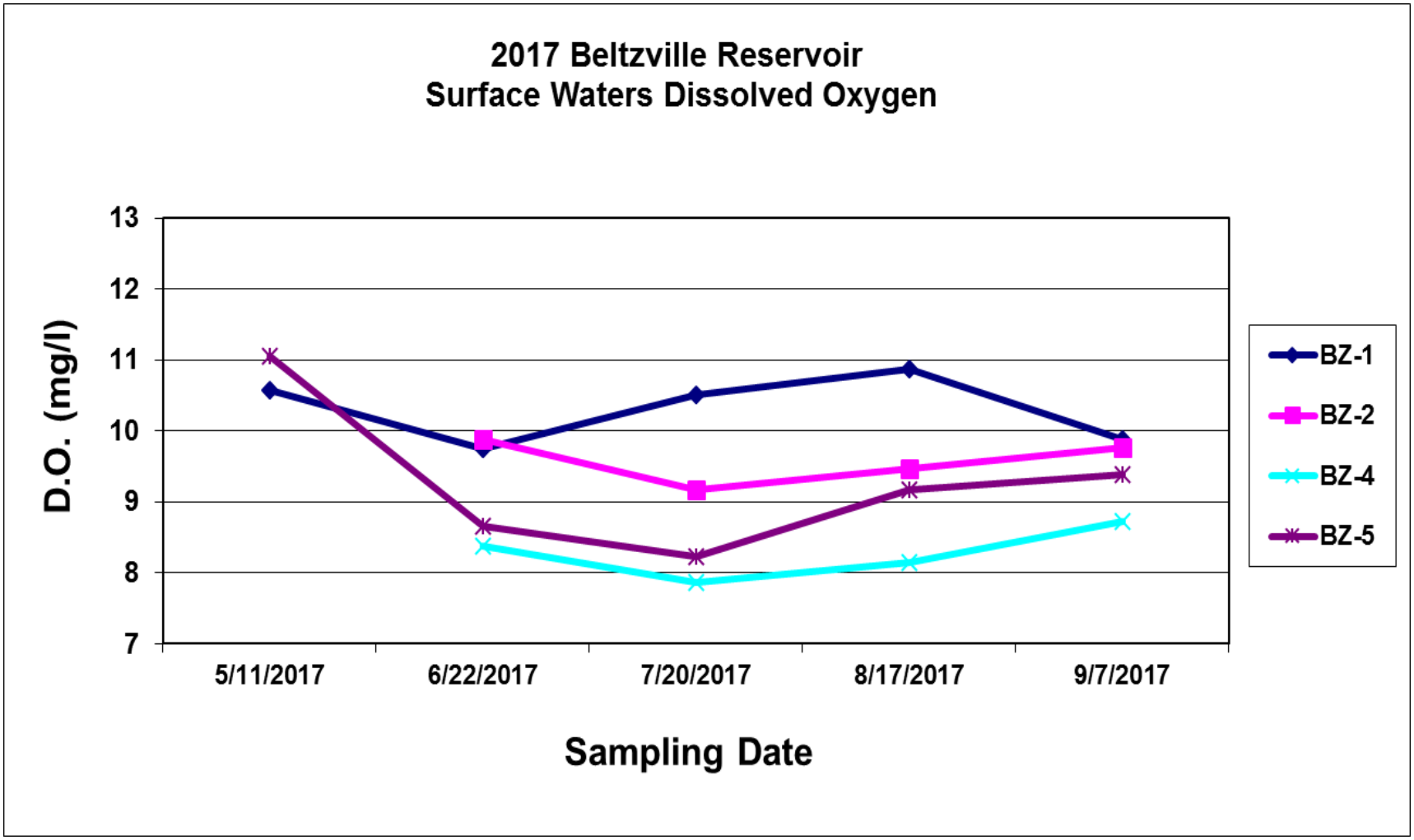

Figure 3-3. Dissolved oxygen concentrations measured in tributary and downstream surface waters at Beltzville Reservoir in 2017. (The PADEP water quality standard for dissolved oxygen is a minimum concentration of 5 mg/L.) See Appendix A for summary of plotted values. Station BZ-1S reflects reservoir release surface waters downstream of Beltzville Reservoir. No data collected at Stations BZ-2 and BZ-4 in May as a result of equipment failure.

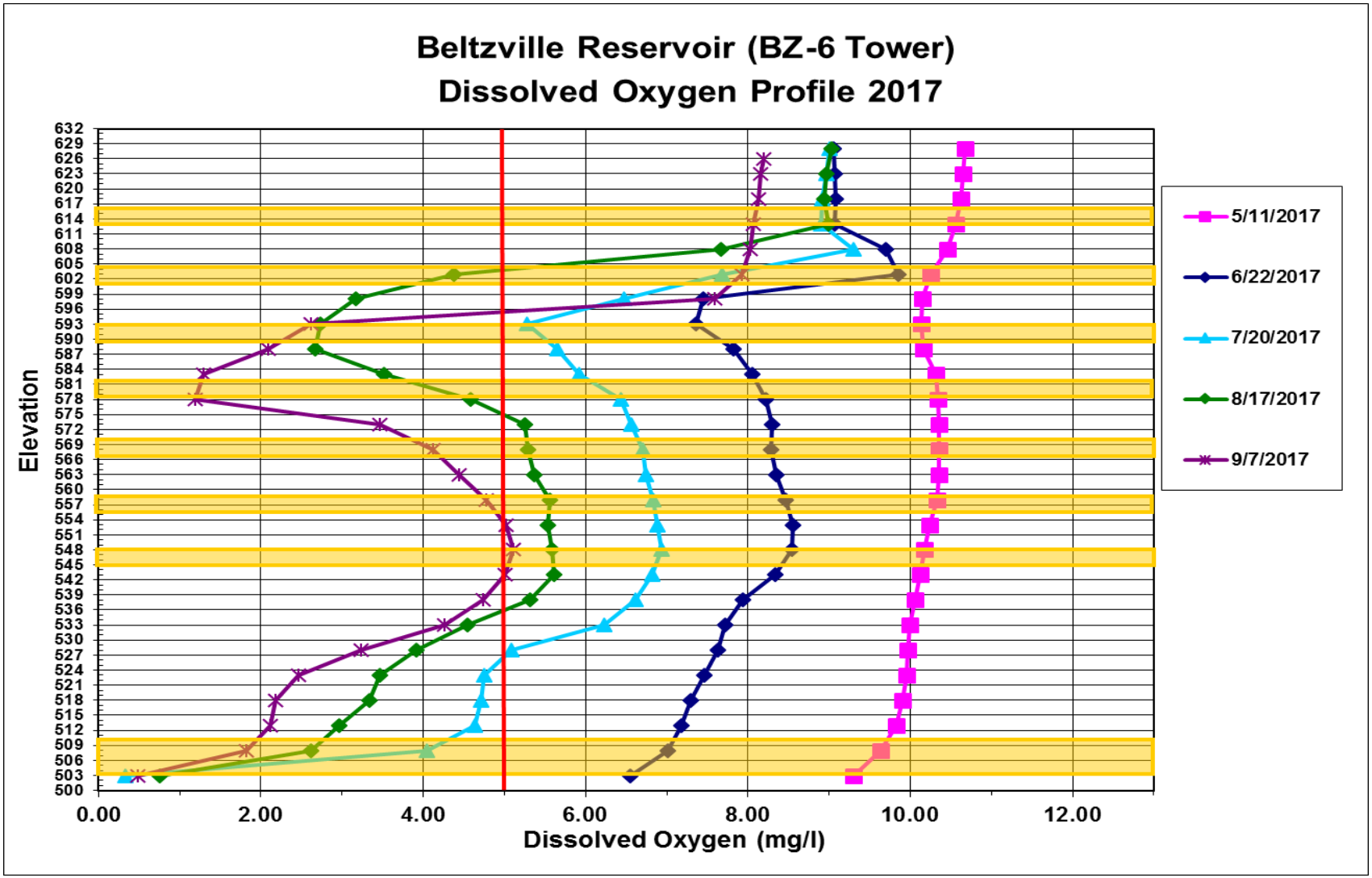

Figure 3-4. Dissolved oxygen profile at station BZ-6 of Beltzville Reservoir in 2017. (The PADEP water quality standard for DO is a minimum concentration of 5 mg/L.) See Appendix A for summary of plotted values.

3.1.3 pH

PH is the measure of the hydrogen –ion concentration in the water. The pH scale is 0-14. A pH below 7 is considered acidic and a pH above 7 is 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 at upstream tributary (BZ-2S, BZ-4S and BZ-5S) and release (BZ-1S) surface water stations primarily stayed within a tight range of values (6.69-7.49) and followed a similar seasonal pattern at Beltzville Reservoir during 2017 (Fig. 3-5).

In all months sampled in 2017, pH values in the lake water column were slightly higher near the water surface, declined rapidly, and remained relatively constant or slightly increasing throughout most of the remaining water column (Fig. 3-6). The higher pH readings near the surface can be attributed to algal productivity in the trophic zone of the lake. A slight increase in pH in bottom waters occurred in the portions of the water column experiencing anoxic or low oxygen conditions. This increase in pH may be attributed to anaerobic oxidation processes in the bottom waters of the lake. The pH measures at all lake and tributary stations at Beltzville Reservoir during 2017 were in compliance with PADEP pH criteria. The standard for pH is a range of acceptable measures between 6 and 9.

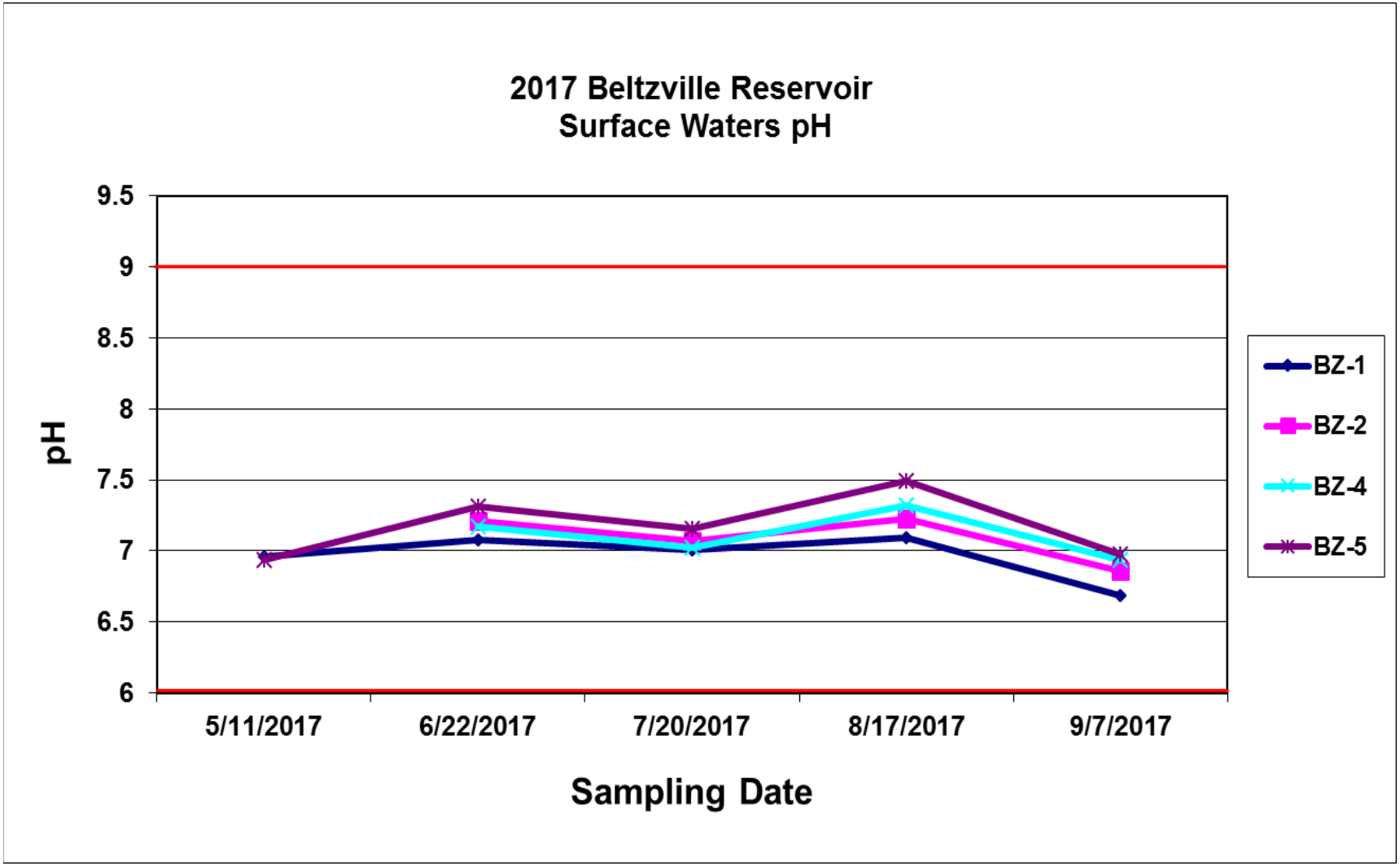

Figure 3-5. pH concentrations measured in tributary and downstream surface waters at Beltzville Reservoir in 2017. (The PADEP water quality standard for pH is between 6 and 9) See Appendix A for summary of plotted values. No data collected at Stations BZ-2 and BZ-4 in May as a result of equipment failure

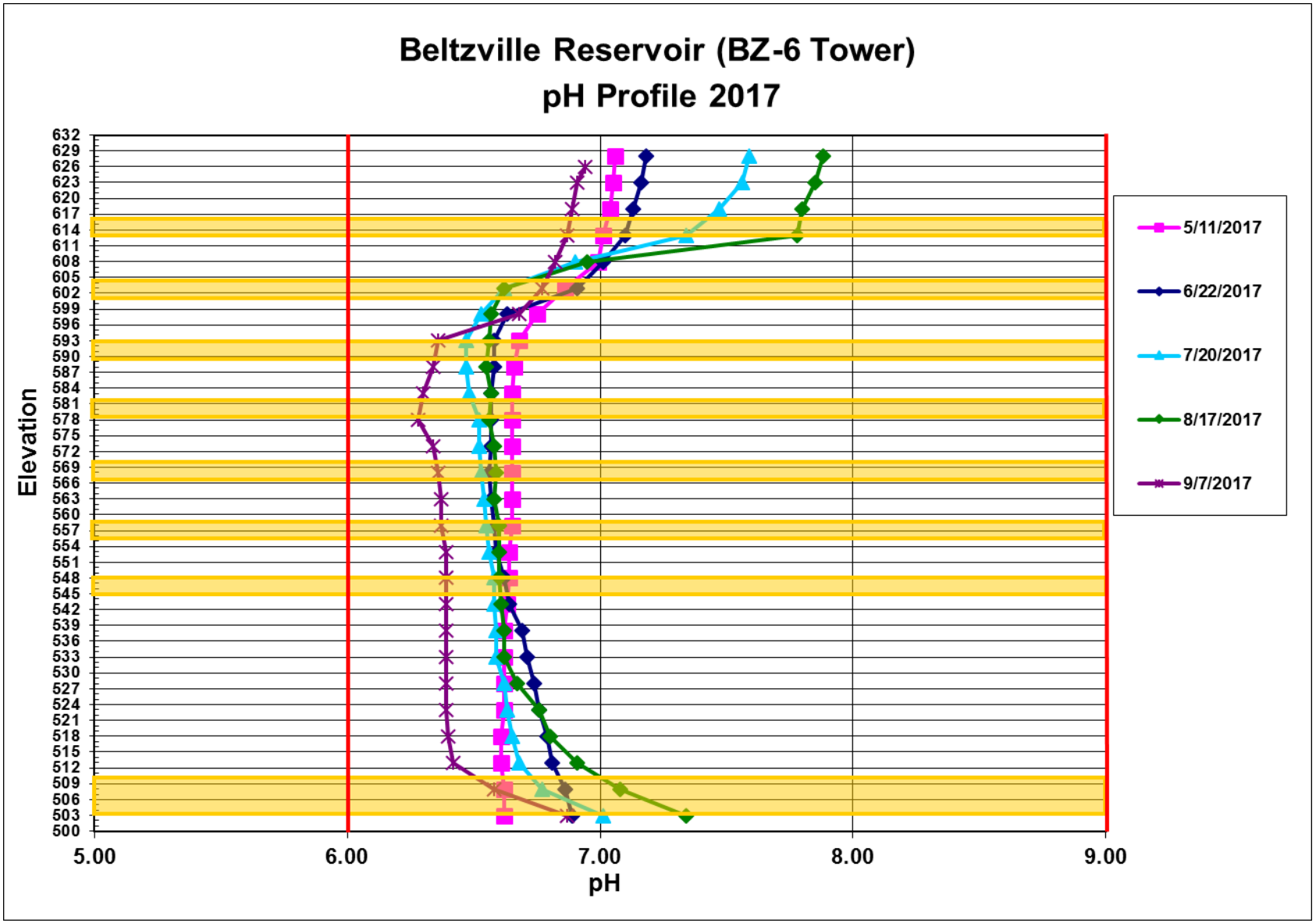

Figure 3-6. pH profile at station BZ-6 of Beltzville Reservoir in 2017. (The PADEP water quality standard for pH is between 6 and 9) See Appendix A for summary of plotted value

3.2 WATER COLUMN CHEMISTRY MONITORING

The following sections describe temporal, spatial, and patterns relating to depth for the water quality parameters measured in surface, middle, and bottom waters of Beltzville 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. Elevated ammonia in the lower water column of deep, stratified lakes and reservoirs usually results in those that are affected by eutrophication. 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 concentrations were low in Beltzville Reservoir during 2017. With the exception of eight samples, concentrations measured at all other stations and depths were less than the laboratory reporting limit of 0.05 mg/L during the entire sampling season. The maximum single recorded sample of 0.12 mg/L was collected from station BZ-1S on 11 May. Concentrations of ammonia measured at Beltzville Reservoir were in compliance with the PADEP water quality standards during 2017. The state water quality standard for ammonia is dependent on temperature and pH (Table 3-1).

Table 3-1. PADEP ammonia nitrogen criteria (Pennsylvania Code, Title 25, Chapter 93, 1996). Specific ammonia criteria dependent on temperature and pH. (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 Beltzville Reservoir in 2017

Station	Date	ALK	BOD5	DISS-P	NH3	NO2	NO3	PO4	TDS	TKN	TOC	TP	TSS
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BZ-1S	5/11/2017	13	<2	<.05	0.12	<.05	0.79	<.01	54	<.25	2	<.01	<3
	6/22/2017	13	<2	<.05	<.05	<.05	0.74	<.01	40	0.27	1.6	<.01	<3
	7/20/2017	13	<2	<.05	0.05	<.05	0.79	<.01	56	0.37	1.5	<.01	<3
	8/17/2017	12	<2	<.05	<.05	<.05	0.8	<.01	51	0.26	1.3	<.01	<3
	9/7/2017	15	<2	<.05	<.05	<.05	0.79	<.01	67	0.29	1.5	<.01	<3
	Mean	13	2	0.05	0.06	0.05	0.78	0.01	54	0.29	1.6	0.01	3
	Stdev	1	0	0.00	0.03	0	0.02	0.00	10	0.05	0.3	0.00	0
	Max	15	2	0.05	0.12	0.05	0.8	0.01	67	0.37	2	0.01	3
	Min	12	2	0.05	0.05	0.05	0.74	0.01	40	0.25	1.3	0.01	3
	No. of Det.	5	0	0	2	0	5	0	5	4	5	0	0
BZ-2S	5/11/2017	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/22/2017	10	<2	<.05	<.05	<.05	0.25	<.01	42	<.25	0.9	<.01	<3
	7/20/2017	10	<2	<.05	<.05	<.05	0.28	<.01	51	0.26	0.7	<.01	<3
	8/17/2017	9	<2	<.05	<.05	<.05	0.34	<.01	46	<.25	0.6	<.01	13
	9/7/2017	13	<2	<.05	<.05	<.05	0.34	<.01	53	0.35	2.2	<.01	<3
	Mean	11	2	0.05	0.05	0.05	0.30	0.01	48	0.28	1.1	0.01	6
	Stdev	2	0	0.00	0	0	0.05	0.00	5	0.05	0.7	0.00	5
	Max	13	2	0.05	0.05	0.05	0.34	0.01	53	0.35	2.2	0.01	13
	Min	9	2	0.05	0.05	0.05	0.25	0.01	42	0.25	0.6	0.01	3
	No. of Det.	4	0	0	0	0	4	0	4	2	4	0	1

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-3S	5/11/2017	13	<2	<.05	<.05	<.05	0.79	<.01	56	<.25	1.8	0.02	<3
	6/22/2017	13	<2	<.05	<.05	<.05	0.66	<.01	45	0.28	1.7	0.01	<3
	7/20/2017	14	<2	<.05	<.05	<.05	0.53	<.01	63	0.4	1.4	0.01	<3
	8/17/2017	14	<2	<.05	<.05	<.05	0.42	<.01	53	0.38	1.6	0.01	<3
	9/7/2017	17	<2	<.05	<.05	<.05	0.45	<.01	57	0.54	1.7	<.01	<3
	Mean	14	2	0.05	0.05	0.05	0.57	0.01	55	0.37	1.6	0.01	3
	Stdev	2	0	0.00	0	0	0.15	0	7	0.11	0.2	0.00	0
	Max	17	2	0.05	0.05	0.05	0.79	0.01	63	0.54	1.8	0.02	3
	Min	13	2	0.05	0.05	0.05	0.42	0.01	45	0.25	1.4	0.01	3
	No. of Det.	5	0	0	0	0	5	0	5	4	5	4	0
BZ-3M	5/11/2017	13	<2	<.05	<.05	<.05	0.79	<.01	74	<.25	1.3	0.01	<3
	6/22/2017	14	<2	<.05	0.06	<.05	0.79	<.01	45	0.33	1.2	<.01	<3
	7/20/2017	14	<2	<.05	0.05	<.05	0.72	<.01	61	0.41	1.2	<.01	<3
	8/17/2017	13	<2	<.05	<.05	<.05	0.76	<.01	48	<.25	1.2	<.01	<3
	9/7/2017	16	<2	<.05	<.05	<.05	0.83	<.01	72	0.36	1.4	<.01	<3
	Mean	14	2	0.05	0.05	0.05	0.78	0.01	60	0.32	1.3	0.01	3
	Stdev	1	0	0.00	0.00	0	0.04	0.00	13	0.07	0.1	0.00	0
	Max	16	2	0.05	0.06	0.05	0.83	0.01	74	0.41	1.4	0.01	3
	Min	13	2	0.05	0.05	0.05	0.72	0.01	45	0.25	1.2	0.01	3
	No. of Det.	5	0	0	2	0	5	0	5	3	5	1	0

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-3B	5/11/2017	13	<2	<.05	<.05	<.05	0.75	<.01	73	0.38	1.4	0.02	14
	6/22/2017	14	<2	<.05	0.09	<.05	0.7	<.01	54	0.31	1.3	0.02	<3
	7/20/2017	13	<2	<.05	<.05	<.05	0.79	<.01	55	0.35	1.2	0.01	21
	8/17/2017	14	<2	<.05	<.05	<.05	0.66	<.01	54	0.45	1.3	0.02	43
	9/7/2017	14	<2	<.05	<.05	<.05	0.62	<.01	66	0.36	1.3	0.01	7
	Mean	14	2	0.05	0.06	0.05	0.70	0.01	60	0.37	1.3	0.02	18
	Stdev	1	0	0.00	0.02	0	0.07	0.00	9	0.05	0.1	0.01	16
	Max	14	2	0.05	0.09	0.05	0.79	0.01	73	0.45	1.4	0.02	43
	Min	13	2	0.05	0.05	0.05	0.62	0.01	54	0.31	1.2	0.01	3
	No. of Det.	5	0	0	1	0	5	0	5	5	5	5	4
BZ-4S	5/11/2017	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/22/2017	9	<2	<.05	<.05	<.05	0.42	<.01	32	0.63	1.3	<.01	6
	7/20/2017	7	<2	<.05	<.05	<.05	0.3	<.01	28	0.39	1.2	<.01	<3
	8/17/2017	7	<2	<.05	<.05	<.05	0.23	<.01	27	0.3	1.3	<.01	<3
	9/7/2017	9	<2	<.05	<.05	<.05	0.56	<.01	42	0.35	0.8	<.01	<3
	Mean	8	2	0.05	0.05	0.05	0.38	0.01	32	0.42	1.2	0.01	4
	Stdev	1	0	0.00	0	0	0.14	0	7	0.15	0.2	0.00	2
	Max	9	2	0.05	0.05	0.05	0.56	0.01	42	0.63	1.3	0.01	6
	Min	7	2	0.05	0.05	0.05	0.23	0.01	27	0.3	0.8	0.01	3
	No. of Det.	4	0	0	0	0	4	0	4	4	4	0	1

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-5S	5/11/2017	14	<2	<.05	<.05	<.05	1.22	<.01	90	0.3	1.5	0.15	3
	6/22/2017	17	<2	<.05	<.05	<.05	1.27	<.01	75	0.4	1.5	0.12	7
	7/20/2017	14	<2	<.05	<.05	<.05	0.65	<.01	72	0.81	1.9	0.13	6
	8/17/2017	15	<2	<.05	<.05	<.05	1.4	<.01	78	0.46	1.5	0.16	<3
	9/7/2017	38	<2	<.05	<.05	<.05	0.97	<.01	77	0.58	5.4	0.1	5
	Mean	20	2	0.05	0.05	0.05	1.10	0.01	78	0.51	2.4	0.13	5
	Stdev	10	0	0.00	0	0	0.30	0.00	7	0.20	1.7	0.02	2
	Max	38	2	0.05	0.05	0.05	1.4	0.01	90	0.81	5.4	0.16	7
	Min	14	2	0.05	0.05	0.05	0.65	0.01	72	0.3	1.5	0.1	3
	No. of Det.	5	0	0	0	0	5	0	5	5	5	5	4
BZ-6S	5/11/2017	12	<2	<.05	<.05	<.05	0.79	<.01	73	0.54	1.8	<.01	<3
	6/22/2017	15	<2	<.05	<.05	<.05	0.66	<.01	57	0.29	1.7	<.01	<3
	7/20/2017	14	<2	<.05	<.05	<.05	0.53	<.01	68	0.39	1.5	<.01	<3
	8/17/2017	15	<2	<.05	<.05	<.05	0.42	<.01	56	0.3	1.6	<.01	<3
	9/7/2017	19	<2	<.05	<.05	<.05	0.44	<.01	63	0.51	1.9	<.01	<3
	Mean	15	2	0.05	0.05	0.05	0.57	0.01	63	0.41	1.7	0.01	3
	Stdev	3	0	0.00	0	0	0.16	0.00	7	0.12	0.2	0.00	0
	Max	19	2	0.05	0.05	0.05	0.79	0.01	73	0.54	1.9	0.01	3
	Min	12	2	0.05	0.05	0.05	0.42	0.01	56	0.29	1.5	0.01	3
	No. of Det.	5	0	0	0	0	5	0	5	5	5	0	0

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-6M	5/11/2017	13	<2	<.05	<.05	<.05	0.78	<.01	80	<.25	1.3	<.01	<3
	6/22/2017	13	<2	<.05	<.05	<.05	0.8	<.01	14	0.25	1.3	<.01	<3
	7/20/2017	12	<2	<.05	<.05	<.05	0.82	<.01	71	0.34	1.2	<.01	<3
	8/17/2017	12	<2	<.05	<.05	<.05	0.81	<.01	50	<.25	1.2	<.01	<3
	9/7/2017	15	<2	<.05	<.05	<.05	0.78	<.01	64	0.37	1.2	<.01	<3
	Mean	13	2	0.05	0.05	0.05	0.80	0.01	55.8	0.29	1.2	0.01	3
	Stdev	1	0	0.00	0	0	0.02	0.00	26	0.06	0.1	0.00	0
	Max	15	2	0.05	0.05	0.05	0.82	0.01	80	0.37	1.3	0.01	3
	Min	12	2	0.05	0.05	0.05	0.78	0.01	14	0.25	1.2	0.01	3
	No. of Det.	5	0	0	0	0	5	0	5	3	5	0	0
BZ-6B	5/11/2017	13	<2	<.05	<.05	<.05	0.74	<.01	77	2.22	2	0.21	246
	6/22/2017	14	<2	<.05	0.1	<.05	0.67	<.01	56	0.69	1.6	0.12	91
	7/20/2017	12	<2	<.05	<.05	<.05	0.73	<.01	67	<.25	1.2	0.18	<3
	8/17/2017	13	<2	<.05	0.1	<.05	0.59	<.01	55	1.66	4.2	0.17	140
	9/7/2017	17	<2	<.05	<.05	<.05	0.56	<.01	66	0.37	1.3	0.13	<3
	Mean	14	2	0.05	0.07	0.05	0.66	0.01	64	1.04	2.1	0.16	97
	Stdev	2	0	0.00	0.03	0	0.08	0.00	9	0.86	1.2	0.04	102
	Max	17	2	0.05	0.1	0.05	0.74	0.01	77	2.22	4.2	0.21	246
	Min	12	2	0.05	0.05	0.05	0.56	0.01	55	0.25	1.2	0.12	3
	No. of Det.	5	0	0	2	0	5	0	5	4	5	5	3

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-7S	5/11/2017	13	<2	<.05	<.05	<.05	0.73	<.01	77	0.27	1.7	0.02	<3
	6/22/2017	14	<2	<.05	<.05	<.05	0.61	<.01	53	0.26	1.7	0.02	<3
	7/20/2017	14	<2	<.05	<.05	<.05	0.47	<.01	63	1.03	1.6	0.02	<3
	8/17/2017	17	<2	<.05	<.05	<.05	0.37	<.01	57	0.36	1.7	0.01	<3
	9/7/2017	17	<2	<.05	<.05	<.05	0.44	<.01	63	0.47	1.7	0.01	<3
	Mean	15	2	0.05	0.05	0.05	0.52	0.01	63	0.48	1.7	0.02	3
	Stdev	2	0	0.00	0	0	0.14	0	9	0.32	0.0	0.01	0
	Max	17	2	0.05	0.05	0.05	0.73	0.01	77	1.03	1.7	0.02	3
	Min	13	2	0.05	0.05	0.05	0.37	0.01	53	0.26	1.6	0.01	3
	No. of Det.	5	0	0	0	0	5	0	5	5	5	5	0
BZ-7M	5/11/2017	12	<2	<.05	<.05	<.05	0.98	<.01	91	<.25	1.5	0.01	<3
	6/22/2017	13	<2	<.05	0.06	<.05	0.84	<.01	61	<.25	1.3	<.01	<3
	7/20/2017	14	<2	<.05	0.1	<.05	0.83	<.01	85	0.35	1.4	<.01	<3
	8/17/2017	17	<2	<.05	<.05	<.05	0.59	<.01	56	0.35	1.5	0.02	<3
	9/7/2017	17	<2	<.05	<.05	<.05	0.47	<.01	64	0.43	1.6	<.01	<3
	Mean	15	2	0.05	0.06	0.05	0.74	0.01	71	0.33	1.5	0.01	3
	Stdev	2	0	0.00	0.02	0	0.21	0.00	16	0.08	0.1	0.00	0.0
	Max	17	2	0.05	0.1	0.05	0.98	0.01	91	0.43	1.6	0.02	3
	Min	12	2	0.05	0.05	0.05	0.47	0.01	56	0.25	1.3	0.01	3
	No. of Det.	5	0	0	2	0	5	0	5	3	5	2	0

Table 3.2 Continued. Summary of surface, middle, and bottom water quality monitoring data for Beltzville 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
BZ-7B	5/11/2017	12	<2	<.05	<.05	<.05	0.79	<.01	70	<.25	1.3	0.01	13
	6/22/2017	14	<2	<.05	0.06	<.05	0.76	<.01	63	<.25	1.3	<.01	<3
	7/20/2017	13	<2	<.05	<.05	<.05	0.76	<.01	84	0.37	1.3	0.01	17
	8/17/2017	15	<2	<.05	<.05	<.05	0.65	<.01	64	0.43	1.6	0.02	42
	9/7/2017	18	<2	<.05	<.05	<.05	0.67	<.01	67	0.49	2.1	0.01	3
	Mean	14	2	0.05	0.05	0.05	0.73	0.01	70	0.36	1.5	0.01	16
	Stdev	2	0	0.00	0.00	0	0.06	0.00	9	0.11	0.3	0.00	16
	Max	18	2	0.05	0.06	0.05	0.79	0.01	84	0.49	2.1	0.02	42
	Min	12	2	0.05	0.05	0.05	0.65	0.01	63	0.25	1.3	0.01	3
	No. of Det.	5	0	0	1	0	5	0	5	3	5	4	4

< Laboratory analysis result was less than the method or reporting limit.
NS- Not Sampled

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. Nitrite concentrations in the waters of Beltzville Reservoir measured at all stations and depths never exceeded the laboratory reporting limit of 0.05 mg/L during the 2017 sampling season.

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. Nitrate was distributed uniformly in the water column of Beltzville Reservoir during 2017 with sample results ranging from 0.23 mg/L to 1.40 mg/L (Table 3-2). The highest recorded single nitrate measure of 1.40 mg/L was measured on 17 August at station BZ-5S. Station BZ-5S maintained the highest seasonal mean concentration (1.10 mg/L) of all stations.

Beltzville 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 across all stations and depths of 1.45 mg/L was measured at station BZ-5S on 17 August.

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 (TKN) was low in the water column of Beltzville Reservoir during 2017 with sample concentrations ranging from less than the 0.25 mg/L laboratory reporting limit to 1.03 mg/L (Table 3-2). The highest concentration of 1.03 mg/L was recorded at station BZ-7S on 20 July.

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 maximum 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. In 2017, 55 of the 65 samples measured for total phosphorus were less than or slightly exceeding the EPA suggested maximum concentration and laboratory reporting limit of 0.01

mg/L (Table 3-2). The remaining 10 elevated samples were collected at stations BZ-6B and BZ-5S. The highest single sample and seasonal mean concentration of 0.21 mg/L and 0.16 mg/L, respectably was measured in the reservoir bottom waters at Station BZ-6B. Elevated TP readings in deep reservoir waters are typically associated with phosphorus release from bottom sediments during low oxygen conditions. Beltzville Reservoir experienced these conditions in 2017. Upstream tributary station BZ-5S (Pohopoco Creek) exceeded the EPA 0.01 mg/L suggested concentration throughout the sampling season. Land use or some other watershed factors contribute to nutrient loading in this tributary.

3.2.5 Dissolved Phosphorus

In 2017, all dissolved phosphorus (Diss. P) concentrations measured at all stations and depths in the water column of Beltzville Reservoir were less than or equal to 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 sample concentration remaining below the laboratory 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. Concentrations of TDS in the water column of Beltzville Reservoir were consistently low during 2017 (Table 3-2). Concentrations among all stations and depths ranged from 14 to 91 mg/L. Total dissolved solids measured at Beltzville Reservoir in 2017 were in compliance with PADEP water quality standards. The state water quality standard for TDS is a maximum concentration of 500 mg/L.

3.2.8 Total Suspended Solids

Total suspended solids (TSS) are 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). Total suspended solids concentrations in the waters of Beltzville Reservoir were low during 2017 (Table 3-2). Many concentrations measured at all stations and depths were less than or near the laboratory reporting limit of 3.0 mg/L. The maximum concentration of 246 mg/L was measured in bottom waters at station BZ-6B on 11 May. High measures of TSS can be the result of sample collection error associated with capturing disturbed fine sediments in the lake bottom sample during field sampling. This

sampling error particularly may apply to any elevated or unexplained high TSS water samples collected at bottom water sampling stations such as BZ-6B, BZ-3B, and BZ-7B.

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 water column of Beltzville Reservoir were consistently low in all months and stations sampled (Table 3-2). All samples were below the laboratory reporting limit of 2.0 mg/L for the entire sampling season. Based on the seasonal sampling results, it is inferred that in 2017 Beltzville Reservoir and its associated tributaries contain very clean water with little biodegradable organic wastes.

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 in the waters of Beltzville Reservoir was relatively low during 2017 (Table 3-2). For all sampling stations and depths, alkalinity measures ranged from 38.0 mg/L to 7.0 mg/L. A maximum concentration of 38.0 mg/L was measured in surface waters at station BZ-5S on 09 September. All other reservoir and tributary samples remained below the state minimum criteria for the sampling season. The natural alkalinity of water is largely dependent on the underlying geology and soils within the surrounding watershed. The typically low alkalinity measured at Beltzville Reservoir results from the regional geology, which is primarily sandstone and shale. Based on this, the reservoir waters and surrounding tributaries are in compliance with the PADEP alkalinity criteria, due to the regional natural conditions.

3.2.11 Total Organic Carbon

Total organic carbon (TOC) is a measurement of the amount of dissolved and particulate carbon that is bound in organic compounds. TOC can be derived from decaying vegetation, bacterial growth, and metabolic activities of living organisms. The bulk of organic carbon in water is composed of humic substances and partly degraded animal and plant materials. Other sources of TOC can include agricultural chemicals such as herbicides and insecticides and also wastewater treatment plant discharges. The amount of carbon in a freshwater stream is an indicator of the organic character of the stream or water body. High organic content can increase the growth of microorganisms which contribute to the depletion of oxygen. Total organic carbon concentrations in the water column and tributaries of Beltzville Reservoir were low during 2017 (Table 3-2). Concentrations of TOC at all stations and depths in 2017 ranged from 5.4 mg/L to 0.6 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. Chlorophyll *a* concentrations in the surface waters (0-15 feet) of Beltzville Reservoir were low during 2017 (Appendix A). Concentrations measured in surface waters at all lake body stations ranged between 0.0 and 8.0 ug/L with an average concentration of 3.34 ug/L.

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 Beltzville Reservoir was based on a single sample each month during the sampling season taken at station BZ-6 (Figure 3-7).

TSIs calculated for measures of total phosphorus (Figure 3-7) classified Beltzville Reservoir as oligotrophic in May (37.35), June (37.35), July (37.35), August (37.35) and September (37.35). TSIs calculated for measures of secchi disk depth (Figure 3-7) classified Beltzville Reservoir as mesotrophic in May (41.95), August (42.58), and September (43.47) and oligotrophic in June (39.99) and July (38.01). TSIs calculated for measures of chlorophyll *a* (Figure 3-7) classified Beltzville Reservoir as oligotrophic in June (25.59), July (33.17), and August (39.97) and mesotrophic in May (48.50) and September (43.95).

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 oligotrophic throughout the 2017 sampling season.

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 TSI's, the trophic condition of Beltzville Reservoir was predominantly oligotrophic in 2017.

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

Water Quality Variable	Oligo-trophic	Meso-trophic	Eutrophic	11 May	22 June	20 July	17 August	07 September
Total phos. (ppb)	<10	10-20	>20	<10	<10	<10	<10	<10
Chlorophyll a (ppb)	<4	4-10	>10	6.2	0.6	1.3	2.6	3.9
Secchi depth (meters)	>4	2-4	<2	3.5	4.0	4.6	3.4	3.2

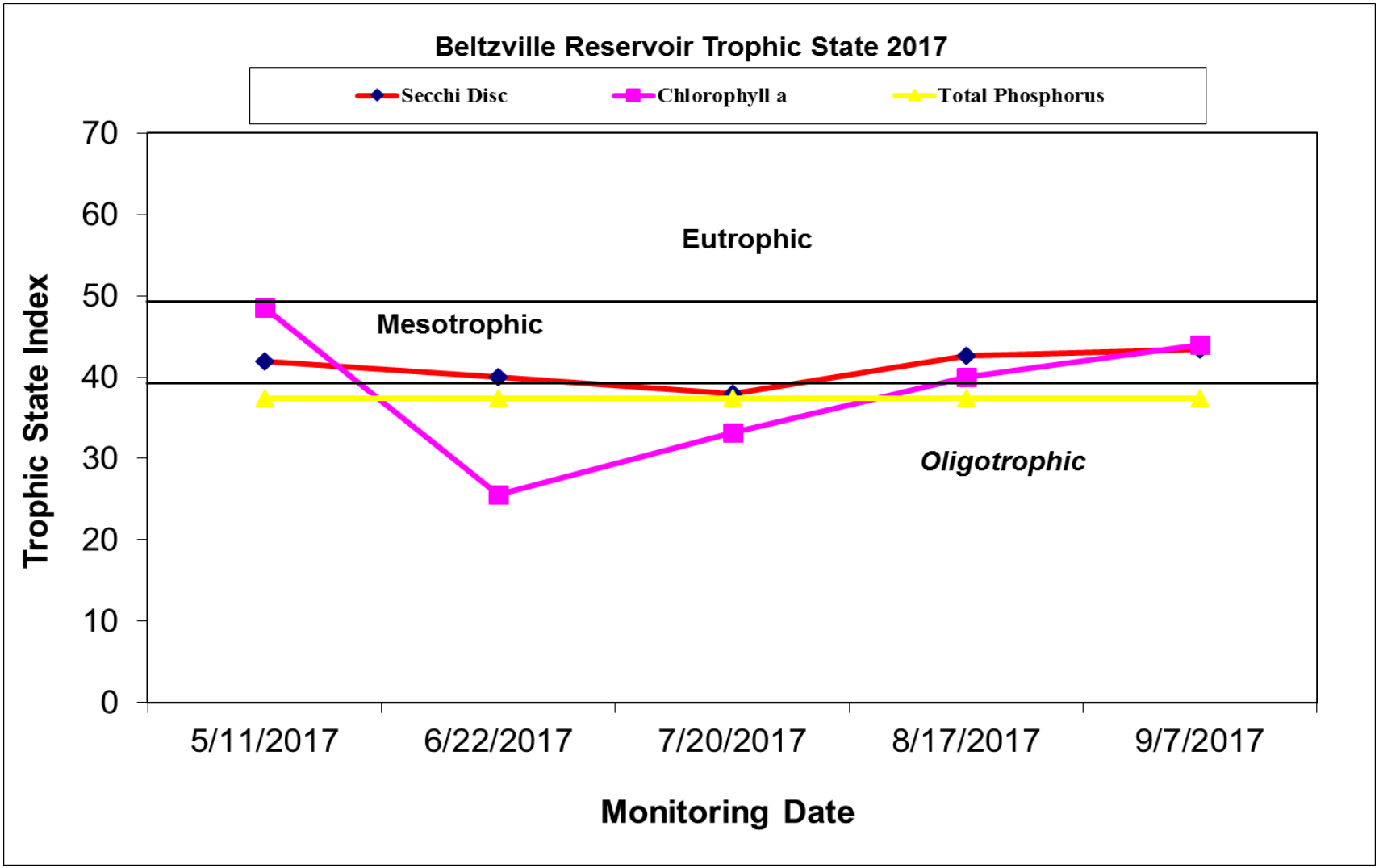

Figure 3-7. Trophic state indices calculated from secchi disk depth and concentrations of total phosphorus and chlorophyll *a* at reservoir Station BZ-6 for Beltzville Reservoir in 2017.

3.4 RESERVOIR BACTERIA MONITORING

Two forms of coliform bacteria contamination were monitored in the tributary and lake surface waters at Beltzville 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 values for all stations ranged from 7 colonies/100-ml to greater than the detection limit of 2400 colonies/100-ml. 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 in Beltzville Reservoir and its tributaries 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 grab samples, single sample results were then compared to the Pennsylvania Department of Health single sample standard of <1000 colonies/100-ml. The fecal coliform samples collected at Beltzville Reservoir did exceed this standard one time in 2017. Fecal coliform values for all tributary and lake stations ranged from less than the detection limit of 2 colonies/100ml to 6000 colonies/100ml at upstream tributary station BZ-4S on 11 June. The cause of this single elevated sample result is unknown but may be a result of upstream watershed activities or land use. Water contact recreation is permitted at Beltzville Reservoir. However, the recreational swimming beach is monitored and managed by the Commonwealth of Pennsylvania. No long term elevated bacteria counts were recorded in the main reservoir body where public water recreation is also permitted.

Table 3-4 Bacteria counts (colonies/100ml) at Beltzville Reservoir and tributaries during 2017. NS = Not Sampled in 2017

STATION	DATE	Total Coliform (TC)		Fecal Coliform (FC)		Escherichia coli	
BZ-1S	5/11/17		360	<	2		NS
	6/22/17		1400		6		NS
	7/20/17		2400		8		NS
	8/17/17		580		5		NS
	9/7/17		1400		10		NS
BZ-2S	5/11/17		NS		NS		NS
	6/22/17		100		58		NS
	7/20/17	>	2400		16		NS
	8/17/17	>	2400		23		NS
	9/7/17	>	2400		76		NS
BZ-3S	5/11/17		8	<	2		NS
	6/22/17		140	<	2		NS
	7/20/17		650	<	2		NS
	8/17/17		230		2		NS
	9/7/17		520	<	2		NS
BZ-4S	5/11/17		NS		NS		NS
	6/22/17		100	>	6000		NS
	7/20/17	>	2400		13		NS
	8/17/17	>	2400		10		NS
	9/7/17	>	2400		8		NS
BZ-5S	5/11/17		1400		41		NS
	6/22/17		100		440		NS
	7/20/17	>	2400		80		NS
	8/17/17	>	2400		110		NS
	9/7/17	>	2400		960		NS
BZ-6S	5/11/17		7	<	2		NS
	6/22/17		240		8		NS
	7/20/17		650	<	2		NS
	8/17/17		140		2		NS
	9/7/17		580	<	2		NS
BZ-7S	5/11/17		15	<	2		NS
	6/22/17		240		5		NS
	7/20/17		2000	<	2		NS
	8/17/17		310	<	2		NS
	9/7/17		980	<	2		NS

- **Highlighted counts exceed single sample State (1000 fecal colonies/100ml) bathing beach criteria.**

4.0 REFERENCES

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APPENDIX A

STRATIFICATION DATA TABLES

2017 Beltzville Reservoir Water Column Profile

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
BZ-1S Outfall Pohopoco	5/11/2017	11:44:02	0.5	12.55	99.3	10.57	6.96	-63.1	165.9	2.5	3.4	0.088
	6/22/2017	7:52:18	0.5	15.88	98.4	9.74	7.08	-69.4	113	2	1.7	0.096
	7/20/2017	10:25:16	0.5	13.72	101	10.51	7.01	-65.5	127.3	1.3	1.2	0.093
	8/17/2017	11:04:33	0.5	12.93	103	10.87	7.09	-69.7	88.8	1.1	2.3	0.092
	9/7/2017	10:37:18	0.5	13.97	95.8	9.88	6.69	-47.7	89.8	1.5	0.1	0.095
BZ-2S Pine Run Trib.	5/11/2017	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/22/2017	7:41:12	0.5	13.83	95.5	9.88	7.21	-76.5	108.1	2.9	0	0.077
	7/20/2017	10:15:09	0.5	17.6	96	9.16	7.07	-68.9	107.7	3.1	-0.4	0.089
	8/17/2017	10:52:07	0.5	15.76	95.5	9.47	7.23	-78	80	2.9	11.7	0.084
	9/7/2017	10:26:32	0.5	13.69	94.2	9.77	6.86	-57.3	76.6	6.4	1	0.081
BZ-3 Bouy/Beach	5/11/2017	8:59:47	0.5	13.36	103	10.71	7.12	-71.6	160.7	2.4	3	0.090
		8:58:49	5	13.37	103	10.71	7.1	-70.4	162.2	2.3	5.3	0.090
		8:58:00	10	13.34	102	10.65	7.08	-69.3	163.5	2.8	6.3	0.090
		8:57:24	15	13.3	101	10.61	7.05	-68	164.9	2.3	6	0.089
		8:56:49	20	13.15	101	10.55	7.01	-65.7	166.6	1.8	5.5	0.089
		8:55:37	25	12.48	95.8	10.21	6.87	-57.7	172.2	2.3	7.7	0.087
		8:54:53	30	11.01	91.1	10.05	6.74	-50.9	177.1	2.2	4.5	0.083
		8:54:15	35	10.14	89.6	10.08	6.73	-50.2	177.9	1.3	4.2	0.082
		8:53:04	40	8.99	88.9	10.28	6.71	-49.2	180.1	1.8	3	0.080
		8:52:24	45	8.42	88	10.32	6.69	-48.5	181.3	0.5	3.1	0.079
		8:52:00	50	8.06	87.1	10.3	6.7	-49.1	181	0.2	3.6	0.078
		8:50:03	55	7.65	86.4	10.32	6.7	-48.9	182.1	0.6	3.4	0.077
		8:49:08	60	7.42	86.1	10.35	6.7	-48.8	182.8	0.5	4.1	0.077
		8:48:33	65	7.33	86.3	10.39	6.7	-48.9	183.1	0.4	3	0.077
		8:48:06	70	7.15	85.6	10.35	6.7	-49.1	183.3	0.3	3.7	0.076
		8:47:06	75	7.05	85.1	10.32	6.71	-49.2	183.7	1.5	3.4	0.076
		8:46:13	80	6.89	85.3	10.38	6.72	-49.9	183.9	0.1	3.1	0.076
		8:45:10	85	6.79	84.3	10.28	6.72	-50.1	184.2	1.1	3	0.076
		8:44:33	90	6.59	83.7	10.26	6.73	-50.7	184.2	0.5	3.3	0.075
		8:43:33	95	6.52	82.3	10.11	6.74	-51.1	184.5	0.7	3.7	0.075
		8:42:45	100	6.48	81.9	10.07	6.75	-51.6	184.5	1.2	3.8	0.075
		8:42:07	105	6.46	82.7	10.17	6.77	-52.6	184	1.2	3.9	0.075

2017 Beltzville Reservoir Water Column Profile

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
		9:31:24	0.5	23.22	105	8.93	7.06	-68.5	103.8	1.8	0.9	0.112
		9:30:46	5.0	23.03	105	8.96	7.04	-67.6	104.6	1.9	1.4	0.111
		9:30:02	10.0	22.86	104	8.97	7.02	-66	105.8	1.5	1.1	0.111
		9:28:56	15.0	21.97	107	9.37	6.93	-61.1	110	1.5	2	0.109
		9:27:57	20.0	19.92	105	9.51	6.82	-55.1	115.6	2.8	10	0.104
BZ-3		9:26:34	25.0	17.19	87.3	8.4	6.63	-44.4	124.8	2.7	5.4	0.100
Bouy/Beach		9:25:42	30.0	14.96	74.3	7.5	6.59	-42.3	126	2.3	5	0.095
		9:24:42	35.0	11.87	67.2	7.27	6.55	-40.6	128.3	0.5	3.5	0.089
	6/22/2017	9:23:47	40.0	10.19	67.2	7.55	6.55	-40.6	129.3	0.8	3.4	0.085
		9:22:41	45.0	9.3	66.7	7.66	6.56	-41.2	129	2.9	3.5	0.083
		9:21:50	50.0	8.98	68.2	7.88	6.57	-41.8	128.7	0.3	2.3	0.082
		9:21:01	55.0	8.75	70.8	8.23	6.59	-42.6	128.3	0.7	2.8	0.081
		9:20:24	60.0	8.48	70.9	8.3	6.59	-42.8	128.3	0.3	2.8	0.081
		9:19:51	65.0	8.34	72.3	8.48	6.61	-44	127.2	0.3	2.6	0.080
		9:18:26	70.0	8.07	73.4	8.67	6.62	-44.7	126.6	0.3	2.7	0.079
		9:17:51	75.0	7.89	73.7	8.75	6.64	-45.4	126	1.7	2.6	0.079
		9:17:06	80.0	7.61	73.4	8.77	6.64	-45.7	125.7	1.1	3.1	0.078
		9:16:28	85.0	7.34	72	8.66	6.65	-46	125.3	0.8	2.4	0.078
		9:15:54	90.0	7.16	69.8	8.44	6.65	-46	125.1	0.2	2.1	0.077
		9:15:28	95.0	6.96	67.6	8.21	6.65	-46	125.1	0.3	2.7	0.077
		9:14:42	100.0	6.8	64	7.8	6.64	-45.7	125.3	0.8	3.4	0.077
		9:13:57	105.0	6.76	62.3	7.61	6.65	-46.2	124.4	2.6	2.7	0.078
		8:31:17	0.5	26.66	111	8.89	7.54	-95.9	69.4	1.3	1.9	0.067
		8:30:42	5	26.69	111	8.86	7.52	-94.9	69.7	1.6	2.3	0.121
		8:29:49	10	26.63	111	8.92	7.42	-89.4	73	1.8	2.0	0.120
		8:29:10	15	25.37	114	9.35	7.33	-83.7	77.1	1.3	2.7	0.117
		8:28:33	20	23.7	114	9.61	7.03	-66.8	91.4	1.6	5.6	0.114
		8:27:37	25	21.14	93.8	8.34	6.66	-46	110.6	1.3	6.3	0.111
BZ-3		8:26:00	30	18.28	66.9	6.3	6.54	-39.5	116.4	1.0	3.8	0.104
Bouy/Beach	7/20/2017	8:24:47	35	14.25	52.3	5.36	6.5	-37.4	119.4	1.0	3.0	0.094
		8:23:56	40	11.11	51.7	5.68	6.53	-39.3	118.4	0.4	3.1	0.087
		8:23:10	45	9.68	51.9	5.9	6.58	-42.3	115.9	0.2	2.6	0.084
		8:22:08	50	9.25	53.7	6.16	6.63	-44.9	113.2	0.3	2.9	0.083
		8:21:05	55	9.01	56.3	6.51	6.67	-47.4	110.3	0.4	2.4	0.082
		8:20:22	60	8.75	58.8	6.84	6.71	-49.3	108.1	1.0	3.0	0.081
		8:19:39	65	8.53	59.8	6.99	6.74	-50.9	106	0.2	2.7	0.081
		8:18:54	70	8.38	60.7	7.12	6.77	-52.4	103.9	0.2	2.7	0.080
		8:18:11	75	8.12	59.4	7.01	6.79	-53.5	102.1	0.6	3.0	0.080
		8:17:29	80	7.87	58.8	6.98	6.82	-55.3	99.5	0.0	3.4	0.079
		8:16:10	85	7.81	57.2	6.8	6.87	-58.2	94.9	**11.4**	**78.2**	0.079

2017 Beltzville Reservoir Water Column Profile

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
BZ-3 Bouy/Beach												
		8:56:17	0.5	24.59	110	9.13	8.01	-122.6	41.1	1.3	1.0	0.115
		8:55:38	5	24.6	110	9.12	7.97	-120.6	42.3	2.6	1.8	0.115
		8:54:09	10	24.58	109	9.06	7.82	-111.8	48.1	2.5	3.5	0.115
		8:53:30	15	24.3	108	9.04	7.71	-105.5	52.8	1.7	3.1	0.114
		8:51:53	20	23.61	86.7	7.35	6.8	-53.7	97.1	1.7	2.6	0.114
		8:50:02	25	22.81	63.3	5.45	6.6	-42.3	109	1.6	2.1	0.112
		8:48:07	30	21.24	46.2	4.1	6.51	-37.2	115.7	1.8	2.3	0.111
		8:46:44	35	19.76	34.9	3.19	6.48	-35.8	118.6	0.9	2.5	0.112
		8:45:29	40	17.34	27.6	2.65	6.49	-36.4	119.7	1.4	2.3	0.103
	8/17/2017	8:44:09	45	12.35	30.9	3.3	6.55	-40.2	119.4	1.5	2.5	0.09
		8:41:41	50	9.83	39.8	4.5	6.67	-46.9	115.6	0.8	2.8	0.085
		8:40:55	55	9.14	41.4	4.77	6.69	-48.3	114.9	1.3	2.2	0.083
		8:40:05	60	8.89	44.2	5.12	6.73	-50.3	112.8	1.0	1.9	0.082
		8:38:55	65	8.67	47.2	5.5	6.78	-53	110.7	0.7	2.1	0.081
		8:37:24	70	8.44	50.5	5.91	6.83	-55.8	107.6	0.8	2.3	0.081
		8:36:32	75	8.23	50.6	5.95	6.86	-57.4	105.9	0.6	2.5	0.08
		8:35:45	80	8	49.4	5.85	6.88	-58.4	104.9	1.7	2.9	0.08
		8:34:58	85	7.72	49.9	5.95	6.91	-60.2	102.7	0.6	2.1	0.079
		8:34:18	90	7.41	49.1	5.9	6.94	-61.9	100.5	0.8	2.6	0.078
		8:33:23	95	7.18	45.2	5.47	6.98	-63.7	98	1.2	2.4	0.078
		8:32:15	100	7.03	38.1	4.62	7.02	-66	94.4	2.1	1.9	0.079
		8:31:35	103	7.02	37.6	4.56	7.06	-68.5	90.1	2.1	2.2	0.079
BZ-3 Bouy/Beach		8:50:17	0.5	21.18	91.8	8.15	6.88	-58.4	75.5	2.0	3.3	0.106
		8:49:21	5	21.2	91.1	8.09	6.88	-58.3	75.9	2.0	5.2	0.106
		8:48:19	10	21.2	91.3	8.1	6.86	-57.2	77.4	1.7	4.9	0.106
		8:47:15	15	21.2	90.8	8.06	6.83	-55.7	79.4	1.5	4.3	0.106
		8:46:17	20	21.19	90.5	8.03	6.8	-54	81.5	1.9	4.9	0.106
		8:45:04	25	21.19	89.2	7.92	6.74	-50.6	85.7	1.8	4.0	0.106
		8:44:16	30	21.16	87.9	7.81	6.7	-48	88.7	1.6	5.0	0.106
		8:42:55	35	20.33	69.1	6.24	6.51	-37.5	99	1.7	1.6	0.106
	9/7/2017	8:41:04	40	19.13	41.1	3.8	6.34	-28.3	107.7	1.6	1.6	0.11
		8:40:12	45	17.66	30.8	2.93	6.31	-26.8	110.7	2.3	2.1	0.107
		8:38:17	50	14.56	14.5	1.48	6.28	-25.1	113.9	1.2	2.1	0.097
		8:36:59	55	11.14	23.3	2.56	6.32	-28.2	114	1.1	2.4	0.088
		8:35:24	60	9.42	28.6	3.27	6.36	-30.5	113.7	0.6	2.5	0.084
		8:33:26	65	8.77	39.9	4.64	6.42	-33.6	111.3	-0.4	2.2	0.082
		8:32:28	70	8.45	42.4	4.96	6.43	-34.4	111.2	0.9	2.5	0.081
		8:31:02	75	8.25	42.9	5.05	6.45	-35.3	110.6	0.6	2.2	0.08
		8:30:14	80	8.03	43.1	5.09	6.46	-35.9	110.4	1.9	1.9	0.08
		8:29:12	85	7.7	44.4	5.3	6.48	-36.8	109.4	0.3	2.3	0.079
		8:28:09	90	7.4	42.8	5.14	6.48	-37.2	109	1.5	2.6	0.079
		8:26:06	95	7.29	38.8	4.68	6.5	-38.3	106.8	1.5	3.1	0.078
		8:24:01	100	7.14	30.9	3.74	6.53	-39.5	104.4	3.5	2.3	0.078

2017 Beltzville Reservoir Water Column Profile

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
BZ-4S	5/11/2017	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Wild Creek	6/22/2017	7:28:11	0.5	20.36	92.8	8.38	7.17	-74.5	110.4	0.8	-0.1	0.046
Upstream	7/20/2017	10:03:06	0.5	24.92	95.1	7.87	7.02	-66.4	103.6	1.5	-1.1	0.049
	8/17/2017	10:39:48	0.5	22.75	94.5	8.14	7.32	-83.2	66.3	0.8	-0.8	0.048
	9/7/2017	10:14:57	0.5	18.88	93.9	8.73	6.94	-61.6	54.4	1.2	0.3	0.048
BZ-5S	5/11/2017	11:23:18	0.5	10.87	100	11.05	6.94	-61.9	154.1	3.1	1.7	0.098
Pohopoco	6/22/2017	7:16:38	0.5	16.45	88.6	8.65	7.31	-82	120.5	16	0	0.115
Upstream	7/20/2017	9:51:26	0.5	21.75	93.6	8.22	7.16	-73.8	84.7	6.9	1.4	0.135
	8/17/2017	10:29:13	0.5	18.07	96.9	9.16	7.49	-92.1	56	6.6	1.7	0.125
	9/7/2017	10:04:28	0.5	14.93	93	9.39	6.98	-64.1	49.8	15.6	2.6	0.107
		8:21:26	0.5	13.63	103	10.67	7.06	-68.3	137.3	2.3	5.5	0.09
		8:20:57	5	13.64	103	10.65	7.05	-67.6	137.7	1.7	6.2	0.09
		8:20:16	10	13.64	102	10.62	7.04	-67.1	137.9	2.3	7.1	0.09
		8:19:43	15	13.63	102	10.56	7.01	-65.8	138.8	1.7	6.1	0.09
		8:19:09	20	13.61	101	10.46	6.99	-64.3	139.7	2	6.6	0.09
		8:18:35	25	13.31	97.9	10.25	6.86	-57.6	145	2.7	6.6	0.089
		8:18:13	30	11.88	93.9	10.15	6.75	-51.2	149.5	1.9	6	0.086
BZ-6		8:17:46	35	9.9	89.6	10.13	6.68	-47.5	152.2	1.3	3.7	0.082
In-Lake		8:17:13	40	9.2	88.3	10.16	6.66	-46.8	152.9	1.6	3.2	0.081
Tower		8:16:27	45	8.45	88	10.31	6.65	-46.2	153.6	0.4	3.3	0.079
	5/11/2017	8:15:58	50	8	87.3	10.34	6.65	-46.4	153.6	0.3	2.8	0.078
Secchi		8:15:30	55	7.6	86.5	10.35	6.65	-46	154	0.4	3.2	0.077
3.5 M		8:15:05	60	7.45	86.3	10.36	6.65	-46.2	153.9	0.5	3	0.077
		8:14:35	65	7.35	86	10.35	6.65	-46.1	154	0.5	3.1	0.077
		8:14:09	70	7.23	85.6	10.33	6.65	-46	154	0.3	3.1	0.076
		8:13:31	75	6.99	84.4	10.24	6.64	-45.6	154.4	0.3	3.3	0.076
		8:13:06	80	6.82	83.5	10.18	6.64	-45.5	154.4	0.4	3	0.076
		8:12:34	85	6.64	82.6	10.12	6.63	-45.2	154.7	0.7	3.1	0.075
		8:12:08	90	6.5	81.9	10.06	6.62	-44.8	154.9	0.5	3.5	0.075
		8:11:35	95	6.46	81.3	9.99	6.62	-44.6	154.9	1	4.2	0.075
		8:10:54	100	6.44	81	9.97	6.62	-44.5	154.8	1	3.1	0.075
		8:10:23	105	6.44	80.9	9.96	6.62	-44.4	154.7	0.2	3.7	0.075
		8:09:56	110	6.44	80.5	9.9	6.61	-44.4	154.5	0.7	3.9	0.075
		8:09:17	115	6.43	79.8	9.83	6.61	-44.2	154.3	0.3	3.4	0.075
		8:08:18	120	6.42	78.3	9.64	6.62	-44.7	152.8	1	3.7	0.075
		8:07:23	125	6.4	75.5	9.3	6.62	-44.5	153	**531.1**	**20.6**	0.075

2017 Beltzville Reservoir Water Column Profile

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
		8:56:48	0.5	22.54	105	9.06	7.18	-75.2	91.5	1.9	0.1	0.11
		8:55:39	5	22.45	105	9.07	7.16	-73.9	92.6	1.2	0.4	0.11
		8:54:53	10	22.39	105	9.08	7.13	-72.4	93.8	1.7	1.1	0.11
		8:54:13	15	22.35	105	9.07	7.1	-70.7	95.1	1.8	0.8	0.11
		8:53:06	20	20.1	107	9.7	7.01	-65.7	100.4	1	4.9	0.104
		8:52:00	25	17.15	102	9.85	6.91	-60	105.4	2.6	7.1	0.098
		8:49:56	30	14.35	72.8	7.45	6.63	-44.8	116.1	1.4	4.9	0.094
		8:48:35	35	12.75	69.5	7.36	6.58	-41.9	118.9	1.1	4.4	0.09
BZ-6		8:47:54	40	10.26	69.8	7.82	6.58	-42	119.7	0.3	4.1	0.085
In-Lake		8:46:15	45	9.53	70.5	8.05	6.57	-41.8	120.1	1.5	3.2	0.083
Tower	6/22/2017	8:45:25	50	9.06	71.3	8.22	6.57	-41.5	120.5	0.9	3.2	0.082
		8:44:46	55	8.71	71.3	8.3	6.57	-41.6	120.5	0.9	3	0.081
		8:44:05	60	8.56	70.9	8.28	6.56	-41.3	120.6	0.2	3.6	0.081
Secchi		8:43:34	65	8.42	71.3	8.35	6.57	-41.9	120.1	0.4	2.9	0.08
4.01 M		8:42:39	70	8.23	71.9	8.47	6.58	-42.4	119.4	0.6	3.4	0.08
		8:41:52	75	7.96	72.3	8.56	6.59	-43.1	118.7	0.3	2.7	0.079
		8:40:51	80	7.7	71.6	8.54	6.62	-44.4	117	1	3.1	0.079
		8:39:58	85	7.34	69.3	8.34	6.64	-45.7	115.3	0.1	3.7	0.078
		8:38:54	90	6.98	65.4	7.94	6.69	-48.3	112.2	1.6	2.8	0.077
		8:38:14	95	6.83	63.3	7.72	6.71	-49.5	110.7	0.9	2.7	0.077
		8:37:14	100	6.77	62.5	7.63	6.74	-50.9	108.5	0.6	2.9	0.077
		8:36:19	105	6.75	61.1	7.46	6.76	-52.3	106.4	1.5	2.9	0.077
		8:35:09	110	6.7	59.7	7.3	6.79	-53.7	103.6	0.8	2.7	0.077
		8:34:24	115	6.68	58.7	7.18	6.81	-54.9	101.3	1.5	2.3	0.077
		8:33:11	120	6.67	57.3	7.01	6.86	-57.5	96.1	1.6	2.6	0.078
		8:31:49	125	6.66	53.5	6.55	6.89	-59.3	98.1	**55.5**	**33.1**	0.078
		8:07:44	0.5	26.15	111	9	7.59	-99	55.2	1.1	1.3	0.119
		8:07:24	5.0	26.16	111	8.97	7.56	-97.2	55.8	1.2	0.9	0.119
		8:06:54	10	26.12	110	8.92	7.47	-92	58.5	1.5	1.4	0.119
		8:06:23	15	26.11	110	8.9	7.34	-84.8	62.3	1.9	1.5	0.118
		8:05:21	20	23.47	109	9.3	6.9	-59.2	86.8	1.7	4.2	0.114
		8:04:07	25	20.8	85.8	7.68	6.62	-43.7	100.6	3.0	6.3	0.110
		8:02:58	30	18.06	68.5	6.47	6.53	-38.9	104.7	1.5	1.5	0.102
BZ-6		8:00:51	35	14.82	52.1	5.28	6.47	-35.7	107.5	1.4	1.8	0.095
In-Lake		7:59:33	40	11.45	51.7	5.65	6.47	-36	107.9	1.2	2.5	0.087
Tower	7/20/2017	7:58:43	45	9.98	52.4	5.92	6.48	-37	106.9	1.1	2.3	0.084
		7:56:57	50	9.12	55.9	6.44	6.52	-38.8	104.2	0.5	2.6	0.082
		7:56:10	55	8.86	56.5	6.56	6.52	-39.2	103	1.2	1.7	0.082
Secchi		7:55:02	60	8.55	57.4	6.71	6.53	-39.6	101.7	0.7	2.3	0.081
4.6 M		7:54:28	65	8.46	57.6	6.74	6.54	-40.2	100.4	0.7	1.8	0.081
		7:53:35	70	8.18	57.9	6.83	6.55	-40.7	98.9	0.6	2.3	0.080
		7:52:45	75	8.09	58.2	6.88	6.56	-41.5	96.8	3.0	2.4	0.080
		7:51:54	80	7.95	58.4	6.93	6.58	-42.1	94.9	0.3	1.8	0.079
		7:51:01	85	7.63	57.1	6.82	6.58	-42.5	93.3	0.0	1.9	0.079
		7:50:03	90	7.3	54.9	6.61	6.59	-42.8	91.2	0.3	2.2	0.078
		7:48:46	95	7.09	51.4	6.23	6.59	-43.3	88	0.3	2.2	0.078
		7:46:08	100	6.85	41.7	5.08	6.62	-44.8	80.3	0.8	2.2	0.078
		7:45:05	105	6.77	38.9	4.75	6.63	-45.2	77.2	1.6	2.5	0.078
		7:44:28	110	6.76	38.6	4.71	6.65	-46.2	74.2	8.3	2.6	0.078
		7:43:46	115	6.78	38	4.64	6.68	-47.8	69.7	4.4	2.5	0.078
		7:41:24	120	6.79	33.1	4.04	6.77	-52.9	50.8	4.7	2.4	0.079
		7:38:04	125	7.46	2.8	0.33	7.01	-65.8	-34.9	**27.3**	**17.5**	0.080

2017 Beltzville Reservoir Water Column Profile

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
		8:24:35	0.5	24.69	109	9.03	7.88	-115.5	36	1.1	1.4	0.115
		8:24:00	5	24.69	108	8.97	7.85	-113.6	37.2	1.6	2.3	0.115
		8:23:22	10	24.69	108	8.94	7.8	-110.7	39.7	1.5	3.4	0.115
		8:22:48	15	24.47	108	8.99	7.78	-109.7	41.5	2.2	3.2	0.114
		8:21:53	20	23.87	90.9	7.67	6.95	-62.3	78.3	1.3	2.7	0.113
		8:20:08	25	22.42	50.5	4.38	6.62	-43.7	96.1	1.8	1.6	0.114
		8:18:30	30	21.1	35.7	3.17	6.57	-40.8	98.8	1.4	2.0	0.114
BZ-6		8:16:58	35	19.91	29.9	2.73	6.56	-40.4	100	2.2	1.8	0.111
In-Lake		8:15:57	40	16.43	27.3	2.67	6.55	-39.9	101.7	1.5	1.3	0.101
Tower		8:14:13	45	12.56	33.1	3.52	6.57	-41.4	102.6	1.3	2.4	0.091
	8/17/2017	8:12:51	50	10.12	40.8	4.59	6.56	-41.3	104	1.6	2.8	0.085
		8:11:40	55	9.06	45.5	5.25	6.58	-42.4	102.7	1.3	1.9	0.082
Secchi		8:10:28	60	8.79	45.6	5.29	6.59	-42.9	100.8	0.4	2.1	0.082
3.35		8:09:14	65	8.61	46	5.37	6.58	-42.5	100	0.4	1.9	0.081
		8:08:21	70	8.41	47.4	5.56	6.6	-43.4	98	0.7	2.4	0.081
		8:07:37	75	8.24	47	5.53	6.6	-43.3	97	1.0	2.2	0.08
		8:07:02	80	7.94	47.1	5.58	6.6	-43.6	95.9	1.1	2.6	0.079
		8:06:34	85	7.58	46.9	5.61	6.61	-44.1	94.5	0.4	2.0	0.079
		8:05:04	90	7.42	44.2	5.31	6.62	-44.6	89.7	1.0	2.3	0.079
		8:03:13	95	7.16	37.7	4.55	6.62	-44.6	83.8	1.9	2.7	0.078
		8:00:32	100	7.03	32.3	3.92	6.67	-47.3	74.4	1.8	2.3	0.079
		7:59:03	105	6.95	28.5	3.47	6.76	-52.3	62.9	2.6	2.4	0.079
		7:58:02	110	6.9	27.4	3.34	6.8	-54.3	55.3	3.0	2.3	0.079
		7:56:08	115	6.87	24.4	2.97	6.91	-60	31.6	4.3	2.6	0.079
		7:54:30	120	6.83	21.5	2.62	7.08	-69.2	-5.3	4.0	1.8	0.079
		7:52:28	125	7.27	6.3	0.76	7.34	-83.3	-117	**21.3**	**21.0**	0.08
		8:15:31	0.5	21.11	92	8.19	6.94	-61.5	70.8	1.7	4.0	0.106
		8:14:52	5	21.15	91.9	8.16	6.91	-60.1	71.8	1.8	4.4	0.106
		8:13:53	10	21.16	91.5	8.13	6.89	-58.8	72.9	1.2	3.9	0.106
		8:13:04	15	21.15	90.8	8.07	6.87	-57.7	73.8	1.7	3.2	0.106
		8:11:56	20	21.16	90.4	8.03	6.82	-54.6	76.6	0.9	4.4	0.106
		8:11:09	25	21.15	89.2	7.93	6.77	-52.1	79	1.5	3.6	0.106
BZ-6		8:10:13	30	21.15	85.4	7.59	6.68	-46.9	83.9	1.7	4.0	0.106
In-Lake		8:09:01	35	20.03	28.9	2.62	6.36	-28.9	98.9	1.7	0.3	0.112
Tower		8:07:33	40	19.33	22.7	2.09	6.34	-28	100.2	1.2	0.4	0.111
		8:06:02	45	18.18	13.8	1.3	6.3	-25.7	103.3	1.6	0.1	0.107
Secchi	9/7/2017	8:05:08	50	15.45	11.9	1.19	6.28	-25.4	106.1	1.4	0.4	0.098
		8:02:35	55	10.37	30.9	3.46	6.34	-29.4	105.2	0.8	1.5	0.086
3.15 M		8:01:38	60	9.32	35.9	4.12	6.36	-30.1	104.9	0.2	1.6	0.083
		8:00:36	65	8.78	38.2	4.44	6.37	-31	104	0.8	2.2	0.082
		7:59:40	70	8.54	40.9	4.78	6.37	-31	103.7	0.7	1.9	0.081
		7:59:00	75	8.29	42.7	5.02	6.39	-32	102.3	0.1	2.1	0.08
		7:57:40	80	7.98	43.1	5.11	6.39	-32.3	101	-0.1	1.6	0.08
		7:56:27	85	7.65	41.9	5.01	6.39	-32.3	99.7	0.5	1.7	0.079
		7:55:15	90	7.49	39.5	4.74	6.39	-32.2	98.1	-0.1	1.4	0.079
		7:53:54	95	7.36	35.4	4.26	6.39	-32.1	95.7	-0.2	1.6	0.079
		7:50:50	100	7.12	26.8	3.24	6.39	-32.3	88.6	1.8	2.1	0.078
		7:48:28	105	6.99	20.2	2.46	6.39	-32.5	82.5	3.2	1.9	0.078
		7:47:31	110	6.93	18	2.18	6.4	-33.1	78.9	3.2	0.9	0.078
		7:46:49	115	6.92	17.3	2.11	6.42	-34	75	5.4	0.8	0.079
		7:43:05	120	6.9	15	1.82	6.58	-42.3	40.4	5.9	0.5	0.079
		7:40:48	125	6.9	4	0.49	6.87	-57.8	-23.1	**87.2**	**50.5**	0.087

2017 Beltzville Reservoir Water Column Profile

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
		9:35:54	0.5	14.07	104	10.68	7.06	-68.5	184.1	2.4	3.8	0.086
		9:35:12	5	14.02	104	10.65	7.05	-68	185.5	2.7	5.7	0.085
		9:34:11	10	12.98	99.2	10.45	6.96	-63	189.7	2.4	7.1	0.086
BZ-7		9:33:18	15	12.7	95.5	10.13	6.89	-58.9	192.9	3.5	8	0.089
Upper Lake		9:32:26	20	12.23	92.6	9.93	6.83	-55.5	196	2.8	7.2	0.088
No-Wake	5/11/2017	9:31:21	25	11.65	90.6	9.83	6.79	-53.4	198.4	4.2	5	0.09
		9:30:11	30	10.97	89.2	9.84	6.77	-52.4	200.7	3.3	3.9	0.092
		9:29:11	35	10.17	87	9.78	6.74	-50.7	202.9	3.1	3	0.087
		9:28:06	40	9.53	85.2	9.72	6.72	-49.9	205	2.7	2.9	0.085
		9:27:09	45	8.86	83.6	9.69	6.72	-49.8	206	2.1	3.1	0.082
		9:25:53	50	8.39	82.2	9.65	6.72	-50	207.3	1.4	3.6	0.08
		9:24:34	55	8.2	82.7	9.75	6.76	-52.1	207.3	1.8	3.4	0.079
		9:57:47	5	24.47	107	8.92	7.18	-75.1	109.9	1.9	0	0.113
		9:56:45	10	24.03	107	8.99	7.17	-74.7	110.6	2	1.3	0.112
BZ-7		9:55:07	15	21.79	89.4	7.85	6.69	-47.7	132.4	5.8	3.9	0.11
Upper Lake		9:54:31	20	19.25	79.5	7.34	6.63	-44	135.9	6.4	2.6	0.109
No-Wake	6/22/2017	9:54:00	25	17.33	74.2	7.12	6.61	-43.2	136.6	4	3.3	0.104
		9:53:14	30	15.04	67	6.75	6.58	-42	137.9	2.4	4	0.098
		9:52:41	35	12.43	61.3	6.54	6.58	-42.1	138	2.2	4.5	0.092
		9:51:48	40	10.69	59.5	6.6	6.61	-43.9	136	1.2	3	0.088
		9:50:31	45	9.51	60.5	6.9	6.64	-45.8	132	1.2	3.1	0.084
		9:49:54	50	9	60.6	7	6.67	-47.1	128.9	0.5	3.5	0.083
		9:48:47	55	8.86	60.8	7.05	6.7	-48.7	120.7	1.4	3.3	0.083
		8:56:17	0.5	27.51	112	8.83	7.56	-97.4	72	2.1	2.2	0.121
		8:55:45	5	27.51	111	8.78	7.49	-93	75.1	1.5	1.9	0.121
		8:55:01	10	27.49	110	8.65	7.35	-85.2	80.7	1.5	2.4	0.120
BZ-7		8:54:13	15	25.63	102	8.3	6.8	-53.5	106.3	2.6	5.5	0.100
Upper Lake	7/20/2017	8:53:11	20	22.87	77.1	6.63	6.63	-44.2	115.4	3.8	5.3	0.123
No-Wake		8:52:22	25	20.76	59.5	5.33	6.59	-41.8	117.7	4.0	2.9	0.119
		8:51:40	30	19.31	50.4	4.65	6.58	-41.4	117.7	3.0	2.5	0.112
		8:50:42	35	16.69	39.5	3.84	6.59	-42.2	117.3	2.2	2.6	0.103
		8:50:04	40	11.31	36	3.94	6.63	-45.1	116.5	1.3	3.1	0.089
		8:49:00	45	9.87	37.4	4.23	6.68	-47.9	114.1	2.0	2.9	0.086
		8:47:57	50	9.36	39.9	4.57	6.74	-50.8	109.8	1.2	2.5	0.084
		8:47:05	55	9.17	39.7	4.57	6.79	-53.5	105.4	2.4	2.7	0.084
		9:30:11	0.5	24.9	114	9.43	8.14	-130	32	1.9	2.0	0.114
		9:29:20	5	24.88	114	9.42	8.05	-125.2	33.9	1.8	2.7	0.114
		9:28:30	10	24.64	110	9.14	7.85	-113.6	41.1	1.8	4.9	0.113
		9:27:46	15	24.31	98.3	8.22	7.08	-69.4	75.4	2.9	7.6	0.111
BZ-7	8/17/2017	9:26:44	20	23.08	82.1	7.03	6.91	-60	83.6	2.3	3.2	0.085
Upper Lake		9:26:07	25	21.73	83.8	7.36	6.91	-60	84.1	3.4	3.8	0.115
No-Wake		9:25:16	30	20.76	82.1	7.35	6.89	-59.1	84.7	5.3	3.0	0.117
		9:24:21	35	19.99	68	6.18	6.82	-55.1	87	5.2	3.0	0.116
		9:23:18	40	16.85	22.5	2.18	6.68	-47	91.3	4.6	1.5	0.105
		9:21:45	45	12.34	14.8	1.58	6.81	-54.5	77.8	3.0	2.8	0.093
		9:19:53	50	10.06	16.7	1.88	7.07	-69	48.7	**17.0**	1.5	0.088

2017 Beltzville Reservoir Water Column Profile

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
BZ-7 Upper Lake No-Wake	9/7/2017											
		9:14:20	0.5	21.46	94.5	8.35	7	-64.8	73.9	1.8	4.6	0.104
		9:13:41	5	21.48	94.2	8.32	6.98	-63.6	75.4	1.9	4.6	0.104
		9:13:08	10	21.47	93.8	8.29	6.96	-62.8	76.5	1.8	4.0	0.105
		9:12:17	15	21.46	92.8	8.2	6.94	-61.6	78.1	1.4	5.3	0.105
		9:11:21	20	21.42	90.6	8.01	6.89	-58.6	81.8	2.2	4.8	0.105
		9:10:06	25	21.02	78.2	6.97	6.77	-52.1	88.6	1.5	2.5	0.103
		9:09:09	30	20.63	85.6	7.69	6.84	-55.8	86.1	1.2	2.5	0.087
		9:08:06	35	20.14	86.3	7.82	6.82	-55.2	87.9	2.6	1.9	0.105
		9:07:28	40	19.27	84.7	7.81	6.81	-54.3	89.9	4.2	2.4	0.111
		9:06:33	45	18.85	84.9	7.9	6.81	-54.6	91	7.0	2.6	0.109
		9:05:03	50	18	76.2	7.21	6.77	-52.4	96.8	7.3	2.5	0.107

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.: 7007298
Report: 05/22/17
Lab Contact: Richard Wheeler

Attention: Gregory Wacik
Reported To: Tetra Tech
USACE, Phila Dist. Env.Resources Branch 100 Penn Square E.
Philadelphia, PA 19107

Project Info: 6226 - Seasonal Monthly Beltzville Reservoir

Lab ID: 7007298-01 **Collected By:** Client **Sampled:** 05/11/17 11:35 **Received:** 05/11/17 13:45
Sample Desc: BZ-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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	0.12	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	05/11/17 16:35		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:43		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	54	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	2.0	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/11/17 14:45		TNS
Total Coliform	360	mpn/100ml	1	SM 9223 B	05/11/17 16:50		TNS

Lab ID: 7007298-02 **Collected By:** Client **Sampled:** 05/11/17 11:50 **Received:** 05/11/17 13:45
Sample Desc: BZ-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Field							
No Sample	0	None		MJRA	05/11/17		NAG

Lab ID: 7007298-03 **Collected By:** Client **Sampled:** 05/11/17 08:40 **Received:** 05/11/17 13:45
Sample Desc: BZ-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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	05/11/17 16:36		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:46		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.8	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/11/17 14:45		TNS
Total Coliform	8	mpn/100ml	1	SM 9223 B	05/11/17 16:50		TNS

Lab ID: 7007298-04 **Collected By:** Client **Sampled:** 05/11/17 08:40 **Received:** 05/11/17 13:45
Sample Desc: BZ-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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	05/11/17 16:39		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:47		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	74	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

Lab ID: 7007298-05 **Collected By:** Client **Sampled:** 05/11/17 08:40 **Received:** 05/11/17 13:45
Sample Desc: BZ-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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.75	mg/l	0.05	EPA 353.2	05/11/17 16:40		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:48		RES
Nitrogen, Total Kjeldahl (TKN)	0.38	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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	73	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.4	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	14	mg/l	3	SM 2540 D	05/17/17		TMH

Lab ID: 7007298-06 **Collected By:** Client **Sampled:** 05/11/17 11:50 **Received:** 05/11/17 13:45
Sample Desc: BZ-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Field							
No Sample	0	None		MJRA	05/11/17		NAG

Lab ID: 7007298-07 **Collected By:** Client **Sampled:** 05/11/17 11:20 **Received:** 05/11/17 13:45
Sample Desc: BZ-5 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	05/12/17	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		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	1.22	mg/l	0.05	EPA 353.2	05/11/17 16:41		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:49		RES
Nitrogen, Total Kjeldahl (TKN)	0.30	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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.15	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	90	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	05/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	41	/100ml	2	SM 9222 D	05/11/17 14:45		TNS
Total Coliform	1400	mpn/100ml	1	SM 9223 B	05/11/17 16:50		TNS

Lab ID: 7007298-08 **Collected By:** Client **Sampled:** 05/11/17 07:55 **Received:** 05/11/17 13:45
Sample Desc: BZ-6 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	05/11/17 16:42		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:50		RES
Nitrogen, Total Kjeldahl (TKN)	0.54	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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	73	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.8	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/11/17 14:45		TNS
Total Coliform	7	mpn/100ml	1	SM 9223 B	05/11/17 16:50		TNS

Lab ID: 7007298-09 **Collected By:** Client **Sampled:** 05/11/17 07:55 **Received:** 05/11/17 13:45
Sample Desc: BZ-6 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.78	mg/l	0.05	EPA 353.2	05/11/17 16:43		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:51		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	80	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

Lab ID: 7007298-10 **Collected By:** Client **Sampled:** 05/11/17 07:55 **Received:** 05/11/17 13:45
Sample Desc: BZ-6 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.74	mg/l	0.05	EPA 353.2	05/11/17 16:44		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:51		RES
Nitrogen, Total Kjeldahl (TKN)	2.22	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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.21	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	77	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	2.0	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	246	mg/l	3	SM 2540 D	05/17/17		TMH

Lab ID: 7007298-11 **Collected By:** Client **Sampled:** 05/11/17 09:15 **Received:** 05/11/17 13:45
Sample Desc: BZ-7 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.73	mg/l	0.05	EPA 353.2	05/11/17 16:47		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:54		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	77	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/11/17 14:51		TNS
Total Coliform	15	mpn/100ml	1	SM 9223 B	05/11/17 16:50		TNS

Lab ID: 7007298-12 **Collected By:** Client **Sampled:** 05/11/17 09:15 **Received:** 05/11/17 13:45
Sample Desc: BZ-7 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.98	mg/l	0.05	EPA 353.2	05/11/17 16:48		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:55		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	91	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/17/17		TMH

Lab ID: 7007298-13 **Collected By:** Client **Sampled:** 05/11/17 09:15 **Received:** 05/11/17 13:45
Sample Desc: BZ-7 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	05/12/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/12/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	05/11/17 16:51		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/11/17 15:56		RES
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	05/12/17 13:10	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	05/12/17		AEH
Solids, Total Dissolved	70	mg/l	5	SM 2540 C	05/17/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	05/16/17		ALD
Solids, Total Suspended	13	mg/l	3	SM 2540 D	05/17/17		TMH

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

7007298

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6226 - Seasonal Monthly Beltzville Reservoir
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

7007298-01 BZ-1 Surface

Matrix: Non-Potable Water Date: 5/11/17
Type: Grab Time: 1135

6 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

7007298-02 BZ-2 Surface

Matrix: Non-Potable Water Date:
Type: Grab Time:

~~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~~

missed

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

7007298-03 BZ-3 Surface

Matrix: Non-Potable Water Date: 5/11/17
Type: Grab Time: 0840

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

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

Relinquished By	Date/Time	Received By	Date/Time
	5/15/17 1150	By NW	5-11-17 1200
		By NW	5-11-17 1345

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.

Sample Kit Prepared By:	Date/Time

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

Printed: 05/01/17 12:42:36PM

Report Template: wko WorkOrder COC is

7007298

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : G. WACIK
(Full Name)

7007298-04 BZ-3 Mid-Depth

Matrix: Non-Potable Water
Type: Grab
Date: 5/11/17
Time: 0840

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

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

7007298-05 BZ-3 Deep

Matrix: Non-Potable Water
Type: Grab
Date: 5/11/17
Time: 0840

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

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

7007298-06 BZ-4 Surface

N.S.

Matrix: Non-Potable Water
Type: Grab
Date:
Time:

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

A - Pl 250ml NP, zero hdspc
B - Pl 500ml H2SO4 missed
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

Relinquished By	Date/Time	Received By	Date/Time
5/11/17 1150		5-11-17 1200	
Relinquished By	Date/Time	Received at Laboratory By	Date/Time
		5-11-17 1345	

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

Printed: 05/01/17 12:42:36PM

Report Template: wko WorkOrder COC is

7007298

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) G. WACIK

7007298-07 BZ-5 Surface

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

Matrix: Non-Potable Water **Date:** 5/11/17
Type: Grab **Time:** 1120

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

7007298-08 BZ-6 Surface

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

Matrix: Non-Potable Water **Date:** 5/11/17
Type: Grab **Time:** 0755

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

7007298-09 BZ-6 Mid-Depth

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

Matrix: Non-Potable Water **Date:** 5/11/17
Type: Grab **Time:** 0755

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 5/11/17 1150	Received By	Date/Time 5-11-17 1200
Relinquished By	Date/Time	Received at Laboratory By	Date/Time 5-11-17 1345

Sample Kit Prepared By:	Date/Time
Sample Temp (°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: 05/01/17 12:42:36PM

Report Template: wko WorkOrder COC ls

7007298

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : G. WACIK
(Full Name)

7007298-10 BZ-6 Deep RES AH

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

Matrix: Non-Potable Water Date: 5/11/17
Type: Grab Time: 0755

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

7007298-11 BZ-7 Surface RES BW AH

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

Matrix: Non-Potable Water Date: 5/11/17
Type: Grab Time: 0915

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

rec'd one sterile bottle labeled BZ-7 Mid. (ral) 05-11-17 disposed as extra volume per client cont. of RAW. (ral) 5-11-17

7007298-12 BZ-7 Mid-Depth RES AH

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

Matrix: Non-Potable Water Date: 5/11/17
Type: Grab Time: 0915

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
	5/11/17 1150	By MA	5-11-17 1200
Relinquished By	Date/Time	Received at Laboratory By	Date/Time
		By MA	5-11-17 1345

Sample Kit Prepared By:	Date/Time

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

Printed: 05/01/17 12:42:36PM

Report Template: wko WorkOrder COC ls

7007298

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : G. WACIK
(Full Name)

7007298-13 BZ-7 Deep

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

Matrix: Non-Potable Water
Type: Grab

Date: 5/11/17
Time: 0915

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	5/11/17 1150 Date/Time	Received By	5-11-17 1200 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	5-11-17 1345 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°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: 05/01/17 12:42:36PM

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.: 7010001
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: 6226 - Seasonal Monthly Beltzville Reservoir

Lab ID: 7010001-01 **Collected By:** Client **Sampled:** 06/22/17 07:55 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	13	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.74	mg/l	0.05	EPA 353.2	06/22/17 18:47		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:10		RES
Nitrogen, Total Kjeldahl (TKN)	0.27	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	06/23/17 14:50	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	06/26/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	6	/100ml	2	SM 9222 D	06/22/17 15:20		TNS
Total Coliform	1400	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-02 **Collected By:** Client **Sampled:** 06/22/17 07:45 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	10	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.25	mg/l	0.05	EPA 353.2	06/22/17 18:48		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:13		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	42	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	0.9	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	58	/100ml	2	SM 9222 D	06/22/17 15:20		TNS
Total Coliform	100	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-03 **Collected By:** Client **Sampled:** 06/22/17 09:20 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	13	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.66	mg/l	0.05	EPA 353.2	06/22/17 18:51		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:14		RES
Nitrogen, Total Kjeldahl (TKN)	0.28	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	45	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	06/22/17 15:20		TNS
Total Coliform	140	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-04 **Collected By:** Client **Sampled:** 06/22/17 09:20 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	14	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	06/22/17 18:52		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:15		RES
Nitrogen, Total Kjeldahl (TKN)	0.33	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	45	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

Lab ID: 7010001-05 **Collected By:** Client **Sampled:** 06/22/17 09:20 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	14	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.09	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.70	mg/l	0.05	EPA 353.2	06/22/17 18:53		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:16		RES
Nitrogen, Total Kjeldahl (TKN)	0.31	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	54	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

Lab ID: 7010001-06 **Collected By:** Client **Sampled:** 06/22/17 07:30 **Received:** 06/22/17 14:25
Sample Desc: BZ-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	9	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.42	mg/l	0.05	EPA 353.2	06/22/17 18:54		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:17		RES
Nitrogen, Total Kjeldahl (TKN)	0.63	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	32	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	6	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	>6000	/100ml	2	SM 9222 D	06/22/17 15:20		TNS
Total Coliform	100	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-07 **Collected By:** Client **Sampled:** 06/22/17 07:15 **Received:** 06/22/17 14:25
Sample Desc: BZ-5 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	17	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	1.27	mg/l	0.05	EPA 353.2	06/22/17 18:55		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:18		RES
Nitrogen, Total Kjeldahl (TKN)	0.40	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	0.12	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	75	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	7	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	440	/100ml	2	SM 9222 D	06/22/17 15:20	Report	TNS
Total Coliform	100	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-08 **Collected By:** Client **Sampled:** 06/22/17 08:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-6 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	15	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.66	mg/l	0.05	EPA 353.2	06/22/17 18:56		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:19		RES
Nitrogen, Total Kjeldahl (TKN)	0.29	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	57	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	8	/100ml	2	SM 9222 D	06/22/17 15:50		TNS
Total Coliform	240	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-09 **Collected By:** Client **Sampled:** 06/22/17 08:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-6 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	13	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.80	mg/l	0.05	EPA 353.2	06/22/17 18:57		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:20		RES
Nitrogen, Total Kjeldahl (TKN)	0.25	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	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	14	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

Lab ID: 7010001-10 **Collected By:** Client **Sampled:** 06/22/17 08:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-6 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	14	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.10	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.67	mg/l	0.05	EPA 353.2	06/22/17 18:58		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:21		RES
Nitrogen, Total Kjeldahl (TKN)	0.69	mg/l	0.25	EPA 351.2	06/26/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	0.12	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	91	mg/l	3	SM 2540 D	06/26/17		TMH

Lab ID: 7010001-11 **Collected By:** Client **Sampled:** 06/22/17 09:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-7 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	14	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.61	mg/l	0.05	EPA 353.2	06/22/17 19:05		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:25		RES
Nitrogen, Total Kjeldahl (TKN)	0.26	mg/l	0.25	EPA 351.2	06/26/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/23/17 14:50	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	5	/100ml	2	SM 9222 D	06/22/17 15:50		TNS
Total Coliform	240	mpn/100ml	1	SM 9223 B	06/22/17 16:45		TNS

Lab ID: 7010001-12 **Collected By:** Client **Sampled:** 06/22/17 09:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-7 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	13	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.84	mg/l	0.05	EPA 353.2	06/22/17 19:06		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:26		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	06/26/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/23/17 15:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	61	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

Lab ID: 7010001-13 **Collected By:** Client **Sampled:** 06/22/17 09:50 **Received:** 06/22/17 14:25
Sample Desc: BZ-7 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	14	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	06/23/17	C-05	EMW
Nitrogen, Nitrate	0.76	mg/l	0.05	EPA 353.2	06/22/17 19:07		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 17:27		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	06/26/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/23/17 15:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	06/26/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	06/27/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/26/17		TMH

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.

Report Sample was analyzed 5 minutes outside the recommended holding time of 8 hours for fecal coliform.

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

WORK ORDER
Chain of Custody

7010001

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6226 - Seasonal Monthly Beltzville Reservoir
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 Wacik

Comments:

7010001-01 BZ-1 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: 6/22/17
Type: Grab Time: 0755

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

7010001-02 BZ-2 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: 6/22/17
Type: Grab Time: 0745

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	6/22/17 1130	Received By	062217 1110	Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062217 1425	Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	18.2
Samples on Ice?	Yes
Approved By:	
Entered By:	

Printed: 06/06/17 12:21:46PM

M.J. Reider Associates, Inc.

7010001

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

Project Manager: Richard Wheeler **Project:** 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory WACIK

7010001-03 BZ-3 Surface

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

Matrix: Non-Potable Water **Date:** 6/22/17
Type: Grab **Time:** 0920

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

7010001-04 BZ-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:** 6/22/17
Type: Grab **Time:** 0920

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

7010001-05 BZ-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:** 6/22/17
Type: Grab **Time:** 0920

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

Relinquished By	6/22/17 1130 Date/Time	Received By	062217 1110 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062217 1425 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	18.2
Samples on Ice?	Yes
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 12:21:46PM

M.J. Reider Associates, Inc.

7010001

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory Wasik

7010001-06 BZ-4 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 6/22/17
Time: 0730

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

7010001-07 BZ-5 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 6/22/17
Time: 0715

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

7010001-08 BZ-6 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 6/22/17
Time: 0850

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	6/22/17 1130 Date/Time	Received By	062217 1110 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062217 1425 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	18.2
Samples on Ice?	Yes / No
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 12:21:46PM

M.J. Reider Associates, Inc.

7010001

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

Project Manager: Richard Wheeler **Project:** 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory WACK

7010001-09 BZ-6 Mid-Depth

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

Matrix: Non-Potable Water **Date:** 6/22/17
Type: Grab **Time:** 0850

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

7010001-10 BZ-6 Deep

BOD, NO2 353.2 RES, 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:** 6/22/17
Type: Grab **Time:** 0850

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

7010001-11 BZ-7 Surface

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

Matrix: Non-Potable Water **Date:** 6/22/17
Type: Grab **Time:** 0950

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	6/22/17 1130 Date/Time	Received By	062217 1110 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062217 1425 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	18.2
Samples on Ice?	Yes
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 12:21:46PM

M.J. Reider Associates, Inc.

7010001

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory Wadik

7010001-12 BZ-7 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

RES

Matrix: Non-Potable Water
Type: Grab

Date: 6/22/17
Time: 0950

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

7010001-13 BZ-7 Deep

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

RES

Matrix: Non-Potable Water
Type: Grab

Date: 6/22/17
Time: 0950

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

Relinquished By	6/22/17 1130 Date/Time	Received By	062217 1110 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062217 1425 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	18.2
Samples on Ice?	Yes / No
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 12:21:46PM

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.: 7011018
Report: 07/31/17
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: 6226 - Seasonal Monthly Beltzville Reservoir

Lab ID: 7011018-01 **Collected By:** Client **Sampled:** 07/20/17 10:50 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	3	SM 2320 B	07/21/17		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	0.79	mg/l	0.05	EPA 353.2	07/21/17 8:32		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:01		RES
Nitrogen, Total Kjeldahl (TKN)	0.37	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	8	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	2400	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-02 **Collected By:** Client **Sampled:** 07/20/17 10:25 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	3	SM 2320 B	07/21/17		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	0.28	mg/l	0.05	EPA 353.2	07/21/17 8:35		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:03		RES
Nitrogen, Total Kjeldahl (TKN)	0.26	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	51	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	0.7	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	16	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-03 **Collected By:** Client **Sampled:** 07/20/17 08:20 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		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	0.53	mg/l	0.05	EPA 353.2	07/21/17 8:36	C-21	RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:04		RES
Nitrogen, Total Kjeldahl (TKN)	0.40	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.4	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	650	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-04 **Collected By:** Client **Sampled:** 07/20/17 08:20 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		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	0.72	mg/l	0.05	EPA 353.2	07/21/17 8:39		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:05		RES
Nitrogen, Total Kjeldahl (TKN)	0.41	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	61	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

Lab ID: 7011018-05 **Collected By:** Client **Sampled:** 07/20/17 08:20 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	07/21/17 8:39		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:06		RES
Nitrogen, Total Kjeldahl (TKN)	0.35	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	55	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	21	mg/l	3	SM 2540 D	07/21/17		TMH

Lab ID: 7011018-06 **Collected By:** Client **Sampled:** 07/20/17 10:10 **Received:** 07/20/17 12:50
Sample Desc: BZ-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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.30	mg/l	0.05	EPA 353.2	07/21/17 8:40		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:07		RES
Nitrogen, Total Kjeldahl (TKN)	0.39	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	28	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	13	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-07 **Collected By:** Client **Sampled:** 07/20/17 09:55 **Received:** 07/20/17 12:50
Sample Desc: BZ-5 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.65	mg/l	0.05	EPA 353.2	07/21/17 8:41		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:08		RES
Nitrogen, Total Kjeldahl (TKN)	0.81	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.13	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	72	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.9	mg/l	0.5	SM 5310 C	07/22/17		ALD
Solids, Total Suspended	6	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	80	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

M.J. Reider Associates, Inc.

Lab ID: 7011018-08 **Collected By:** Client **Sampled:** 07/20/17 08:00 **Received:** 07/20/17 12:50
Sample Desc: BZ-6 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.53	mg/l	0.05	EPA 353.2	07/21/17 8:42		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:11		RES
Nitrogen, Total Kjeldahl (TKN)	0.39	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	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	68	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	07/20/17 14:00		TNS
Total Coliform	650	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-09 **Collected By:** Client **Sampled:** 07/20/17 08:00 **Received:** 07/20/17 12:50
Sample Desc: BZ-6 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.82	mg/l	0.05	EPA 353.2	07/21/17 8:43		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:12		RES
Nitrogen, Total Kjeldahl (TKN)	0.34	mg/l	0.25	EPA 351.2	07/24/17	C-21a	RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	71	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

Lab ID: 7011018-10 **Collected By:** Client **Sampled:** 07/20/17 08:00 **Received:** 07/20/17 12:50
Sample Desc: BZ-6 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.73	mg/l	0.05	EPA 353.2	07/21/17 8:46		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:13		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	07/25/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.18	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	67	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

Lab ID: 7011018-11 **Collected By:** Client **Sampled:** 07/20/17 08:55 **Received:** 07/20/17 12:50
Sample Desc: BZ-7 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.47	mg/l	0.05	EPA 353.2	07/21/17 8:47		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:14		RES
Nitrogen, Total Kjeldahl (TKN)	1.03	mg/l	0.25	EPA 351.2	07/25/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	07/20/17 14:30		TNS
Total Coliform	2000	mpn/100ml	1	SM 9223 B	07/20/17 16:34		TNS

Lab ID: 7011018-12 **Collected By:** Client **Sampled:** 07/20/17 08:55 **Received:** 07/20/17 12:50
Sample Desc: BZ-7 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	0.10	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.83	mg/l	0.05	EPA 353.2	07/21/17 8:48		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:17		RES
Nitrogen, Total Kjeldahl (TKN)	0.35	mg/l	0.25	EPA 351.2	07/25/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	85	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.4	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/21/17		TMH

Lab ID: 7011018-13 **Collected By:** Client **Sampled:** 07/20/17 08:55 **Received:** 07/20/17 12:50
Sample Desc: BZ-7 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	07/21/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	3	SM 2320 B	07/21/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/21/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.76	mg/l	0.05	EPA 353.2	07/21/17 8:49		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/21/17 7:18		RES
Nitrogen, Total Kjeldahl (TKN)	0.37	mg/l	0.25	EPA 351.2	07/25/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/21/17 14:55	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/21/17		AEH
Solids, Total Dissolved	84	mg/l	5	SM 2540 C	07/21/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	07/25/17		ALD
Solids, Total Suspended	17	mg/l	3	SM 2540 D	07/21/17		TMH

Notes and Definitions

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

C-21 The nitrate matrix spike and matrix spike dup were outside the acceptable range of 90-110% at 110.7% and 111.3%.

C-21a The TKN matrix spike dup was outside the acceptable range of 90-110% at 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

7011018

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6226 - Seasonal Monthly Beltzville Reservoir
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 Wacik

7011018-01 BZ-1 Surface

Matrix: Non-Potable Water Date: 7/20/17
Type: Grab Time: 1030

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

7011018-02 BZ-2 Surface

Matrix: Non-Potable Water Date: 7/20/17
Type: Grab Time: 1025

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

	Date/Time		Date/Time
Relinquished By		Received By	7/20/17 1130
Relinquished By	7/20/17 1130	Received at Laboratory By	7/20/17 1250

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

Printed: 6/15/2017 8:02:40AM

Report Template: wko WorkOrder COC 15

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7011018-03 BZ-3 Surface

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

Matrix: Non-Potable Water **Date:** 7/20/17
Type: Grab **Time:** 0820

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

7011018-04 BZ-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:** 7/20/17
Type: Grab **Time:** 0820

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

7011018-05 BZ-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:** 7/20/17
Type: Grab **Time:** 0820

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

	Date/Time		Date/Time
Relinquished By	7/20/17 1130	Received By	7/20/17 1130
Relinquished By		Received at Laboratory By	7/20/17 1250

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

Printed: 6/15/2017 8:02:40AM

Report Template:

7011018

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7011018-06 BZ-4 Surface

Matrix: Non-Potable Water **Date:** 7/20/17
Type: Grab **Time:** 1010

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

7011018-07 BZ-5 Surface

Matrix: Non-Potable Water **Date:** 7/20/17
Type: Grab **Time:** 0955

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

7011018-08 BZ-6 Surface

Matrix: Non-Potable Water **Date:** 7/20/17
Type: Grab **Time:** 0800

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

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	7/20/17 1130	Received By	7/20/17 1130
Relinquished By	Date/Time	Received at Laboratory By	7/20/17 1250 Date/Time

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

Report Template:

Printed: 6/15/2017 8:02:40AM

7011018

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7011018-09 BZ-6 Mid-Depth
NO3 353.2, O-PO4 H, PO4-D(H), BOD, NO2 353.2
PO4-P H, Alk 2320B, NH3-N, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water Date: 7/20/17
Type: Grab Time: 0900

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

7011018-10 BZ-6 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: 7/20/17
Type: Grab Time: 0800

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

7011018-11 BZ-7 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: 7/20/17
Type: Grab Time: 0855

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	7/20/17 1130 Date/Time	Received By	7/20/17 1130 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/20/17 1250 Date/Time

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

Report Template:

Printed: 6/15/2017 8:02:40AM

7011018

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7011018-12 BZ-7 Mid-Depth

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

Matrix: Non-Potable Water
Type: Grab
Date: 7/20/17
Time: 0855

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

7011018-13 BZ-7 Deep

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

Matrix: Non-Potable Water
Type: Grab
Date: 7/20/17
Time: 0855

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

Relinquished By	7/20/17 1136 Date/Time	Received By	7/20/17 1130 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/20/17 1250 Date/Time

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

Printed: 6/15/2017 8:02:40AM

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.: 7013229
Report: 08/28/17
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: 6226 - Seasonal Monthly Beltzville Reservoir

Lab ID: 7013229-01 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 11:05 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.80	mg/l	0.05	EPA 353.2	08/18/17 7:55		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 6:55		RES
Nitrogen, Total Kjeldahl (TKN)	0.26	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	51	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	5	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	580	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-02 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 10:50 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.34	mg/l	0.05	EPA 353.2	08/18/17 7:58		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 6:58		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	46	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	0.6	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	13	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	23	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-03 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 08:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.42	mg/l	0.05	EPA 353.2	08/18/17 7:59		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 6:59		RES
Nitrogen, Total Kjeldahl (TKN)	0.38	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	230	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-04 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 08:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.76	mg/l	0.05	EPA 353.2	08/18/17 8:00		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 6:59		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	48	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

Lab ID: 7013229-05 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 08:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.66	mg/l	0.05	EPA 353.2	08/18/17 8:01		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:00		RES
Nitrogen, Total Kjeldahl (TKN)	0.45	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	54	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	43	mg/l	3	SM 2540 D	08/18/17		TMH

Lab ID: 7013229-06 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 10:40 **Received:** 08/17/17 14:30
Sample Desc: BZ-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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.23	mg/l	0.05	EPA 353.2	08/18/17 8:02		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:01		RES
Nitrogen, Total Kjeldahl (TKN)	0.30	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	27	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	10	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-07 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 10:30 **Received:** 08/17/17 14:30
Sample Desc: BZ-5 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	1.40	mg/l	0.05	EPA 353.2	08/18/17 8:03		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:02		RES
Nitrogen, Total Kjeldahl (TKN)	0.46	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.16	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	78	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	110	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-08 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 07:40 **Received:** 08/17/17 14:30
Sample Desc: BZ-6 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.42	mg/l	0.05	EPA 353.2	08/18/17 8:04		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:03		RES
Nitrogen, Total Kjeldahl (TKN)	0.30	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	08/17/17 16:00		TNS
Total Coliform	140	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-09 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 07:40 **Received:** 08/17/17 14:30
Sample Desc: BZ-6 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.81	mg/l	0.05	EPA 353.2	08/18/17 8:07		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:06		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	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	08/18/17 10:30		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	50	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

Lab ID: 7013229-10 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 07:40 **Received:** 08/17/17 14:30
Sample Desc: BZ-6 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	0.10	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.59	mg/l	0.05	EPA 353.2	08/18/17 8:08		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:07		RES
Nitrogen, Total Kjeldahl (TKN)	1.66	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.17	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	55	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	4.2	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	140	mg/l	3	SM 2540 D	08/18/17		TMH

Lab ID: 7013229-11 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 09:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-7 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.37	mg/l	0.05	EPA 353.2	08/18/17 8:09		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:08		RES
Nitrogen, Total Kjeldahl (TKN)	0.36	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	57	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	08/17/17 16:30		TNS
Total Coliform	310	mpn/100ml	1	SM 9223 B	08/17/17 16:30		PLW

Lab ID: 7013229-12 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 09:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-7 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.59	mg/l	0.05	EPA 353.2	08/18/17 8:14		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:11		RES
Nitrogen, Total Kjeldahl (TKN)	0.35	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/18/17		TMH

Lab ID: 7013229-13 **Collected By:** Crystal H Leister **Sampled:** 08/17/17 09:15 **Received:** 08/17/17 14:30
Sample Desc: BZ-7 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	08/18/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	08/24/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/18/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/17/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.65	mg/l	0.05	EPA 353.2	08/18/17 8:15		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/18/17 7:12		RES
Nitrogen, Total Kjeldahl (TKN)	0.43	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	08/18/17 10:30		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/18/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	08/18/17		TMH
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	08/23/17		HRG
Solids, Total Suspended	42	mg/l	3	SM 2540 D	08/18/17		TMH

Notes and Definitions

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

C-13 The dissolved oxygen depletion of the SM5210B dilution water blank was greater than 0.2 mg/L.

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

WORK ORDER
Chain of Custody

7013229

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6226 - Seasonal Monthly Beltzville Reservoir
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

7013229-01 BZ-1 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: 8/17/17
Type: Grab Time: 1105

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

7013229-02 BZ-2 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: 8/17/17
Type: Grab Time: 1050

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	8/17/17 1130 Date/Time	Received By	08/17/17 1145 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/17/17 1430 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	5.0°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.

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7013229

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7013229-03 BZ-3 Surface
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TOC, TSS, TDS, TKN

Matrix: Non-Potable Water **Date:** 8/17/17
Type: Grab **Time:** 0815

- 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

7013229-04 BZ-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:** 8/17/17
Type: Grab **Time:** 0815

- 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

7013229-05 BZ-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:** 8/17/17
Type: Grab **Time:** 0815

- 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

Relinquished By	8/17/17 1130 Date/Time	Received By	08/17/17 1145 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/17/17 1430 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	5.0°C
Samples on Ice?	(Yes)
Approved By:	CH
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.

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7013229

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7013229-06 BZ-4 Surface
CWM AH TNS NAP
BOD, O-PO4 H, PO4-D(H), TC#s, FC, NO2 353.2, NO3 353.2
Alk 2320B, PO4-P H, NH3-N, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 8/17/17
Type: Grab **Time:** 1040

✓
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

7013229-07 BZ-5 Surface
CWM AH TNS NAP AH
BOD, FC, PO4-D(H), TC#s, NO2 353.2, NO3 353.2, O-PO4 H
Alk 2320B, NH3-N, TDS, TKN, PO4-P H, TOC, TSS

Matrix: Non-Potable Water **Date:** 8/17/17
Type: Grab **Time:** 1030

✓
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

7013229-08 BZ-6 Surface
CWM NAP AH TNS
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water **Date:** 8/17/17
Type: Grab **Time:** 0740

✓
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	8/17/17 1130	Received By	08/17/17 1145
Relinquished By	Date/Time	Received at Laboratory By	08/17/17 1430

Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	4.0°C
Samples on Ice?	(Yes) No NA
Approved By:	CW
Entered By:	AH

Printed: 7/7/2017 6:38:59AM

7013229

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7013229-09 BZ-6 Mid-Depth

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

Matrix: Non-Potable Water **Date:** 8/17/17
Type: Grab **Time:** 0740

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

7013229-10 BZ-6 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:** 8/17/17
Type: Grab **Time:** 0740

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

7013229-11 BZ-7 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:** 8/17/17
Type: Grab **Time:** 0915

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	8/17/17 1130 Date/Time	Received By	08/17/17 1145 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/17/17 1430 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	5.0°C
Samples on Ice?	(Yes) No
Approved By:	CH
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.

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M.J. Reider Associates, Inc.

7013229

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Collected By : (Full Name) Gregory Wacik

Comments:

7013229-12 BZ-7 Mid-Depth
CWK KV NAP AW
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
Type: Grab
Date: 8/17/17
Time: 0915

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

7013229-13 BZ-7 Deep
CWK NAP RB
BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TOC, TSS, PO4-P H, TDS, TKN

Matrix: Non-Potable Water
Type: Grab
Date: 8/17/17
Time: 0915

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

Relinquished By	8/17/17 1130 Date/Time	Received By	08/17/17 1145 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	08/17/17 1430 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	5.0°C
Samples on Ice?	(Yes) No
Approved By:	CWK
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 6:38:59AM

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.: 7016205
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: 6226 - Seasonal Monthly Beltzville Reservoir

Lab ID: 7016205-01 **Collected By:** Client **Sampled:** 09/07/17 10:40 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.79	mg/l	0.05	EPA 353.2	09/08/17 11:10		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:17		RES
Nitrogen, Total Kjeldahl (TKN)	0.29	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	67	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.5	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	10	/100ml	2	SM 9222 D	09/07/17 17:05		PLW
Total Coliform	1400	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

M.J. Reider Associates, Inc.

Lab ID: 7016205-02 **Collected By:** Client **Sampled:** 09/07/17 10:30 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.34	mg/l	0.05	EPA 353.2	09/08/17 11:13		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:20		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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	2.2	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	76	/100ml	2	SM 9222 D	09/07/17 17:05		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

M.J. Reider Associates, Inc.

Lab ID: 7016205-03 **Collected By:** Client **Sampled:** 09/07/17 08:35 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.45	mg/l	0.05	EPA 353.2	09/08/17 11:14		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:21		RES
Nitrogen, Total Kjeldahl (TKN)	0.54	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	57	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/07/17 17:35		PLW
Total Coliform	520	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

Lab ID: 7016205-04 **Collected By:** Client **Sampled:** 09/07/17 08:35 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	16	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.83	mg/l	0.05	EPA 353.2	09/08/17 11:15		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:22		RES
Nitrogen, Total Kjeldahl (TKN)	0.36	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	72	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.4	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

Lab ID: 7016205-05 **Collected By:** Client **Sampled:** 09/07/17 08:35 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-13, C-05	EMW
Nitrogen, Nitrate	0.62	mg/l	0.05	EPA 353.2	09/08/17 11:16		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:23		RES
Nitrogen, Total Kjeldahl (TKN)	0.36	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	66	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	7	mg/l	3	SM 2540 D	09/08/17		AJS

M.J. Reider Associates, Inc.

Lab ID: 7016205-06 **Collected By:** Client **Sampled:** 09/07/17 10:20 **Received:** 09/07/17 14:26
Sample Desc: BZ-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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.56	mg/l	0.05	EPA 353.2	09/08/17 11:17		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:24		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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	42	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	0.8	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	8	/100ml	2	SM 9222 D	09/07/17 17:35		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

Lab ID: 7016205-07 **Collected By:** Client **Sampled:** 09/07/17 10:15 **Received:** 09/07/17 14:26
Sample Desc: BZ-5 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	38	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.97	mg/l	0.05	EPA 353.2	09/08/17 11:18		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:25		RES
Nitrogen, Total Kjeldahl (TKN)	0.58	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	0.10	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	77	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	5	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	960	/100ml	2	SM 9222 D	09/07/17 17:35		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

Lab ID: 7016205-08 **Collected By:** Client **Sampled:** 09/07/17 07:50 **Received:** 09/07/17 14:26
Sample Desc: BZ-6 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	19	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.44	mg/l	0.05	EPA 353.2	09/08/17 11:19		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:25		RES
Nitrogen, Total Kjeldahl (TKN)	0.51	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.9	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/07/17 17:35		PLW
Total Coliform	580	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

Lab ID: 7016205-09 **Collected By:** Client **Sampled:** 09/07/17 08:35 **Received:** 09/07/17 14:26
Sample Desc: BZ-6 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.78	mg/l	0.05	EPA 353.2	09/08/17 11:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:28		RES
Nitrogen, Total Kjeldahl (TKN)	0.37	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.2	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

Lab ID: 7016205-10 **Collected By:** Client **Sampled:** 09/07/17 08:35 **Received:** 09/07/17 14:26
Sample Desc: BZ-6 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.56	mg/l	0.05	EPA 353.2	09/08/17 11:22		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:29		RES
Nitrogen, Total Kjeldahl (TKN)	0.37	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	0.13	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	66	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.3	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

M.J. Reider Associates, Inc.

Lab ID: 7016205-11 **Collected By:** Client **Sampled:** 09/07/17 09:05 **Received:** 09/07/17 14:26
Sample Desc: BZ-7 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.44	mg/l	0.05	EPA 353.2	09/08/17 11:23		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:30		RES
Nitrogen, Total Kjeldahl (TKN)	0.47	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.7	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/07/17 17:35		PLW
Total Coliform	980	mpn/100ml	1	SM 9223 B	09/07/17 17:00		ECC

Lab ID: 7016205-12 **Collected By:** Client **Sampled:** 09/07/17 09:05 **Received:** 09/07/17 14:26
Sample Desc: BZ-7 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	17	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.47	mg/l	0.05	EPA 353.2	09/08/17 11:26		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:33		RES
Nitrogen, Total Kjeldahl (TKN)	0.43	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	1.6	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/08/17		AJS

Lab ID: 7016205-13 **Collected By:** Client **Sampled:** 09/07/17 09:05 **Received:** 09/07/17 14:26
Sample Desc: BZ-7 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	09/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	18	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/08/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/08/17	C-05, C-13	EMW
Nitrogen, Nitrate	0.67	mg/l	0.05	EPA 353.2	09/08/17 11:27		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/08/17 10:34		RES
Nitrogen, Total Kjeldahl (TKN)	0.49	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	09/07/17 18:00	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/11/17		AEH
Solids, Total Dissolved	67	mg/l	5	SM 2540 C	09/09/17		AJS
Total Organic Carbon	2.1	mg/l	0.5	SM 5310 C	09/13/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	09/08/17		AJS

Notes and Definitions

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

C-13 The dissolved oxygen depletion of the SM5210B dilution water blank was greater than 0.2 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

7016205

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6226 - Seasonal Monthly Beltzville Reservoir
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

Collected By : (Full Name) GREG WACIK
Comments:

7016205-01 BZ-1 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: 9/7/17
Type: Grab Time: 1040

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

7016205-02 BZ-2 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: 9/7/17
Type: Grab Time: 1030

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	9/7/17 11:30 Date/Time	Received By	9/7/17 1158 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/7/17 1426 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°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.

M.J. Reider Associates, Inc.

7016205

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Collected By : GREG WACIK (Full Name)

Comments:

7016205-03 BZ-3 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 9/7/17
Time: 0835

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

7016205-04 BZ-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
Type: Grab
Date: 9/7/17
Time: 0835

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

7016205-05 BZ-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
Type: Grab
Date: 9/7/17
Time: 0835

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

Relinquished By	9/7/17 1130 Date/Time	Received By	9/7/17 1158 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/7/17 1426 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C): 2	
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.

M.J. Reider Associates, Inc.

7016205

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Comments:

Collected By : (Full Name) GREG WACIK

7016205-06 BZ-4 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 9/7/17
Time: 1020

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

7016205-07 BZ-5 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 9/7/17
Time: 1015

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

7016205-08 BZ-6 Surface

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

Matrix: Non-Potable Water
Type: Grab
Date: 9/7/17
Time: 0750

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	9/7/17 1130 Date/Time	Received By	9/7/17 1158 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/7/17 1426 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C): 2	
Samples on Ice? Yes No NA	
Approved By:	
Entered By:	

M.J. Reider Associates, Inc.

7016205

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Collected By : (Full Name) GREG WACIK

Comments:

7016205-09 BZ-6 Mid-Depth
RES SW RES
NO3 353.2, O-PO4 H, PO4-D(H), BOD, NO2 353.2
PO4-P H, Alk 2320B, NH3-N, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water
Type: Grab
Date: 9/7/17
Time: 0835

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

7016205-10 BZ-6 Deep
SW RES
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: 9/7/17
Time: 0838

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

7016205-11 BZ-7 Surface
RES SW PW PW
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: 9/7/17
Time: 0905

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	9/7/17 1130 Date/Time	Received By	9/7/17 1158 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/7/17 1426 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	2
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 12:00:18PM

Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

7016205

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6226 - Seasonal Monthly Beltzville Reservoir

Collected By : (Full Name) GREG WACIK

Comments:

7016205-12 BZ-7 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
Type: Grab

Date: 9/7/17
Time: 0905

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

7016205-13 BZ-7 Deep

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

Matrix: Non-Potable Water
Type: Grab

Date: 9/7/17
Time: 0905

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

Relinquished By	9/7/17 1130 Date/Time	Received By	9/7/17 1158 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/7/17 1426 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°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: 8/7/2017 12:00:18PM

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