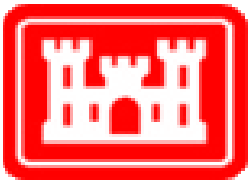
2017 WATER QUALITY MONITORING
F.E. WALTER RESERVOIR
WHITE HAVEN, PENNSYLVANIA



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

December 2017

2017 Water Quality Monitoring
F.E. Walter Reservoir
White Haven, Pennsylvania

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1.0 INTRODUCTION

1.1 DESCRIPTION OF F.E. WALTER RESERVOIR

The U.S. Army Corps of Engineers (USACE) manages F.E. Walter Reservoir located in northeastern Pennsylvania within the Delaware River Basin. F.E. Walter Reservoir is an integral part of the Lehigh River Flood Control Program. The authorized purpose of this project is flood control. The reservoir project was authorized for recreation and specifically white water recreation as part of Public Law 100-676, Section 6, dated November 17, 1988. Located about 9 miles southeast of Wilkes-Barre, PA, the reservoir dams a drainage area of 288 square miles. The dam can impound up to 35.8 billion gallons of floodwater. The primary surface water input into the reservoir is the Lehigh River as it flows west between Luzerne and Carbon Counties. Bear Creek, a secondary surface water input, enters the reservoir from the north. Tobyhanna Creek drains an area to the southeast and joins the Lehigh River near the headwaters of the reservoir. The reservoir is approximately 3 miles long and approximately 50 feet deep when not operating for flood control or recreation. In an effort to maximize recreational potential in the reservoir and on the Lehigh River downstream, specifically recreational boating and fishing, the normal operating pool of 50 feet was raised an additional 70 feet in April of 2017. The additional storage was used to augment low flows in the Lehigh River downstream as a fishery management tool and increase the number of recreational boating releases throughout the summer recreation season.

1.2 PURPOSE OF THE MONITORING PROGRAM

Foremost, F.E. Walter Reservoir provides flood control to downstream communities on the Lehigh River. Additionally, the reservoir provides important habitat for fish, waterfowl, and other wildlife, and recreational opportunities through fishing and boating both within the lake and downstream. Drinking water intakes exist at various locations on the Lehigh River downstream of the dam. Due to the broad range of uses and demands F.E. Walter Reservoir serves, the USACE monitors water quality and other aspects related to reservoir health primarily to ensure public health safety and protection of the environment. Water quality monitoring results are compared to state water quality standards and used to diagnose problems that commonly effect reservoir health such as nutrient enrichment and toxic loadings. This report summarizes the results of water quality monitoring at F.E. Walter Reservoir and its tributaries from May through September 2017.

1.3 ELEMENTS OF THE STUDY

The USACE, Philadelphia District, has been monitoring the water quality of F.E. Walter Reservoir since 1975. Over this time, yearly monitoring program designs have evolved to address new areas of concern such as human health aspects of drinking water, sediment contaminants within the reservoir basin, and a 2002 investigation of a hydrogen sulfide smell near the tail water of the dam. The 2017 monitoring program was similar to those in recent

years. The major element of the monitoring includes monthly physical and chemical water quality and bacteria monitoring from May through September to evaluate compliance with the Pennsylvania state water quality standards and to monitor the overall health of the reservoir.

2.0 METHODS

2.1 PHYSICAL STRATIFICATION MONITORING

Physical stratification monitoring of the water column of F.E. Walter Reservoir was conducted five times between May and September 2017 at all stations (Table 2-1). Physical stratification parameters included temperature, dissolved oxygen (DO), pH, ORP, Chlorophyll a, depth, turbidity, and conductivity. Monitoring was conducted at seven fixed stations located throughout the reservoir watershed (Fig. 2-1). Surface water quality was monitored at stations downstream (outfall discharge) of the reservoir (WA-1S) and upstream tributary stations on Tobyhanna Creek (WA-3S), the Lehigh River (WA-4S), and Bear Creek (WA-5S). Stratification monitoring was conducted within the reservoir at a reservoir tower station (WA-2), Bear Creek arm of the lake (WA-6), and Lehigh River arm of the lake (WA-7) with water quality measured from the water surface to the bottom at 5-ft intervals. All of the water quality monitoring was conducted with a calibrated YSI 6600 V2-4 multi-parameter water quality sonde.

In this report, when applicable, water quality data recorded from stratification monitoring was compared to water quality standards mandated by the Pennsylvania Department of Environmental Protection (PADEP Chapter 93). The standard for DO is a minimum concentration of 5 mg/L, and that for pH is an acceptable range from 6 to 9. Temperatures criteria are based on seasonal guidelines. All of the water quality data collected during physical stratification monitoring is summarized in Appendix A.

2.2 WATER COLUMN CHEMISTRY MONITORING

Water column chemistry monitoring was conducted five times at F.E. Walter Reservoir between May and September 2017 (Table 2-1). Water samples were collected at the seven fixed stations throughout the reservoir drainage area (Fig. 2-1). Surface water samples were collected at stations downstream of the reservoir (WA-1S) and upstream on Tobyhanna Creek (WA-3S), the Lehigh River (WA-4S), and Bear Creek (WA-5S). Surface, middle, and bottom water samples were collected at each of the reservoir-body stations WA-2, WA-6, and WA-7. Surface water samples were collected by opening the sample containers approximately 0.5-1 foot below the water's surface. Middle and bottom samples were collected with a Van Dorn design water bottle sampler. All samples were placed on ice in a cooler and shipped to a certified laboratory for testing. MJ Reider Associates in Reading, Pennsylvania conducted the laboratory water analysis for 2017.

Water samples collected from surface, middle, and bottom depths were analyzed for ammonia, nitrite, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus, diss./ortho-phosphate, soluble phosphorus, total dissolved solids (TDS), total suspended solids (TSS), biochemical oxygen demand (BOD), alkalinity, and total organic carbon (TOC). Table 2-2 summarizes the water quality parameters; laboratory method detection limits, laboratory required reporting limits, state water quality standards, and allowable maximum hold times for each.

Table 2-1. F.E. Walter Reservoir water quality schedule for 2017 monitoring

Date of Sample Collection	(3) Physical Stratification Monitoring (All Stations)	Water Column Chemistry Monitoring (All Stations)	Trophic State Determination (WA-2)	Coliform Bacteria Monitoring (All Stations)	(4) Sediment Priority Pollutant Monitoring (WA-2)	(2) Lehigh Temperature Probes	(1) Drinking Water Monitoring
10 May	X	X	X	X	NS	NS	NS
21 June	X	X	X	X	NS	NS	NS
19 July	X	X	X	X	NS	NS	NS
16 August	X	X	X	X	NS	NS	NS
6 September	X	X	X	X	NS	NS	NS

(1) Drinking water samples are sampled quarterly by personnel at each reservoir.
(2) Lehigh River temperature probes continuously monitor river temperatures throughout the sampling period. They are periodically downloaded.
(3) Physical stratification monitoring is conducted at all stations during routine monthly sampling.
(4) Sediment Sampling was not conducted in 2017 based on historic sampling results showing low probability of sediment contamination.
NS- Not Sampled

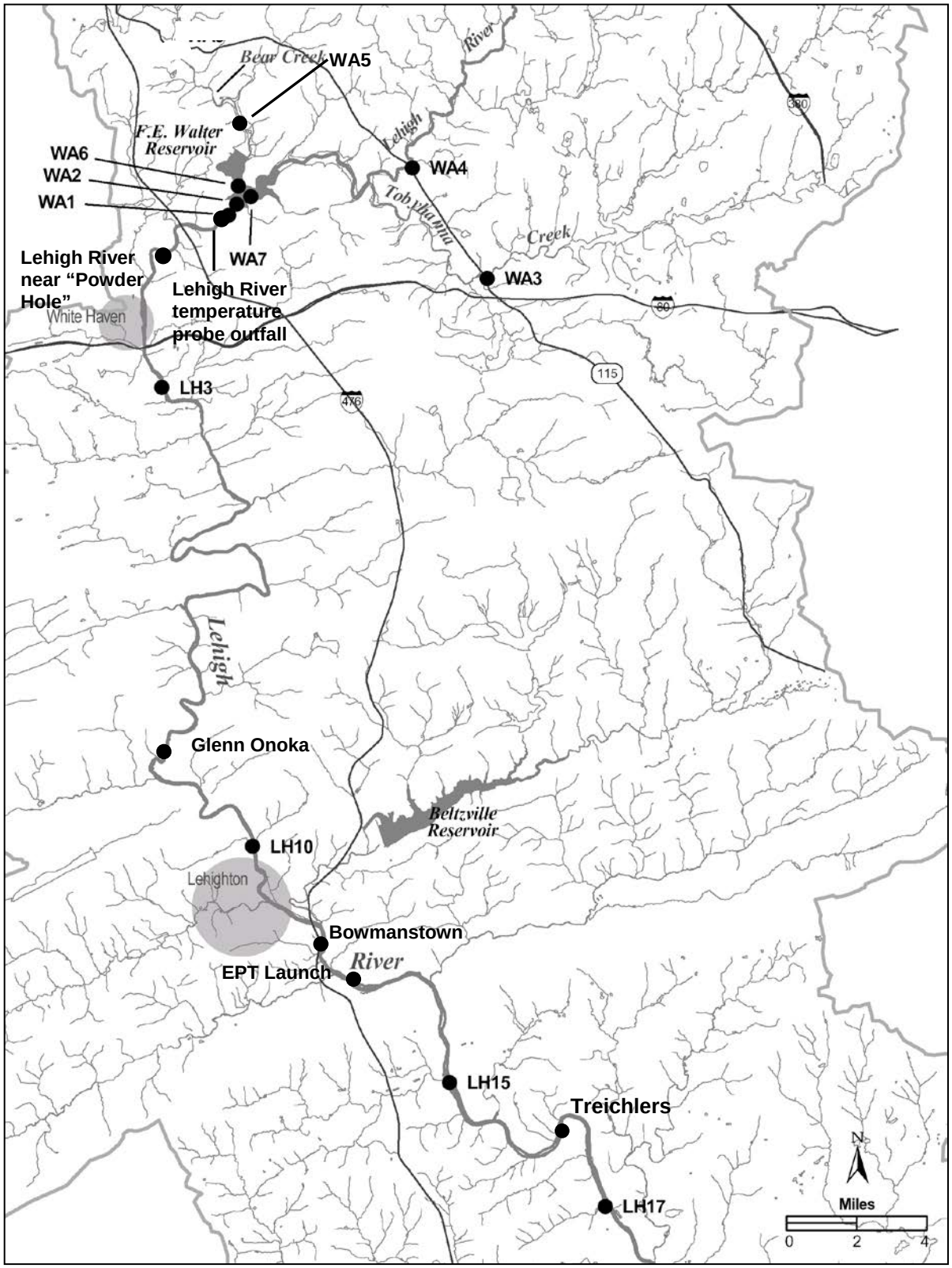

Figure 2-1. Location map for F.E. Walter Reservoir and historically sampled Lehigh River temperature probe monitoring stations.

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

Parameter	(2) Method	Reporting Limit	PADEP Surface Water Quality Criteria	Allowable Hold Times (Days)
Total Alkalinity	SM20 2320B	2.0 mg/L	Min. 20 mg/L $CaCO_3$	14
Biochemical Oxygen Demand (BOD)	SM20 5210B	2.0 mg/L	None	2
Total Phosphorus	SM20 4500P-E	0.01 mg/L	None	28
Diss./Ortho-Phosphate	SM20 4500P-E	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*			None	
Total Kjeldahl Nitrogen	MCAWW 351.2	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 V2-4 with a chlorophyll sensor.
(2) Laboratory Methods Reference:
MCAWW- "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SM-20- "Standard Methods for the Examination of Water and Wastewater", 22nd Edition, 2012.
SW846- "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", 3rd. Edition, November 1986 and updates.
NA- Total Inorganic Carbon and Total Carbon were not sampled for in 2017

2.3 TROPHIC STATE DETERMINATION

The trophic state of F.E. Walter Reservoir was determined by methods outlined by Carlson (1977) and EPA (1983). In general, these methods calculate trophic state indices (TSIs) independently for total phosphorus and chlorophyll *a* concentrations, and secchi disk depth. Surface water measures of total phosphorus and chlorophyll *a* from chemistry monitoring were used independently in determining monthly TSI values. Secchi disk depth was measured only in surface waters in the reservoir-body. Trophic state determinations were calculated only for Station WA-2 within the reservoir.

2.4 RESERVOIR BACTERIA MONITORING

Monitoring for coliform bacteria contaminants was conducted five times at each sampling station between May and September 2017 at F.E. Walter Reservoir. Surface water samples were collected in the same manner as for chemical parameter samples, and analyzed for total and fecal coliform and e-coli bacteria contamination. Table 2-3 presents the test methods, detection limits, PADEP standards, and sample holding times for the bacteria parameters monitored at F.E. Walter 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. MJ Reider Associates Laboratory in Reading, Pennsylvania conducted the bacteria analysis for 2017.

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

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

Parameter	Total coliform	Fecal coliform
Test method	SM 9223B	SM9222D
Detection limit	1 clns/100-mls	2 clns/100-ml
PADEP standard	-	Geometric mean less than 200 clns/100-ml (application of this standard is conservative because swimming is not permitted in the reservoir)
Maximum allowable holding time	30 hours	30 hours
Achieved holding time	< 30 hours	< 30 hours

3.0 RESULTS AND DISCUSSION

3.1 STRATIFICATION MONITORING

The following sections describe temporal and spatial patterns for the water quality parameters of temperature, dissolved oxygen (DO) and pH measured throughout the F.E. Walter Reservoir and watershed during 2017. Additionally, patterns related to season and depths are described for station WA-2 which is located near the operations tower and maintains the greatest water depths in the reservoir. Maximum depths for WA-2, during five separate monthly sampling days, vary between approximately 99 to 121 feet depending on 2017 reservoir operations (recreation and flood control) at the time of sampling. All of the stratification data collected during the 2017 monitoring period is 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 temperature stratification patterns naturally occurring in lakes affect the distribution of dissolved and suspended compounds.

Temperatures of the tributary surface waters (Stations WA-3S, -4S, and -5S) of the F.E. Walter Reservoir watershed generally followed a similar seasonal pattern throughout the monitoring period. Monthly sampling showed temperatures rising through spring and early summer with a peak during mid-July (Fig. 3-1). Downstream release (Station WA-1S) surface water temperatures showed a similar trend with August and September temperatures slightly warmer than tributary inflow temperatures. A maximum inflow temperature of 22.09 ºC (WA-3S) was measured in July and maximum outflow temperature of 20.86 ºC (WA-1S) was also seen in July. Surface water temperatures of the reservoir-body (Station WA-2S, -6S, and -7S) were generally warmer than in tributaries and downstream of the dam as a result of warming from the sun. In-lake reservoir surface temperatures peaked in mid-July at approximately 25.56 ºC (Station WA-7S). In 2017, tributary and release water temperatures, at times, exceeded the Pennsylvania state water quality criteria for cold water fisheries.

The water column of F.E. Walter Reservoir was temperature stratified during the 2017 sampling season (Fig. 3-2). Due to operations in 2017, specifically the raising of the base pool level and recreational release operations, the temperature stratification within the reservoir was likely affected by bottom flood gate releases on various occasions during the season. This was particular evident in July, August and September when the pool level was drawn down considerably and reservoir profile temperatures had little variation. The reservoir tower was constructed with bottom flood control gates only and does not have the flexibility to withdrawal water from other locations in the water column. As a result, deeper and typically cooler bottom waters are withdrawn first, likely causing a disruption in stratification and accelerated depletion of cooler bottom waters. Overall, reservoir lake temperatures in 2017 showed a pronounced stratification in June. Cooler deep water temperatures were available into the early July time period of the recreational season.

3.1.2 Dissolved Oxygen

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

In 2017, DO in the tributary surface waters (stations WA-3S, -4S, and -5S) of F.E. Walter Reservoir remained relatively constant from May through September sampling with recorded values ranging from 8.24 mg/L to 10.24 mg/L. These values can be attributed to typically well oxygenated stream and river systems and seasonal changes in water temperature. Station WA-1S located downstream of F.E. Walter Reservoir also maintained a similar seasonal pattern with recorded values ranging from 8.61 mg/L to 10.17 mg/L. This can be attributed, in part, to the aeration of reservoir bottom waters as it passes through the conduit system of the dam and is released downstream.

The water column of F.E. Walter Reservoir was weakly stratified with respect to DO during most of the sampling season (Fig. 3-4). July sampling showed the most pronounced evidence of stratification. The reservoir profile showed the formation of a metalimnetic dissolved oxygen minimum as was documented during 2015 sampling. As seen in some oxygen versus depth profiles of lakes or reservoirs, concentrations of dissolved oxygen may be depleted in the metalimnion of the lake profile. This depletion is termed a negative heterograde curve or metalimnetic oxygen minimum. Metalimnetic minimums of dissolved oxygen in deep mesotrophic reservoirs are often seen and have been shown to also exist in the Corps Philadelphia District's Beltzville Reservoir. This water column profile formation may be a natural occurrence and/or man induced. In the case of F.E. Walter Reservoir, the severity of this occurrence appears influenced by seasonal recreational and flood control operations. In either case, the potential exists for negative impacts on water quality, recreational use, and aquatic species such as fish. The occurrence and severity of this DO formation will be monitored during future sampling efforts. In all months sampled the DO concentrations remained above state epilimnion criteria (minimum 5 mg/l).

The health of aquatic ecosystems can be impaired by low DO concentrations in the water column. The lowest DO concentration (1.52 mg/L) was recorded at the bottom of the reservoir during the 19 July sampling event (Fig. 3-4). Hypoxia, or conditions of DO concentrations less than 2 mg/L, is generally accepted as the threshold at which the most severe effects on biota occur. F.E. Walter Reservoir did experience short term hypoxic conditions during the 2017 sampling season. Low oxygen reservoir waters are re-aerated as they pass through the conduit system of the reservoir during release. As a result, water releases from the deeper portions of the reservoir containing lower DO concentration did not negatively impact the DO concentrations of the Lehigh River downstream.

3.1.3 pH

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

Measures of pH in tributary surface (WA-3S, -4S, and –5S) waters of F.E. Walter Reservoir generally followed a similar pattern during 2017 and remained relatively constant or within a narrow range of values (6.30-7.05) throughout the sampling season. The lowest pH level of 6.30 recorded during the sampling season occurred at station WA-5S during the July sampling and the highest pH reading of 7.05 was recorded at Station WA-5S in September. Measures of pH at the downstream station WA-1S are directly influenced by bottom water column releases from the reservoir. Readings of pH at this station ranged from a high of 6.94 in September to a low of 6.69 in August (Fig. 3-5).

In 2017, measures of reservoir pH stayed within a tight range of values (6.60-7.70) from the surface to the bottom throughout the sampling season (Fig. 3-6). Slightly higher pH values were measured near the surface and bottom waters of the lake. Many factors can influence the pH of the reservoir water such as geology, acid rain, algal productivity, deep water biological productivity and others. Measures of pH throughout the water column in all months sampled remained in compliance with PADEP water quality standards. The water quality standard for pH is a range of acceptable measures between 6 and 9.

3.2 WATER COLUMN CHEMISTRY MONITORING

Table 3-1 provides a summary of water column chemistry sampling for all stations and dates sampled at F.E. Walter Reservoir in 2017. The following sections describe the temporal, spatial, and depth related patterns for these water quality measures.

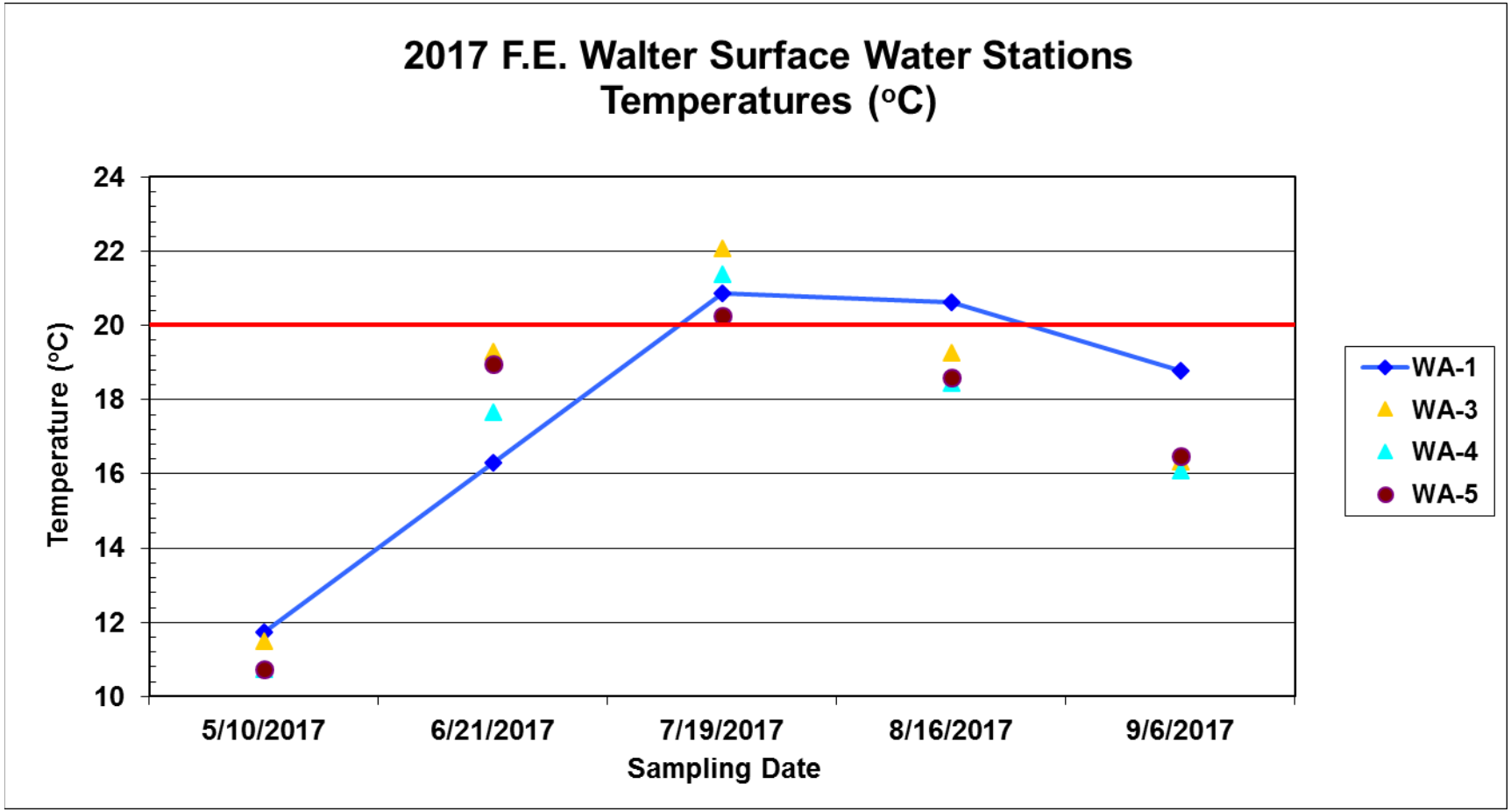

Figure 3-1. Temperature measured in tributary and release (WA-1) surface waters of F.E. Walter Reservoir during 2017. See Appendix A for a summary of the plotted values. The coldwater species preference temperature of 20°C is shown as a red line reference.

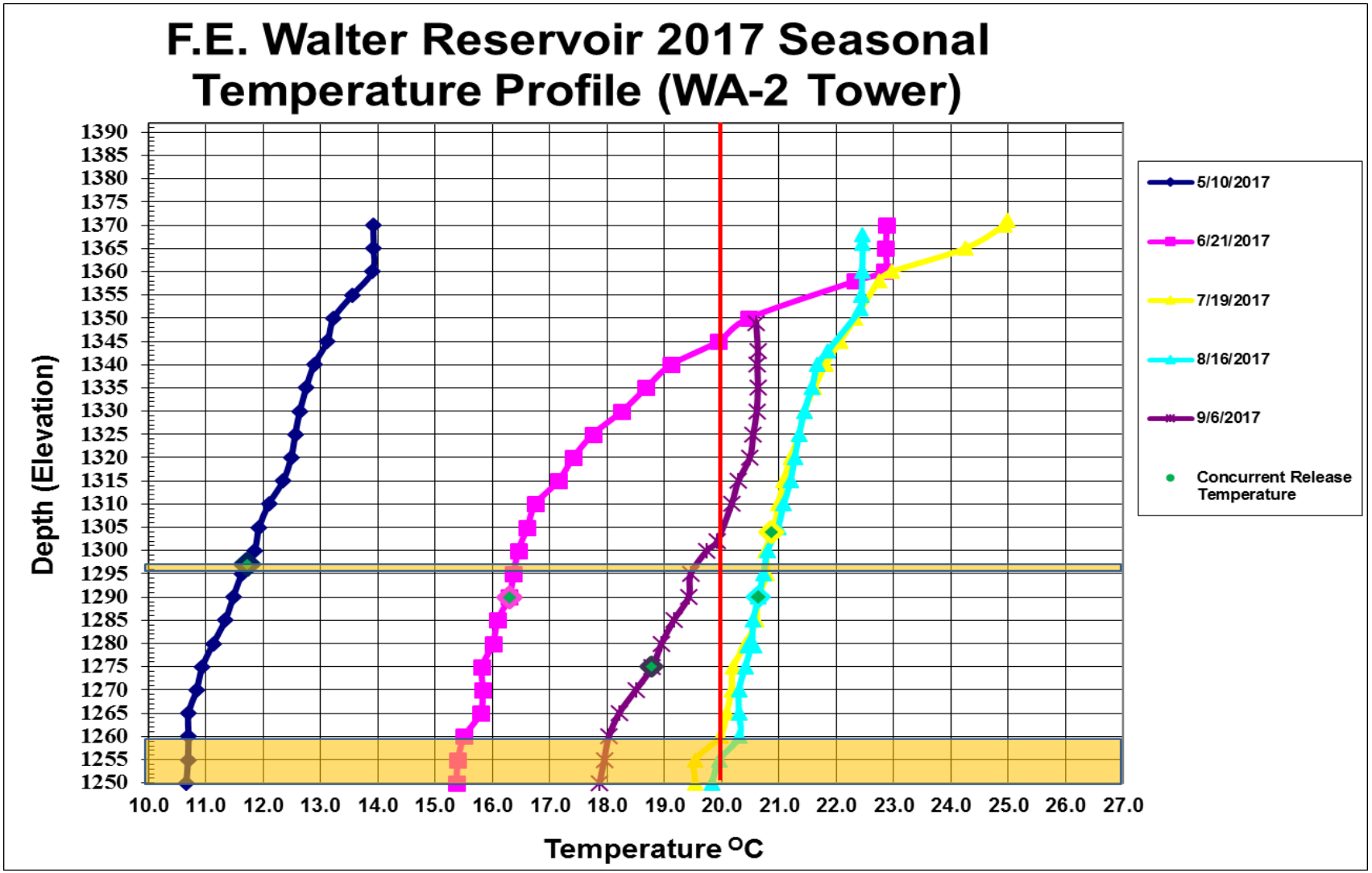

Figure 3-2. Stratification of temperature measured in the water column of F. E. Walter Reservoir at station WA-2 during 2017. See Appendix A for a summary of the plotted values. The coldwater species preference temperature of 20°C is shown as a red line reference.

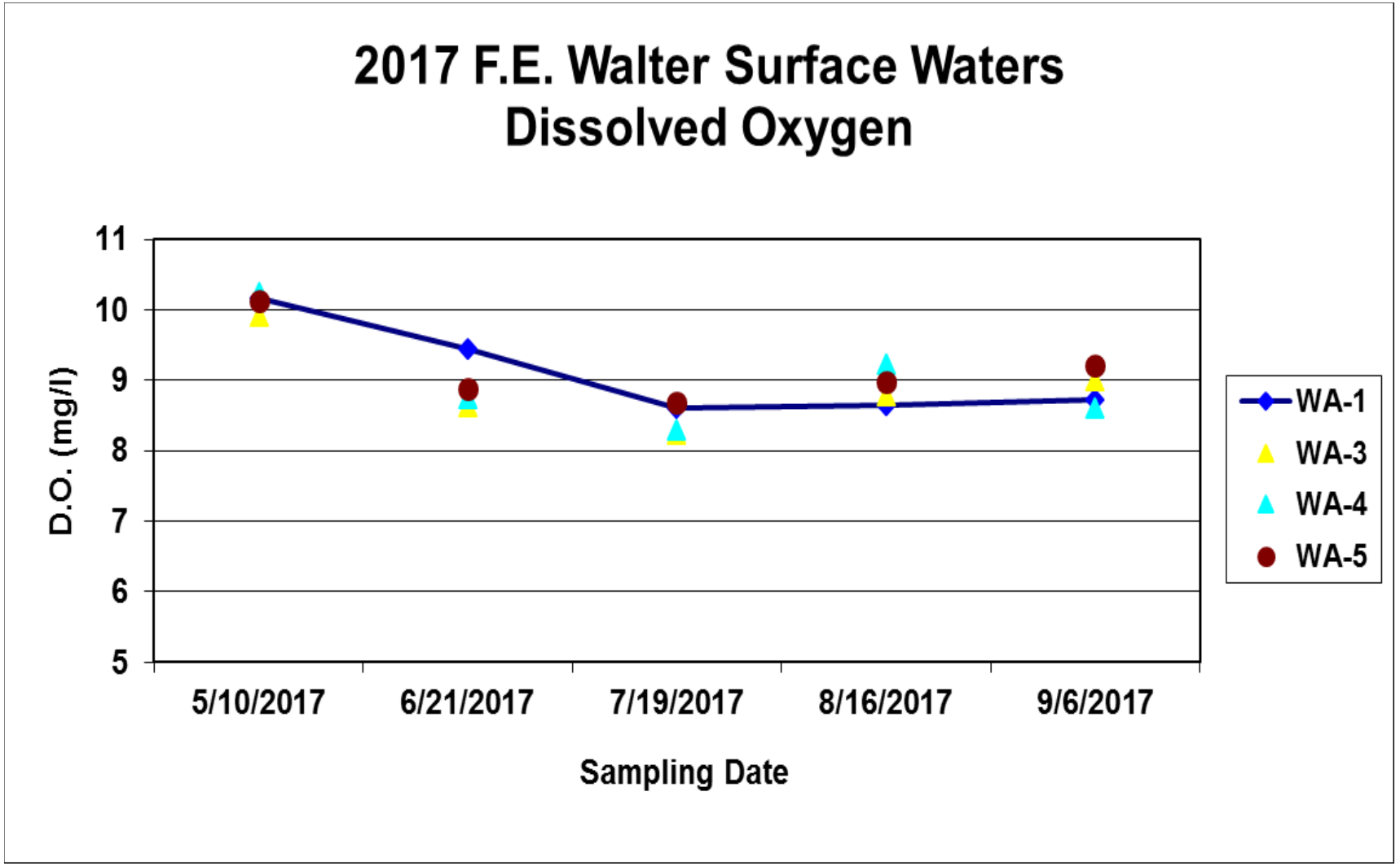

Figure 3-3. Dissolved oxygen measured in tributary and release (WA-1) surface waters of F. E. Walter Reservoir during 2017. See Appendix A for a summary of the plotted value.

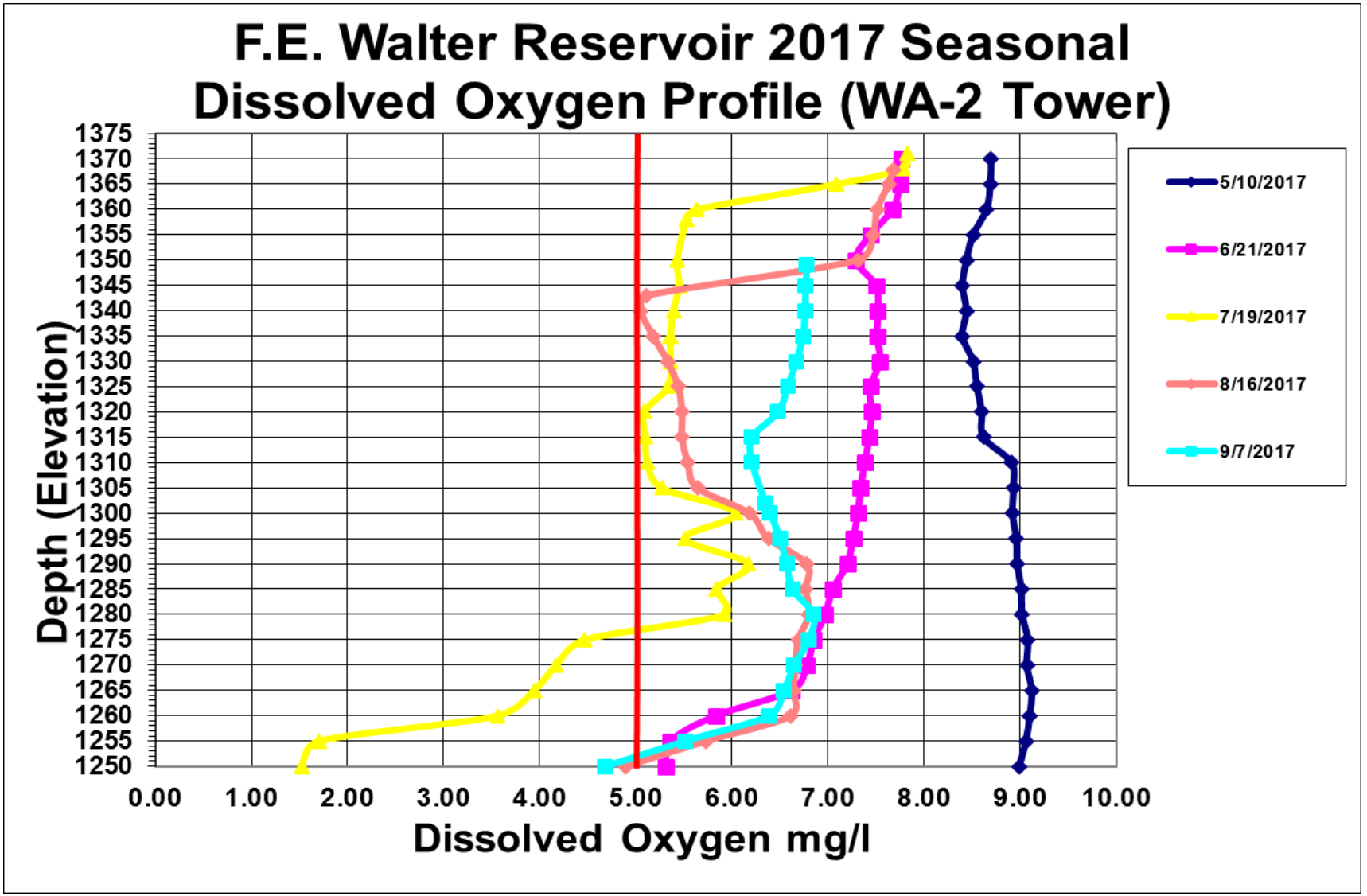

Figure 3-4. Dissolved oxygen measured in the water column of F.E. Walter Reservoir at station WA-2 during 2017. The PADEP WQ standard for DO is an epilimnion minimum concentration of 5 mg/L. See Appendix A for a summary of the plotted values.

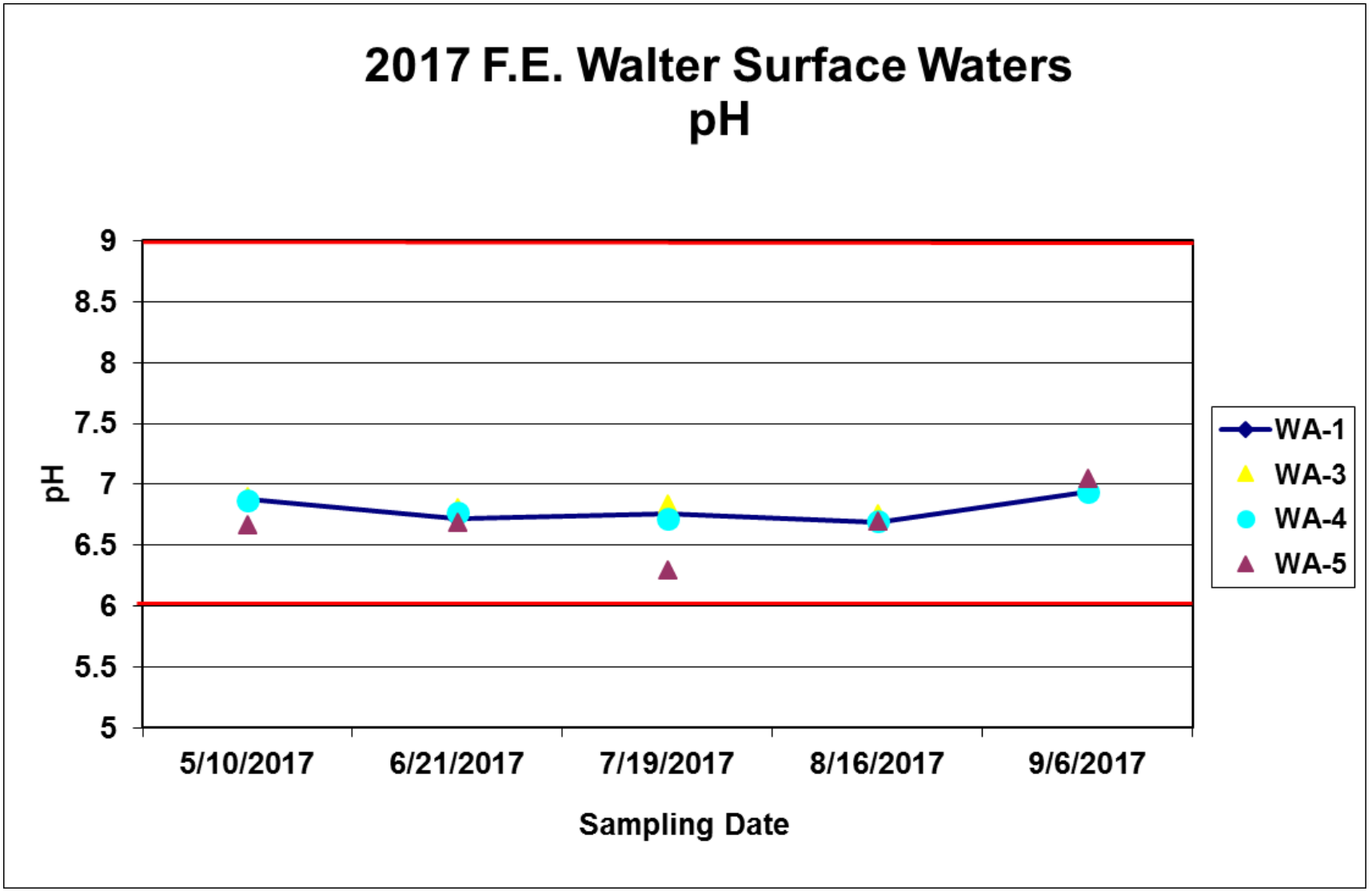

Figure 3-5. Measures of pH in tributary and release (WA-1) surface waters of F.E. Walter Reservoir during 2017. The PADEP WQ standard for pH is an acceptable range from 6 to 9. See Appendix A for a summary of the plotted values

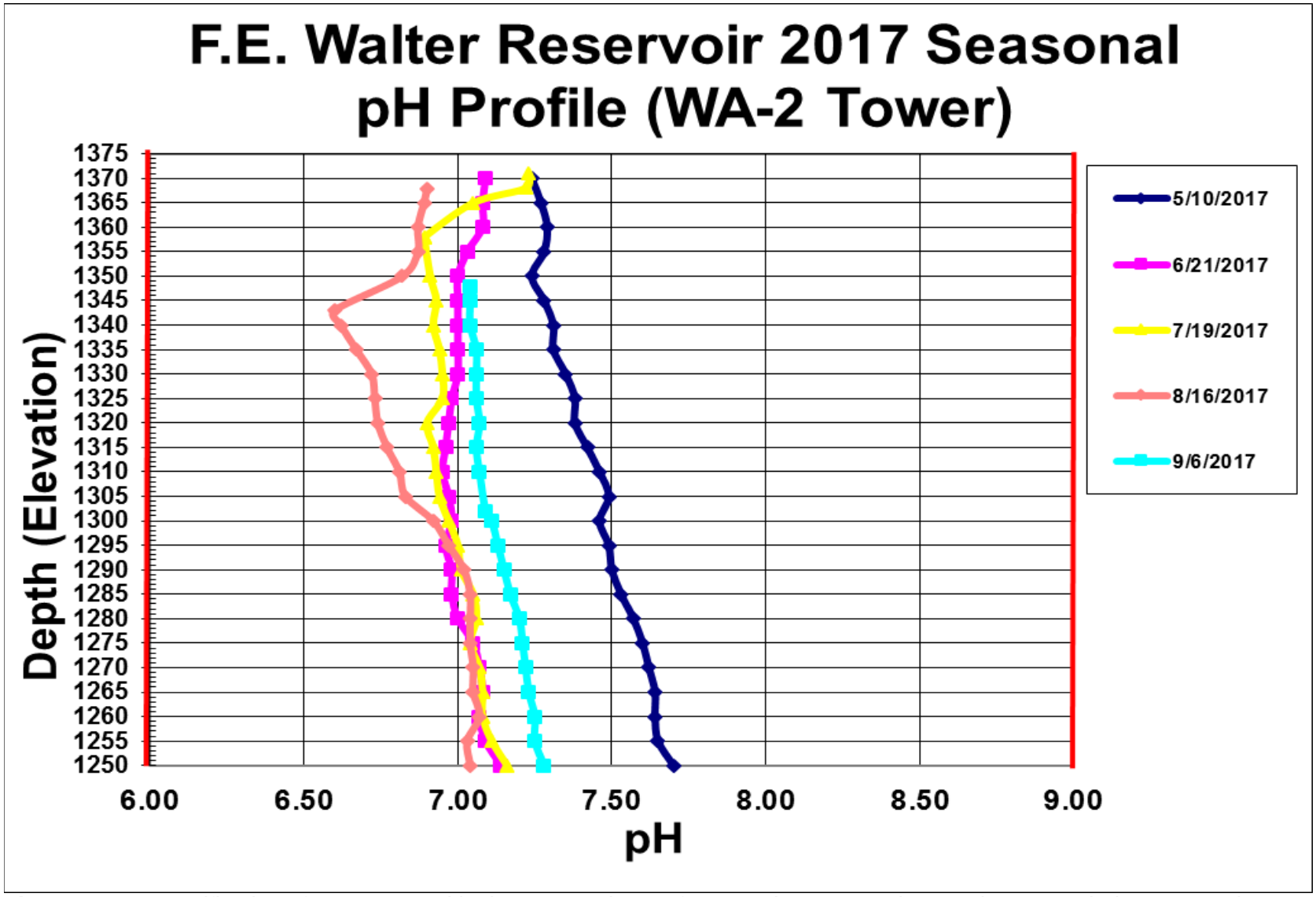

Figure 3-6. Stratification of pH measured in the water column of F.E. Walter Reservoir at station WA-2 during 2017. The PADEP water quality standard pH is an acceptable range from 6 to 9. See Appendix A for a summary of the plotted value.

Table 3-1. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-01S	5/10/2017	6	<2	<.05	<.05	<.05	0.08	<.01	30	0.31	5.7	0.02	<3
	6/21/2017	6	<2	<.05	<.05	<.05	0.07	<.01	79	<.25	4.7	0.01	<3
	7/19/2017	7	<2	<.05	0.07	<.05	0.09	<.01	60	0.56	6.1	0.02	3
	8/16/2017	11	<2	<.05	0.05	<.05	0.08	<.01	55	0.51	6.7	0.01	3
	9/6/2017	9	<2	<.05	<.05	<.05	0.11	<.01	81	0.44	4.9	0.01	4
	Mean	8	2	0.05	0.05	0.05	0.08	0.01	61	0.41	5.6	0.01	3.2
	Stdev	2	0	0	0	0	0.02	0	18.5	0.09	0.7	0.01	0
	Max	11	2	0.05	0.07	0.05	0.11	0.01	81	0.56	6.7	0.02	4
	Min	6	2	0.05	0.05	0.05	0.06	0.01	30	0.25	4.7	0.01	3
	No. of Det	5	0	0	2	0	5	0	5	4	5	5	3
WA-02S	5/10/2017	5	<2	<.05	<.05	<.05	0.07	<.01	19	<.25	5.2	<.01	<3
	6/21/2017	6	<2	<.05	<.05	<.05	0.09	<.01	53	0.27	4.8	0.01	<3
	7/19/2017	7	<2	<.05	<.05	<.05	0.06	<.01	57	0.4	5	<.01	3
	8/16/2017	9	<2	<.05	<.05	<.05	0.09	<.01	48	0.45	5.7	<.01	<3
	9/6/2017	7	<2	<.05	<.05	<.05	0.09	<.01	81	0.49	5.2	<.01	<3
	Mean	6.8	2	0.05	0.05	0.05	0.08	0.01	62	0.40	5.3	0.01	3
	Stdev	1	0	0	0	0	0.05	0	36	0.20	2.9	0.00	0
	Max	9	2	0.05	0.05	0.05	0.09	0.01	81	0.49	5.7	0.01	3
	Min	5	2	0.05	0.05	0.05	0.06	0.01	48	0.25	5	0.01	3
	No. of Det	5	0	0	0	0	5	0	5	4	5	1	1

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-02M	5/10/2017	5	<2	<.05	<.05	<.05	0.07	<.01	41	<.25	5.2	<.01	<3
	6/21/2017	6	<2	<.05	<.05	<.05	0.09	<.01	74	<.25	4.8	<.01	<3
	7/19/2017	8	<2	<.05	0.07	<.05	0.1	<.01	71	0.33	5	<.01	<3
	8/16/2017	7	<2	<.05	<.05	<.05	0.09	<.01	49	0.43	6.4	<.01	<3
	9/6/2017	8	<2	<.05	<.05	<.05	0.09	<.01	103	0.44	5.2	<.01	<3
	Mean	7	2	0.05	0.05	0.05	0.09	0.01	68	0.34	5.32	0.01	3
	Stdev	1	0	0	0.01	0	0.01	0.00	24	0.09	0.6	0.00	0
	Max	8	2	0.05	0.07	0.05	0.1	0.01	103	0.44	6.4	0.01	3
	Min	5	2	0.05	0.05	0.05	0.07	0.01	41	0.25	4.8	0.01	3
	No. of Det	5	0	0	1	0	5	0	5	3	5	0	0
WA-02B	5/10/2017	6	<2	<.05	<.05	<.05	0.08	<.01	47	<.25	5.7	0.02	4
	6/21/2017	7	<2	<.05	<.05	<.05	0.09	<.01	74	0.41	5.8	<.01	11
	7/19/2017	11	<2	<.05	0.19	<.05	0.09	<.01	69	<.25	6.1	0.01	9
	8/16/2017	10	<2	<.05	0.08	<.05	0.08	<.01	63	0.55	7	0.01	8
	9/6/2017	9	<2	<.05	<.05	<.05	0.11	<.01	80	0.43	5.1	0.01	3
	Mean	9	2	0.05	0.08	0.05	0.09	0.01	67	0.38	5.9	0.01	7
	Stdev	2	0	0	0.06	0	0.01	0.00	13	0.13	0.7	0	3
	Max	11	2	0.05	0.19	0.05	0.11	0.01	80	0.55	7	0.02	11
	Min	6	2	0.05	0.05	0.05	0.08	0.01	47	0.25	5.1	0.01	3
	No. of Det	5	0	0	2	0	5	0	5	3	5	4	5

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-03S	5/10/2017	8	<2	<.05	<.05	<.05	0.12	<.01	50	0.28	6.7	0.03	3
	6/21/2017	9	<2	<.05	<.05	<.05	0.11	<.01	73	0.42	9.3	0.02	3
	7/19/2017	12	<2	<.05	<.05	<.05	0.13	<.01	78	0.54	6.7	<.01	<3
	8/16/2017	11	<2	<.05	<.05	<.05	0.1	<.01	71	0.65	8.2	0.01	3
	9/6/2017	12	<2	<.05	<.05	<.05	0.09	<.01	95	0.52	9.1	<.01	14
	Mean	10	2	0.05	0.05	0.05	0.11	0.01	73	0.48	8.0	0.02	5
	Stdev	2	0	0	0	0	0.02	0.00	16	0.14	1.3	0.01	5
	Max	12	2	0.05	0.05	0.05	0.13	0.01	95	0.65	9.3	0.03	14
	Min	8	2	0.05	0.05	0.05	0.09	0.01	50	0.28	6.7	0.01	3
	No. of Det	5	0	0	0	0	5	0	5	5	5	3	4
WA-04S	5/10/2017	8	<2	<.05	<.05	<.05	0.06	<.01	26	0.29	5.1	0.02	3
	6/21/2017	11	<2	<.05	<.05	<.05	0.11	<.01	97	0.52	7.7	<.01	44
	7/19/2017	13	<2	<.05	<.05	<.05	0.07	<.01	64	1.15	8.8	<.01	9
	8/16/2017	12	<2	<.05	<.05	<.05	0.11	<.01	56	0.81	8.6	<.01	<3
	9/6/2017	14	<2	<.05	<.05	<.05	0.11	<.01	79	0.67	6.1	<.01	<3
	Mean	12	2	0.05	0.05	0.05	0.09	0.01	64	0.69	7.3	0.01	12
	Stdev	2	0	0	0	0	0.02	0.00	27	0.32	1.6	0.00	18
	Max	14	2	0.05	0.05	0.05	0.11	0.01	97	1.15	8.8	0.02	44
	Min	8	2	0.05	0.05	0.05	0.06	0.01	26	0.29	5.1	0.01	3
	No. of Det	5	0	0	0	0	5	0	5	5	5	1	3

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-05S	5/10/2017	2	<2	<.05	<.05	<.05	<.05	<.01	22	<.25	5	0.02	<3
	6/21/2017	4	<2	<.05	<.05	<.05	<.05	<.01	72	0.3	6.4	0.01	<3
	7/19/2017	3	2	<.05	<.05	<.05	<.05	<.01	33	0.49	9.7	0.01	<3
	8/16/2017	4	<2	<.05	<.05	<.05	<.05	<.01	42	0.42	5.8	<.01	<3
	9/6/2017	4	<2	<.05	<.05	<.05	<.05	<.01	68	0.52	4.9	<.01	48
	Mean	3	2	0.05	0.05	0.05	0.05	0.01	47	0.40	6.4	0.01	12
	Stdev	1	0	0	0	0	0	0	22	0.12	2.0	0.00	20
	Max	4	2	0.05	0.05	0.05	0.05	0.01	72	0.52	9.7	0.02	48
	Min	2	2	0.05	0.05	0.05	0.05	0.01	22	0.25	4.9	0.01	3
	No. of Det	5	1	0	0	0	0	0	5	4	5	3	1
WA-06S	5/10/2017	15	<2	0.06	<.05	<.05	0.07	0.02	38	<.25	4.4	0.07	<3
	6/21/2017	5	<2	<.05	<.05	<.05	0.08	<.01	51	0.3	4.9	0.05	<3
	7/19/2017	8	<2	<.05	<.05	<.05	0.06	<.01	63	0.39	4.6	0.05	<3
	8/16/2017	8	<2	<.05	<.05	<.05	0.08	<.01	54	0.47	5.6	0.05	<3
	9/6/2017	7	<2	<.05	<.05	<.05	0.09	<.01	78	0.5	5.4	0.04	<3
	Mean	8.6	2	0.05	0.05	0.05	0.08	0.01	57	0.38	5.0	0.05	3
	Stdev	3.8	0	0.00	0	0	0.01	0	15	0.11	0.5	0.01	0
	Max	15	2	0.06	0.05	0.05	0.09	0.02	78	0.5	5.6	0.07	3
	Min	5	2	0.05	0.05	0.05	0.06	0.01	38	0.25	4.4	0.04	3
	No. of Det	5	0	1	0	0	5	1	5	4	5	5	0

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-06M	5/10/2017	5	<2	<.05	<.05	<.05	0.06	<.01	18	<.25	4.5	0.01	<3
	6/21/2017	6	<2	<.05	<.05	<.05	0.08	<.01	41	0.27	4.4	<.01	<3
	7/19/2017	8	<2	<.05	0.06	<.05	0.1	<.01	59	0.37	4.8	0.01	<3
	8/16/2017	7	<2	<.05	<.05	<.05	0.09	<.01	49	0.81	6.4	<.01	<3
	9/6/2017	7	<2	<.05	<.05	<.05	0.09	<.01	82	0.45	5.4	0.01	<3
	Mean	7	2	0.05	0.05	0.05	0.08	0.01	50	0.43	5.1	0.01	3
	Stdev	1	0	0	0.00	0	0.02	0	24	0.23	0.8	0.00	0
	Max	8	2	0.05	0.06	0.05	0.1	0.01	82	0.81	6.4	0.01	3
	Min	5	2	0.05	0.05	0.05	0.06	0.01	18	0.25	4.4	0.01	3
	No. of Det	5	0	0	1	0	5	0	5	4	5	3	0
WA-06B	5/10/2017	4	<2	<.05	<.05	<.05	<.05	<.01	16	<.25	4.6	0.02	<3
	6/21/2017	6	<2	<.05	<.05	<.05	0.08	<.01	64	0.86	5.2	<.01	4
	7/19/2017	5	<2	<.05	0.06	<.05	<.05	<.01	58	0.89	8.8	0.01	35
	8/16/2017	9	<2	<.05	0.05	<.05	0.08	<.01	55	0.46	6.4	<.01	22
	9/6/2017	6	<2	<.05	<.05	<.05	0.08	<.01	80	0.73	4.9	<.01	<3
	Mean	6.0	2	0.05	0.05	0.05	0.07	0.01	55	0.64	6.0	0.01	13
	Stdev	1.9	0	0	0.00	0	0.02	0	24	0.28	1.7	0	15
	Max	9	2	0.05	0.06	0.05	0.08	0.01	80	0.89	8.8	0.02	35
	Min	4	2	0.05	0.05	0.05	0.05	0.01	16	0.25	4.6	0.01	3
	No. of Det	5	0	0	2	0	3	0	5	4	5	2	3

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-07S	5/10/2017	5	<2	<.05	<.05	<.05	0.07	<.01	26	0.43	5.1	0.02	<3
	6/21/2017	5	<2	<.05	<.05	<.05	0.11	<.01	85	<.25	5.4	<.01	<3
	7/19/2017	9	<2	<.05	<.05	<.05	0.07	<.01	57	0.41	4.8	<.01	<3
	8/16/2017	8	<2	<.05	<.05	<.05	0.09	<.01	53	0.34	5.7	<.01	<3
	9/6/2017	8	<2	<.05	<.05	<.05	0.09	<.01	88	0.45	5.4	<.01	<3
	Mean	7	2	0.05	0.05	0.05	0.09	0.01	62	0.38	5.3	0.01	3
	Stdev	2	0	0.00	0	0	0.02	0.00	26	0.08	0.3	0.00	0
	Max	9	2	0.05	0.05	0.05	0.11	0.01	88	0.45	5.7	0.02	3
	Min	5	2	0.05	0.05	0.05	0.07	0.01	26	0.25	4.8	0.01	3
	No. of Det	5	0	0	0	0	5	0	5	4	5	1	0
WA-07M	5/10/2017	6	<2	<.05	<.05	<.05	0.09	<.01	36	<.25	5.3	0.03	<3
	6/21/2017	7	<2	<.05	<.05	<.05	0.12	<.01	71	0.4	5.2	0.02	<3
	7/19/2017	10	<2	<.05	0.07	<.05	0.11	<.01	65	0.4	4.8	0.02	<3
	8/16/2017	9	<2	<.05	<.05	<.05	0.1	<.01	51	0.37	6.4	0.02	<3
	9/6/2017	8	<2	<.05	<.05	<.05	0.09	<.01	58	0.52	5.2	0.02	<3
	Mean	8	2	0.05	0.05	0.05	0.10	0.01	56	0.39	5.4	0.02	3
	Stdev	2	0	0	0.01	0	0.01	0	14	0.10	0.6	0.00	0
	Max	10	2	0.05	0.07	0.05	0.12	0.01	71	0.52	6.4	0.03	3
	Min	6	2	0.05	0.05	0.05	0.09	0.01	36	0.25	4.8	0.02	3
	No. of Det	5	0	0	1	0	5	0	5	4	5	5	0

Table 3-1 continued. Summary of surface, middle, and bottom water quality monitoring data for F.E. Walter 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
WA-07B	5/10/2017	6	<2	<.05	<.05	<.05	0.08	<.01	42	<.25	5.7	0.02	<3
	6/21/2017	8	<2	<.05	0.08	<.05	0.1	<.01	54	0.4	6.1	0.02	7
	7/19/2017	10	<2	<.05	0.1	<.05	0.1	<.01	67	1.65	7	0.02	197
	8/16/2017	10	<2	<.05	<.05	<.05	0.09	<.01	66	0.53	7.1	0.02	15
	9/6/2017	10	<2	<.05	<.05	<.05	0.12	<.01	62	0.89	5.4	0.01	130
	Mean	9	2	0.05	0.07	0.05	0.10	0.01	58	0.74	6.3	0.02	70
	Stdev	2	0	0	0.02	0	0.01	0	10	0.56	0.8	0.00	88
	Max	10	2	0.05	0.1	0.05	0.12	0.01	67	1.65	7.1	0.02	197
	Min	6	2	0.05	0.05	0.05	0.08	0.01	42	0.25	5.4	0.01	3
	No. of Det	5	0	0	2	0	5	0	5	4	5	5	4

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 is an essential plant nutrient, it contributes to the trophic status of a water body. Excess ammonia contributes to eutrophication of water bodies. This can result in excessive algal growths and impacts on recreation and drinking water supplies. In high concentrations, ammonia is toxic to aquatic life.

Ammonia in the water column of F.E. Walter Reservoir was consistently low throughout the monitoring period with nine samples of sixty five total samples measuring greater than the laboratory reporting limit (<0.05 mg/L). The maximum measure of 0.19 mg/L of ammonia was collected at station WA-2B on 19 July (Table 3-1). F.E. Walter Reservoir was in compliance with the PADEP water quality standard for ammonia during 2017. The water quality standard of ammonia is dependent on temperature and pH (Table 3-2). Throughout the monitoring period, all measures of ammonia were less than their respective criteria values.

Table 3-2. PADEP ammonia nitrogen criteria (Pennsylvania Code, Title 25, Chapter 93 1984 and 1997). Specific ammonia criteria dependent on temperature and pH.

PH	0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C
6.50	25.5	25.5	25.5	17.4	12.0	8.4	5.9
6.75	23.6	23.6	23.6	16.0	11.1	7.7	5.5
7.00	20.6	20.6	20.6	14.0	9.7	6.8	4.8
7.25	16.7	16.7	16.7	11.4	7.8	5.5	3.9
7.50	12.4	12.4	12.4	8.5	5.9	4.1	2.9
7.75	8.5	8.5	8.5	5.8	4.0	2.8	2.0
8.00	5.5	5.5	5.5	5.8	4.0	2.8	2.0
8.25	3.4	3.4	3.4	2.3	1.6	1.2	0.9
8.50	2.0	2.0	2.0	1.4	1.0	0.7	0.6
8.75	1.2	1.2	1.2	0.9	0.6	0.5	0.4
9.00	0.8	0.8	0.8	0.5	0.4	0.3	0.3

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. Concentrations of nitrite at F.E. Walter Reservoir were consistently low during 2017. Concentrations of nitrite measured at all stations and depths were less than the reporting limit of 0.05 mg/L (Table 3-1).

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 also consistently low at F.E. Walter Reservoir during 2017. For all stations and depths, sample results ranged from less than

the reporting limit of 0.05 mg/L to a high of 0.13 mg/L in the surface waters at station WA-3S on 19 July.

In 2017, F.E. Walter Reservoir was in compliance with the PADEP water quality standard for nitrogen. The water quality standard for nitrogen is a summed concentration of nitrite and nitrate of less than 10-mg/L. Throughout the monitoring period, the summed concentrations for each station were well below this standard. The maximum summed concentration for any one sampling station did not exceed 0.18 mg/L.

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 an inorganic form occurs. TKN in the water column of F.E. Walter Reservoir was low during 2017 (Table 3-1). Concentrations measured at all reservoir stations ranged from less than the reporting limit of 0.25 mg/L to a high of 1.65 mg/L at station WA-7B on 19 July. Slightly higher concentrations were most often observed in the bottom waters at all lake sampling stations.

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. Concentrations of total phosphorus were occasionally elevated at some of the reservoir sampling stations during the sampling season (Table 3-1). For all stations and depths, concentrations ranged from less than the reporting limit of 0.01 mg/L to a high of 0.07 mg/L. The maximum single sample concentration of 0.07 mg/L was measured on 10 May at station WA-06S.

3.2.5 Dissolved Phosphorus

Dissolved or soluble phosphorus (DISS P) in the water column of F.E. Walter Reservoir remained consistently low during 2017. With the exception of one sample (0.06 mg/L), concentrations at all stations and depths during the sampling season were below the reporting limit of 0.05 mg/L (Table 3-1). In freshwater environments, dissolved phosphorus is usually a limiting nutrient and is utilized by freshwater plants and algae during photosynthesis.

3.2.6 Dissolved Phosphate

Dissolved Phosphate or 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 2017, concentrations of dissolved phosphate were near or below the reporting limit of 0.01 mg/L at all stations and depths (Table 3-1). The single highest measure of 0.02 mg/L was recorded on 10 May at station WA-06S.

3.2.7 Total Dissolved Solids

Total Dissolved Solids (TDS) is a measure of the amount of filterable dissolved material in the water. Dissolved salts such as sulfate, magnesium, chloride, and sodium contribute to elevated levels. TDS in the lake and tributary stations of F.E. Walter Reservoir remained relatively constant and low during 2017. Concentrations at all stations and depths over the monitoring period ranged from 16 to 103 mg/L (Table 3-1). The highest mean concentration of 103 mg/L was seen at the in lake station WA-02M in September. F.E. Walter Reservoir and its tributaries were in compliance with the PADEP water quality standard for total dissolved solids during 2017. The water quality standard is a maximum concentration of 500-mg/L.

3.2.8 Total Suspended Solids

Total Suspended Solids (TSS) is a measure of the amount of non-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). TSS measures in the water column of F.E. Walter Reservoir were low in 2017 with most sample results less than the reporting limit of 3.0 mg/L and a maximum concentration of 197 mg/L (Table 3-1). Elevated results were most seen in the lake bottom water samples. This is likely a result of sampling error and resulting interference of suspended sediment in the sampling apparatus during lake bottom water sample collection. On occasion, bottom sediments are re-suspended during the process of collecting a sample from deeper waters. These elevated results do not always accurately reflect conditions at those stations and depths.

3.2.9 Biochemical Oxygen Demand

Five-day biochemical oxygen demand (BOD) 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.

Measurements of 5-day Biochemical oxygen demand (BOD) for all samples at F.E. Walter Reservoir and its tributary stations in 2017 were below the reporting limit of 2.0 mg/L. It is therefore inferred that F.E. Walter 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 measurements in the waters of F.E. Walter Reservoir were routinely low during 2017. Concentrations measured at all stations and depths ranged from 2.0 mg/L to 15.0 mg/L $CaCO_3$ throughout the monitoring period (Table 3-1). The natural alkalinity of water is largely dependent on the underlying geology and soils within the surrounding watershed. The low alkalinity typically measured at F.E. Walter Reservoir probably results from the regional geology, which is primarily sandstone and shale (Van Diver 1990).

3.2.11 Total Organic Carbon

Total Organic Carbon (TOC) is a measure of the dissolved and particulate organic carbon in water. The bulk of organic carbon in water is composed of humic substances and partly degraded animal and plant materials. High levels of organic carbon coincide with a lowering of dissolved oxygen concentrations. Carbon is a nutrient required for biological processes.

Total Organic Carbon (TOC) was measured in the water column and tributaries of F.E. Walter Reservoir (Table 3-1). Concentrations of TOC at all stations and depths ranged from 4.4 mg/L to 9.7 mg/L. The highest single measured concentration of 9.7 mg/L was in the surface waters at tributary station WA-5S on 19 July.

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. For the entire sampling season, chlorophyll *a* was low in the surface waters of F.E. Walter Reservoir (Appendix A). Concentrations for all sampling dates for tributary and lake stations at depths from 0-15 feet ranged from 0.0 ug/L to 7.2 ug/L.

3.3 TROPHIC STATE DETERMINATION

Carlson's (1977) trophic state index (TSI) is a method of expressing the extent of eutrophication of a lake, quantitatively. The trophic state analysis calculates separate indices for eutrophication based on measures of total phosphorus, chlorophyll *a*, and secchi disc depth. 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 F.E. Walter Reservoir was based on a single sample each month during the sampling season. It is important to note that variability in measurements not captured between sampling events and the resulting classification can occur. Figure 3-7 graphically shows this potential variability between samples.

TSIs calculated for measures of total phosphorus classified F.E. Walter 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 classified F.E. Walter Reservoir as mesotrophic in May (44.71), June (46.07), July (49.17), August (45.42) and September (48.12). TSIs calculated for measures of chlorophyll *a* classified F.E. Walter Reservoir as oligotrophic in June (38.02) and mesotrophic in May (44.03), July (46.45), August (41.92), and September (41.92).

Carlson (1977) warned against averaging TSI values estimated for different parameters, and instead suggested giving priority to chlorophyll a during the summer and to phosphorus in the spring, fall, and winter. With this in mind, and based on the pattern of TSI values for secchi disk depth, chlorophyll a and total phosphorus, F.E. Walter Reservoir was mesotrophic in May and June and oligotrophic in July, August, and September. Cumulatively, F.E. Walter Reservoir can be considered mesotrophic during the 2017 sampling season.

The EPA (1983) also provides criteria for classifying the trophic conditions of lakes of the North Temperate Zone based on concentrations of total phosphorus, chlorophyll *a*, and secchi disk depth (Table 3-3). Taking into account the general agreement between the EPA classifications with that of the Carlson TSIs, the trophic condition of F.E. Walter Reservoir fluctuated between being mesotrophic and oligotrophic throughout much of the 2017 sampling season.

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

Water Quality Variable	Oligo-trophic	Meso-trophic	Eutrophic	10 May	21 June	19 July	16 Aug.	06 Sep.
Total Phosphorus (ppb)	<10	10-20	>20	<10	<10	<10	<10	<10
Chlorophyll a (ppb)	<4	4-10	>10	3.93	2.13	5.03	3.17	3.17
Secchi Depth (m)	>4	2-4	<2	2.89	2.63	2.12	2.75	2.28

3.4 RESERVOIR BACTERIA MONITORING

Two forms of coliform bacteria were monitored in the tributary and lake surface waters at F.E. Walter 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 measures for all lake and tributary stations at F.E. Walter Reservoir during 2017, ranged from 81-clns/100-ml to greater than the detection limit of 2400-clns/100-ml. Fecal coliform counts ranged from less than the detection limit of 2-clns/100-ml to 700-clns/100-ml for the monitoring period. Overall, bacteria levels were low at F.E. Walter Reservoir with respect to PADEP water quality standards. Elevated bacteria levels were seen primarily in tributary surface water stations WA-3S, WA-4S, and WA-5S and are directly affected by upstream watershed activity. For waters with contact recreation, the water quality standard for bacterial contamination is a single fecal sample standard of 1000 colonies/100-ml. No fecal coliform bacteria samples exceeded the PADEP water contact recreation standard. Water contact recreation is not permitted at F.E. Walter Reservoir.

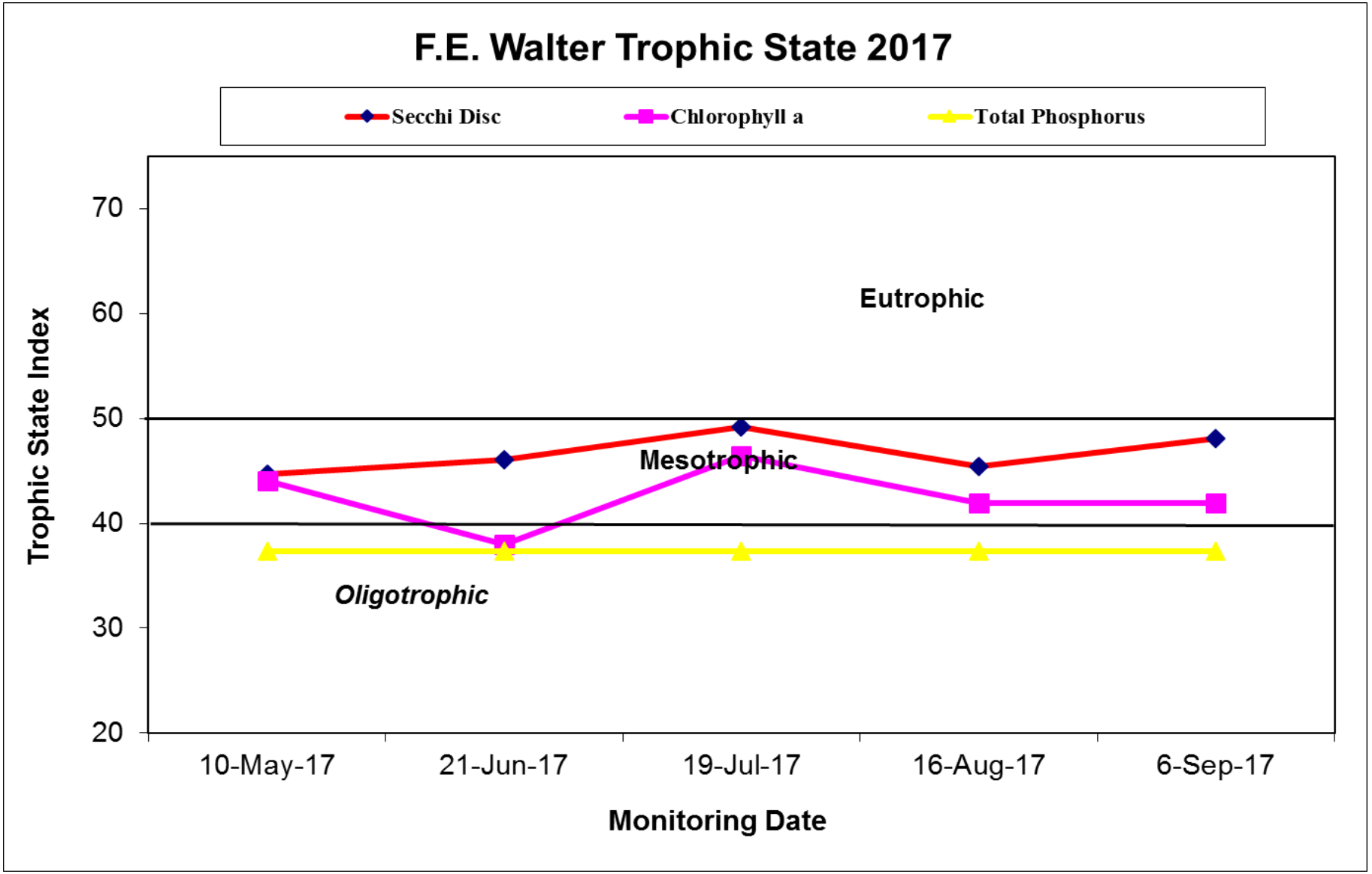

Figure 3-7. Carlson Trophic state indices calculated from secchi disk depth, concentrations of chlorophyll a and Total Phosphorus measured in surface waters of F.E. Walter Reservoir at Station WA-2 during 2017.

Table 3-4. Surface water bacteria counts (colonies/100 ml) at Walter Reservoir during 2017. Shaded values exceed State bacteria criteria. NS = Not Sampled in 2017

STATION	DATE	Total Coliform		Fecal Coliform		Escherichia coli	
WA-1S	5/10/17		920		16		NS
	6/21/17		820	<	2		NS
	7/19/17	>	2400		190		NS
	8/16/17	>	2400		3		NS
	9/6/17		870		5		NS
WA-2S	5/10/17		120	<	2		NS
	6/21/17	>	2400	<	2		NS
	7/19/17	>	2400		3		NS
	8/16/17		550		5		NS
	9/6/17		280	<	2		NS
WA-3S	5/10/17		1600		2		NS
	6/21/17	>	2400		120		NS
	7/19/17	>	2400		28		NS
	8/16/17	>	2400		15		NS
	9/6/17	>	2400		700		NS
WA-4S	5/10/17	>	2400		13		NS
	6/21/17	>	2400		92		NS
	7/19/17	>	2400		380		NS
	8/16/17	>	2400		34		NS
	9/6/17	>	2400		610		NS
WA-5S	5/10/17		1700		6		NS
	6/21/17	>	2400		44		NS
	7/19/17	>	2400		320		NS
	8/16/17	>	2400		15		NS
	9/6/17	>	2400		340		NS
WA-6S	5/10/17		81	<	2		NS
	6/21/17	>	2400		15		NS
	7/19/17	>	2400		3		NS
	8/16/17		770	<	2		NS
	9/6/17		1000	<	2		NS
WA-7S	5/10/17		120	<	2		NS
	6/21/17	>	2400		44		NS
	7/19/17	>	2400		5		NS
	8/16/17		650	<	2		NS
	9/6/17		520	<	2		NS

4.0 REFERENCES

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APPENDIX A

STRATIFICATION DATA TABLES

2017 F.E. Walter Water Quality Profiles

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
	5/10/2017	9:42:39	0.5	11.74	93.9	10.17	6.88	-58.6	166.7	5.4	4.8	0.072
	6/21/2017	9:18:33	0.5	16.29	96.3	9.44	6.72	-49.3	128.8	4.3	1.7	0.071
WA-1	7/19/2017	9:08:16	0.5	20.86	96.4	8.61	6.76	-51.5	104.5	8.4	4.0	0.084
Outfall	8/16/2017	9:22:57	0.5	20.64	96.3	8.64	6.69	-47.7	90.8	12.8	1.8	0.093
	9/6/2017	9:33:39	0.5	18.78	93.7	8.73	6.94	-61.6	94.9	12.3	0.0	0.087
		7:51:32	0.5	13.92	84.3	8.70	7.24	-78	145.7	1.0	3.6	0.072
		7:49:58	5	13.93	84.2	8.69	7.27	-79.6	144.8	1.4	4.0	0.072
		7:48:19	10	13.91	83.8	8.65	7.29	-80.9	144	1.8	4.2	0.072
		7:47:08	15	13.56	81.8	8.51	7.28	-80.2	144.1	2.0	3.4	0.07
		7:46:23	20	13.23	80.5	8.44	7.24	-78	144.8	1.5	5.4	0.071
		7:45:23	25	13.12	80	8.40	7.28	-80.5	143	2.1	5.1	0.073
		7:44:19	30	12.89	79.9	8.44	7.31	-81.9	142.2	2.3	4.9	0.074
WA-2		7:43:16	35	12.75	79.3	8.40	7.31	-81.8	142.3	2.8	4.4	0.073
		7:42:28	40	12.64	80.1	8.51	7.35	-84.3	140.1	2.5	4.6	0.074
Lake		7:41:20	45	12.56	80.4	8.55	7.38	-86	139.2	2.3	4.9	0.074
Tower	5/10/2017	7:40:18	50	12.49	80.7	8.60	7.38	-86	139.5	2.7	5.2	0.072
		7:39:30	55	12.35	80.7	8.62	7.42	-87.8	137.1	3.4	4.4	0.071
Lake		7:38:09	60	12.1	82.9	8.91	7.46	-90.2	135.4	2.9	4.7	0.073
Tower		7:37:18	65	11.93	82.7	8.93	7.49	-91.6	135.1	3.5	5.3	0.072
Secchi		7:36:03	70	11.85	82.5	8.92	7.46	-90.4	135	3.2	4.7	0.072
		7:35:08	75	11.63	82.4	8.96	7.49	-91.9	134.3	3.3	5.3	0.072
2.89 M		7:34:03	80	11.48	82.3	8.97	7.50	-92.5	132.9	3.9	4.9	0.073
		7:32:20	85	11.34	82.3	9.01	7.53	-93.9	131.4	3.3	5.6	0.073
		7:31:10	90	11.13	82.1	9.02	7.57	-96.2	129.4	3.4	5.2	0.073
		7:29:48	95	10.94	82.3	9.08	7.60	-97.7	128.5	5.0	5.3	0.073
		7:28:33	100	10.84	82	9.07	7.62	-99	126.7	8.5	4.9	0.073
		7:27:39	105	10.7	82.1	9.12	7.64	-100	124	4.9	6.3	0.072
		7:25:35	110	10.7	82	9.10	7.64	-99.9	121.4	4.8	5.2	0.072
		7:24:37	115	10.69	81.6	9.06	7.65	-100.4	118.5	**81.0**	9.7	0.072
		7:22:40	120	10.66	81	8.99	7.70	-103.3	113.3	**486.6**	12.1	0.072

2017 F.E. Walter Water Quality Profiles

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
		7:49:19	0.5	22.88	90.2	7.76	7.09	-70.3	122.7	0.4	2.2	0.085
		7:48:28	5	22.86	90.1	7.75	7.08	-69.4	123.8	0.3	2	0.085
		7:47:38	10	22.83	89.1	7.67	7.08	-69.5	123.6	0.3	2.2	0.085
		7:46:51	15	22.33	85.6	7.44	7.03	-66.6	125.8	0	1.9	0.085
WA-2		7:45:55	20	20.47	81.0	7.29	7.00	-65.1	128.3	1.8	2.1	0.087
		7:44:48	25	19.94	82.4	7.50	7.00	-64.8	128.7	1.5	2.4	0.084
Lake		7:43:58	30	19.12	81.3	7.52	7.00	-64.8	128.6	0.3	2.1	0.082
Tower		7:43:10	35	18.68	80.4	7.51	7.00	-65	128.9	1.7	3.5	0.081
		7:42:05	40	18.26	80.1	7.54	7.00	-65	129.3	1.4	3.1	0.079
Secchi		7:41:07	45	17.75	78.2	7.44	6.98	-63.6	130.2	1.2	2.1	0.075
	6/21/2017	7:39:54	50	17.41	77.7	7.45	6.97	-63.2	130.8	1.3	2.2	0.074
2.63 M		7:39:04	55	17.15	77.1	7.43	6.96	-63.1	130.7	0.9	2.4	0.072
		7:38:21	60	16.75	75.9	7.38	6.95	-62.4	131.3	1.1	1.9	0.071
		7:37:37	65	16.61	75.3	7.34	6.97	-63.5	130.4	1.8	2.5	0.073
		7:36:39	70	16.45	74.7	7.31	6.98	-63.8	130.7	1	2.1	0.074
		7:35:56	75	16.37	74.1	7.26	6.96	-63.1	130.3	1.8	2.3	0.068
		7:34:45	80	16.29	73.4	7.20	6.98	-63.8	129.3	1.8	2.5	0.067
		7:33:48	85	16.09	71.6	7.05	6.98	-63.7	128.6	2.6	3.1	0.068
		7:33:09	90	16.01	70.7	6.97	7.00	-65.1	127.0	2.6	2.6	0.068
		7:32:27	95	15.82	69.2	6.85	7.05	-67.7	126.2	2.9	2.3	0.075
		7:31:31	100	15.83	68.5	6.78	7.07	-68.7	125.2	2.4	3.1	0.075
		7:30:48	105	15.79	66.8	6.62	7.08	-69.3	125.1	3.1	2.9	0.074
		7:29:28	110	15.51	58.4	5.83	7.07	-69	126.4	13.5	2.5	0.075
		7:27:58	115	15.40	53.6	5.36	7.09	-70.2	126.4	11.6	2.3	0.076
		7:26:06	120	15.37	53.1	5.31	7.14	-72.5	124.8	18.2	2.6	0.076
		7:36:20	0.5	24.99	94.7	7.82	7.23	-78.4	103.7	1.0	4.7	0.094
		7:35:27	5	24.93	94.1	7.78	7.22	-77.6	103.6	1.6	4.6	0.094
		7:33:48	10	24.24	84.7	7.09	7.05	-68.1	111.1	1.1	5.8	0.093
		7:32:28	15	22.96	65.6	5.63	6.89	-59	118.1	1.6	2.8	0.093
		7:31:55	20	22.74	64.2	5.53	6.89	-58.9	118.1	1.2	3.2	0.091
		7:31:19	25	22.33	62.5	5.43	6.91	-59.6	117.5	0.7	3.1	0.092
WA-2		7:30:39	30	22.06	62.4	5.45	6.93	-60.9	116.9	0.5	3.0	0.094
Lake		7:29:48	35	21.81	61.4	5.39	6.92	-60.7	117.6	0.8	3.5	0.095
Tower		7:29:07	40	21.61	60.8	5.36	6.94	-61.4	117.5	0.7	3.4	0.095
		7:28:15	45	21.44	60.6	5.36	6.95	-62	117.8	1.1	3.3	0.096
Secchi	7/19/2017	7:27:36	50	21.35	60.3	5.34	6.95	-62	118.5	1.3	4.1	0.097
		7:26:37	55	21.20	57.4	5.09	6.90	-59.4	120.9	1.5	2.6	0.088
2.12 M		7:25:39	60	21.08	57.3	5.10	6.92	-60.3	120.8	2.8	3.1	0.087
		7:24:31	65	20.99	57.4	5.12	6.93	-61.1	120.1	2.6	3.1	0.086
		7:23:16	70	20.91	59.1	5.27	6.94	-61.6	120.6	4.0	3.4	0.088
		7:22:18	75	20.77	67.4	6.04	6.97	-63.6	119	8.8	4.3	0.075
		7:21:15	80	20.79	61.5	5.51	7.00	-65.3	117.4	3.0	4.0	0.093
		7:20:11	85	20.63	68.7	6.17	7.01	-65.7	117.7	8.6	4.4	0.074
		7:18:43	90	20.60	65.0	5.84	7.05	-67.7	114.9	7.7	4.9	0.080
		7:17:51	95	20.42	65.7	5.92	7.06	-68.2	114.4	11.0	5.2	0.077
		7:16:32	100	20.20	49.4	4.47	7.04	-67.5	114	10.1	3.7	0.088
		7:15:07	105	20.17	46.0	4.17	7.07	-68.7	111.8	8.5	3.8	0.092
		7:13:47	110	20.08	43.4	3.94	7.08	-69.4	110	9.1	3.4	0.092
		7:12:14	115	19.97	39.2	3.56	7.08	-69.3	107.3	13.3	5.0	0.093
		7:10:46	120	19.54	18.5	1.70	7.11	-70.9	100.4	21.6	4.4	0.098
		7:09:29	121	19.54	16.6	1.52	7.16	-74	111.6	21.5	1.3	0.099

2017 F.E. Walter Water Quality Profiles

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
		7:48:53	0.5	22.45	88.6	7.68	6.9	-59.6	91.2	1.00	2.7	0.088
		7:47:52	5	22.46	88	7.63	6.89	-58.7	92.1	0.60	3.8	0.088
		7:47:17	10	22.45	86.6	7.51	6.87	-57.8	93.2	1.10	3.0	0.088
		7:46:28	15	22.44	86.1	7.47	6.87	-57.4	93.5	0.90	2.8	0.088
		7:45:28	20	22.42	84.3	7.31	6.82	-54.7	96.5	0.60	2.8	0.088
		7:44:15	25	21.85	58.3	5.11	6.6	-42.4	106.6	0.30	2.5	0.080
		7:42:08	30	21.67	57.3	5.05	6.62	-43.5	105.7	0.90	2.9	0.075
		7:40:51	35	21.57	58.7	5.18	6.67	-46.2	103.4	1.10	2.5	0.079
		7:40:09	40	21.44	60.3	5.33	6.72	-49.0	101.5	1.40	2.5	0.080
WA-2		7:39:03	45	21.35	61.4	5.44	6.73	-49.9	100.7	1.30	1.8	0.081
Lake	8/16/2017	7:37:52	50	21.27	61.8	5.48	6.74	-50.4	100.6	1.60	1.3	0.080
Tower		7:36:43	55	21.20	61.7	5.48	6.77	-52.1	99.0	1.40	1.7	0.080
		7:35:49	60	21.08	62.2	5.54	6.81	-54.2	97.4	1.60	1.1	0.083
Secchi		7:34:17	65	20.98	63.2	5.64	6.83	-55.5	96.4	1.90	2.0	0.083
		7:32:28	70	20.80	69.1	6.18	6.92	-60.7	91.8	4.60	0.4	0.087
2.75 M		7:31:16	75	20.73	71.2	6.38	6.97	-63.3	89.4	5.50	0.9	0.089
		7:30:13	80	20.64	75.5	6.78	7.02	-65.9	87.6	6.70	0.4	0.093
		7:29:12	85	20.55	75.3	6.77	7.04	-67.1	86.8	7.50	1.4	0.093
		7:28:23	90	20.52	75.6	6.80	7.04	-67.0	87.2	8.40	0.9	0.094
		7:27:48	95	20.41	74.2	6.69	7.04	-67.2	87.5	12.10	0.8	0.094
		7:26:48	100	20.30	73.7	6.66	7.05	-67.9	87.4	13.80	1.6	0.094
		7:25:49	105	20.30	73.4	6.64	7.05	-68.0	87.7	16.20	1.7	0.094
		7:24:46	110	20.31	73.1	6.61	7.07	-69.2	86.8	16.80	1.7	0.094
		7:22:54	115	19.96	63	5.73	7.03	-66.5	90.6	24.60	0.9	0.095
		7:21:20	118	19.83	53.7	4.89	7.04	-67.1	92.4	42.20	1.4	0.096
		8:14:08	0.5	20.60	75.5	6.78	7.04	-67.4	93.6	1.30	3.5	0.084
		8:13:31	5	20.63	75.4	6.77	7.04	-67.2	93.9	1.40	2.9	0.084
WA-2		8:12:53	10	20.62	75.3	6.76	7.04	-67.3	93.5	2.10	3.1	0.084
		8:12:22	15	20.63	75.1	6.74	7.06	-68.5	92.2	1.60	4.3	0.084
Lake		8:11:23	20	20.61	74.2	6.67	7.06	-68.4	92.1	2.20	4.5	0.084
Tower		8:10:30	25	20.55	73.2	6.58	7.06	-68.6	91.5	2.20	3.8	0.084
		8:09:49	30	20.49	72	6.48	7.07	-68.9	90.9	2.00	4.3	0.084
Secchi		8:08:37	35	20.29	68.7	6.21	7.06	-68.2	90.7	4.10	1.9	0.084
	9/6/2017	8:07:49	40	20.17	68.6	6.21	7.07	-69.2	89.2	2.90	0.5	0.084
2.28 M		8:06:52	45	19.92	69.7	6.35	7.09	-70.0	87.5	3.50	0.8	0.083
		8:06:02	50	19.74	70.1	6.4	7.11	-70.9	85.7	3.70	0.9	0.084
		8:05:23	55	19.46	70.7	6.5	7.13	-72.3	83.8	5.50	0.1	0.085
		8:04:22	60	19.42	71.4	6.57	7.15	-73.3	81.3	5.80	1.2	0.085
		8:03:37	65	19.16	71.7	6.63	7.17	-74.5	78.7	8.90	0.6	0.084
		8:02:46	70	18.95	73.8	6.85	7.2	-76.3	75.1	9.30	1.3	0.088
		8:02:06	75	18.79	73	6.8	7.21	-76.5	73.4	11.60	0.5	0.089
		8:01:16	80	18.50	71	6.65	7.22	-77.2	69.4	11.50	1.7	0.086
		8:00:07	85	18.21	69.4	6.54	7.23	-78.0	64.0	15.80	0.7	0.087
		7:58:53	90	18.03	67.5	6.38	7.25	-78.8	55.8	26.60	0.3	0.088
		7:57:32	95	17.95	58.2	5.51	7.25	-78.7	41.9	34.80	0.4	0.088
		7:56:00	98	17.87	49.4	4.68	7.28	-80.6	-7.0	59.80	4.1	0.090

2017 F.E. Walter Water Quality Profiles

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
WA-3 Tobyhanna Creek Upstream	5/10/2017	10:03:47	0.5	11.49	91	9.92	6.9	-59.3	149.9	4.2	5.1	0.090
	6/21/2017	10:11:43	0.5	19.29	93.5	8.62	6.81	-54.6	122.8	8.799999	4	0.102
	7/19/2017	9:57:23	0.5	22.09	94.5	8.24	6.84	-56	107.3	4.8	3	0.122
	8/16/2017	10:12:46	0.5	19.27	95.2	8.78	6.76	-51.3	83.7	6.5	3.8	0.105
	9/6/2017	10:21:01	0.5	16.33	91.9	9	6.98	-63.7	89.2	30.6	4.9	0.096
WA-4 Lehigh River Upstream	5/10/2017	10:15:59	0.5	10.73	92.3	10.24	6.87	-57.8	162.6	11.9	4.3	0.061
	6/21/2017	10:01:50	0.5	17.65	91.8	8.75	6.77	-52.1	127.3	9.2	2.9	0.081
	7/19/2017	9:46:57	0.5	21.38	93.7	8.29	6.72	-49.4	111.6	5.1	5.2	0.080
	8/16/2017	10:01:21	0.5	18.45	98.4	9.23	6.70	-48.5	83.8	2.4	1.4	0.082
	9/6/2017	10:11:26	0.5	16.08	87.3	8.6	6.94	-61.5	95.3	6.3	1.7	0.075
WA-5 Bear Creek Upstream	05/10/17	10:35:47	0.5	10.73	91.3	10.13	6.67	-46.8	178.7	1.8	3.4	0.049
	6/21/2017	9:36:24	0.5	18.97	95.5	8.87	6.69	-47.4	131.9	3.8	3.3	0.059
	7/19/2017	9:26:43	0.5	20.27	96.1	8.69	6.3	-25.6	131.9	9.3	5.6	0.038
	8/16/2017	9:42:21	0.5	18.59	96.0	8.98	6.7	-48.1	84.4	2.0	-0.3	0.064
	9/6/2017	9:51:55	0.5	16.49	94.3	9.21	7.05	-67.7	87.7	4.7	-0.6	0.065
WA-6 Bear Creek Lake Arm	5/10/2017	8:24:25	0.5	13.95	84.2	8.69	6.92	-60.5	173.3	1.3	4.2	0.072
		8:23:28	5	13.88	83.7	8.65	6.93	-61.2	173.8	1.5	3.8	0.071
		8:22:45	10	13.83	83.3	8.62	6.95	-62.0	173.4	1.6	4.0	0.072
		8:22:02	15	13.54	81.9	8.52	6.94	-61.8	174.2	2.4	4.6	0.072
		8:21:15	20	13.41	81.3	8.48	6.94	-61.7	174.8	1.8	4.3	0.071
		8:20:27	25	13.19	80.5	8.45	6.91	-60.1	177.3	1.8	4.3	0.074
		8:19:54	30	13.01	80.5	8.47	6.90	-59.4	177.0	2.4	3.9	0.068
		8:19:14	35	12.78	80.6	8.54	6.91	-60.0	176.8	3.6	5.4	0.068
		8:17:34	40	12.59	81.8	8.69	6.95	-62.1	175.9	3.5	4.8	0.066
		8:16:29	45	12.43	81.9	8.74	7.03	-66.5	173.7	3.2	5.3	0.073
		8:15:16	50	12.33	82.4	8.82	7.03	-66.5	174.6	2.6	4.9	0.071
		8:14:28	55	12.23	82.8	8.88	7.04	-67.0	176.0	2.7	5.6	0.072
		8:13:31	60	12.05	82.5	8.88	6.97	-63.5	178.3	3.7	4.9	0.064
		8:12:55	65	11.80	82.6	8.94	6.97	-63.6	178.7	5.3	4.5	0.063
		8:12:20	70	11.73	82.5	8.95	6.98	-64.0	178.6	5.3	4.4	0.062
		8:11:19	75	11.65	82.3	8.94	6.98	-64.0	178.9	4.1	4.8	0.061
		8:10:27	80	11.49	82.0	8.94	7.00	-64.9	179.0	4.8	4.4	0.061
		8:09:28	85	11.25	81.3	8.91	6.99	-64.7	179.9	7.8	4.8	0.059
		8:07:58	88	11.21	80.6	8.84	6.98	-64.2	181.6	**1236.8**	**10.0**	0.059
WA-6 Bear Creek Lake Arm	6/21/2017	8:16:10	0.5	22.95	90.3	7.75	6.86	-56.8	128.3	0.5	1.5	0.084
		8:15:12	5	22.93	90.1	7.74	6.86	-57	127.9	-0.6	1.5	0.084
		8:14:23	10	22.90	89.3	7.68	6.86	-56.8	128.2	0.7	1.5	0.084
		8:13:24	15	21.59	82.7	7.29	6.77	-52.1	132.3	1.5	2.9	0.087
		8:12:03	20	20.88	81.1	7.25	6.78	-52.4	132.4	1.8	2.8	0.087
		8:11:08	25	19.77	79.8	7.29	6.76	-51.5	133.6	1.4	2.7	0.085
		8:10:27	30	19.38	79.6	7.32	6.74	-50.7	134.7	1.5	2.9	0.084
		8:09:39	35	18.94	80.1	7.44	6.72	-49.5	134.8	1	2.3	0.075
		8:08:40	40	18.40	78.8	7.4	6.71	-48.8	135.1	1.3	3.0	0.073
		8:07:37	45	17.81	77.3	7.35	6.69	-47.6	135.9	1.4	2.5	0.071
		8:06:21	50	17.16	75.9	7.31	6.66	-46	136.3	1.9	3.1	0.066
		8:05:21	55	16.85	75.6	7.33	6.66	-46.2	134.9	1.4	2.5	0.064
		8:04:12	60	16.60	75.9	7.39	6.70	-48.4	131.8	1.9	3.1	0.068
		8:02:53	65	16.52	75.2	7.34	6.71	-48.6	128.8	2.3	3.2	0.066
		8:01:55	70	16.31	73.5	7.21	6.71	-49	127.1	3	3.2	0.067
		8:00:30	75	16.20	73.6	7.24	6.81	-54.4	119.8	1.9	2.8	0.077
		7:59:34	80	16.10	71.5	7.04	6.75	-51	118.4	3.6	3.0	0.067
		7:58:24	85	16.04	71.3	7.03	6.82	-55.1	107.8	3.7	3.3	0.072

2017 F.E. Walter Water Quality Profiles

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
		8:01:45	0.5	25.16	94.1	7.75	6.97	-63.0	108.6	0.7	3.4	0.094
		8:00:52	5	25.08	92.3	7.61	6.93	-60.7	109.9	0.9	4.4	0.094
		8:00:03	10	23.79	73.4	6.20	6.74	-50.5	118.0	1.1	5.3	0.093
		7:59:24	15	23.08	68.3	5.85	6.71	-48.8	119.6	1.0	4.6	0.095
		7:58:37	20	22.61	65.6	5.67	6.71	-48.3	120.4	1.1	3.6	0.095
		7:57:43	25	22.36	63.4	5.50	6.70	-47.8	121.0	1.3	3.0	0.095
WA-6		7:56:53	30	22.03	62.6	5.47	6.68	-47.2	122.2	1.7	3.7	0.095
Bear Creek		7:56:12	35	21.81	62.0	5.44	6.66	-45.7	123.5	2.5	3.7	0.088
Lake Arm	7/19/2017	7:55:25	40	21.61	62.6	5.51	6.66	-45.9	123.7	2.4	3.2	0.087
		7:54:33	45	21.52	65.5	5.78	6.66	-45.8	123.7	4.1	3.4	0.080
		7:53:50	50	21.41	66.4	5.88	6.66	-45.6	124.0	4.7	4.5	0.078
		7:52:49	55	21.26	70.3	6.24	6.67	-46.1	123.6	5.5	4.4	0.076
		7:52:02	60	21.12	76.7	6.82	6.70	-47.9	121.4	8.6	4.6	0.065
		7:51:13	65	20.98	76.6	6.83	6.72	-49.0	118.6	11.5	5.3	0.065
		7:50:28	70	20.83	72.4	6.47	6.74	-50.3	116.3	8.2	4.2	0.071
		7:49:08	75	20.71	66.6	5.97	6.73	-50.0	114.5	7.0	4.5	0.080
		7:48:28	80	20.58	70.0	6.29	6.74	-50.4	112.4	10.0	4.4	0.074
		7:47:48	85	20.48	72.3	6.51	6.76	-51.6	108.3	12.1	4.6	0.068
		7:46:47	88	20.44	75.3	6.79	6.78	-52.5	101.4	17.9	5.2	0.062
		8:12:07	0.5	22.52	86.6	7.50	6.64	-44.7	96.4	0.4	3.9	0.087
		8:11:34	5	22.52	86.1	7.45	6.63	-44.0	97.1	0.8	2.9	0.087
		8:10:56	10	22.51	84.7	7.33	6.62	-43.3	97.6	0.3	2.4	0.087
		8:10:11	15	22.42	76.7	6.65	6.55	-39.3	100.9	0.3	1.9	0.086
		8:09:08	20	22.07	60.1	5.25	6.40	-31.0	107.1	1.0	2.9	0.082
WA-6		8:08:27	25	21.81	57.0	5.01	6.39	-30.3	107.4	0.3	2.8	0.078
Bear Creek		8:07:24	30	21.65	58.5	5.15	6.40	-31.2	106.6	0.2	2.7	0.079
Lake Arm	8/16/2017	8:06:26	35	21.56	59.7	5.26	6.43	-32.7	105.2	1.1	2.7	0.077
		8:05:22	40	21.45	61.6	5.44	6.43	-32.9	104.6	1.2	2.3	0.076
		8:04:39	45	21.37	62.5	5.53	6.45	-33.9	103.1	2.1	3	0.077
		8:03:47	50	21.27	66.4	5.89	6.47	-35.1	101.2	3.9	2	0.074
		8:02:56	55	21.14	65.6	5.84	6.48	-35.7	99.3	4.0	2.7	0.076
		8:02:24	60	21.06	65.7	5.85	6.51	-37.5	96.2	4.1	1.7	0.076
		8:01:30	65	20.93	67.2	6.00	6.55	-39.8	91.8	5.0	1.4	0.077
		8:00:21	70	20.83	70.5	6.31	6.64	-44.7	82.7	5.3	2.7	0.088
		7:59:29	75	20.76	69.9	6.26	6.63	-44.2	78.8	6.3	2.2	0.087
		7:58:38	80	20.65	68.2	6.12	6.63	-44.3	71.5	8.8	2.2	0.085
		7:57:32	84	20.62	55.4	4.98	6.71	-48.6	50.0	42.1	11.7	0.087

2017 F.E. Walter Water Quality Profiles

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
WA-6 Bear Creek Lake Arm	9/6/2017	8:36:11	0.5	20.79	77.0	6.89	6.91	-59.7	100.1	2.5	0.2	0.084
		8:35:12	5	20.82	76.8	6.87	6.91	-59.9	100.1	2.2	1.4	0.084
		8:34:11	10	20.76	74.9	6.71	6.9	-59.6	100.5	2.2	1.5	0.084
		8:33:07	15	20.45	70.2	6.33	6.88	-58.4	101.8	2.0	0.6	0.084
		8:32:05	20	20.40	70.2	6.33	6.89	-58.9	101.8	2.0	0.5	0.084
		8:31:20	25	20.35	69.7	6.30	6.89	-59.0	101.9	1.8	0	0.084
		8:30:36	30	20.31	69.2	6.25	6.89	-59.1	102.2	1.3	0.5	0.084
		8:29:38	35	20.23	69.4	6.28	6.9	-59.6	102.1	2.7	-0.2	0.084
		8:28:41	40	20.16	69.9	6.34	6.92	-60.3	102.0	3.0	-0.1	0.084
		8:27:42	45	19.97	71.2	6.47	6.93	-61.3	101.9	2.9	1	0.085
		8:26:52	50	19.72	70.8	6.47	6.93	-60.9	103.0	5.9	0.8	0.083
		8:26:10	55	19.64	70.4	6.45	6.92	-60.4	104.2	6.9	-0.7	0.083
		8:25:25	60	19.38	69.5	6.40	6.91	-60.0	105.2	10.4	0.3	0.081
		8:24:20	65	18.95	67.5	6.27	6.9	-59.6	106.6	28.1	-1.5	0.079
WA-7 Lehigh Lake Arm	5/10/2017	8:58:33	0.5	14.14	85.8	8.81	6.84	-56.2	183.8	1.5	4.5	0.073
		8:57:15	5	14.04	85.1	8.76	6.84	-56.0	185.2	2.1	4.8	0.072
		8:56:28	10	13.93	84.5	8.72	6.85	-56.5	185.3	1.3	4.8	0.072
		8:53:52	15	13.56	82.9	8.63	6.86	-57.2	185.2	2.1	4.8	0.073
		8:52:58	20	13.33	82.2	8.59	6.87	-58.0	185.3	2.5	4.8	0.075
		8:52:26	25	13.16	82.1	8.61	6.87	-58.1	185.8	2.3	5.2	0.076
		8:51:43	30	13.02	82.0	8.64	6.88	-58.7	185.7	2.5	4.6	0.076
		8:51:00	35	12.89	81.4	8.6	6.88	-58.5	186.3	2.6	5.4	0.076
		8:50:13	40	12.79	81.3	8.61	6.88	-58.5	186.5	2.7	5.0	0.076
		8:49:28	45	12.69	81.8	8.68	6.89	-59.2	186.5	3.1	6.2	0.076
		8:48:44	50	12.60	82.0	8.72	6.90	-59.7	186.7	3.2	5.1	0.075
		8:47:17	55	12.32	81.1	8.67	6.90	-59.4	188.2	2.8	5.2	0.075
		8:46:26	60	12.08	81.8	8.79	6.92	-60.5	187.9	3.3	4.8	0.074
		8:45:31	65	11.87	83.2	8.99	6.95	-62.2	187.1	2.5	5.3	0.074
		8:44:32	70	11.61	83.7	9.1	6.95	-62.2	187.7	3.4	5.6	0.073
		8:43:53	75	11.50	84.3	9.18	6.96	-62.9	187.7	3.1	5.6	0.073
		8:42:33	80	11.02	84.9	9.36	6.97	-63.3	189.0	3.6	6.1	0.073
		8:40:48	85	10.74	84.2	9.34	6.98	-64.0	189.8	3.7	6.1	0.073

2017 F.E. Walter Water Quality Profiles

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
		8:42:16	0.5	22.82	90.0	7.75	6.79	-52.9	133.6	2.6	2.4	0.091
		8:41:34	5	22.80	89.3	7.69	6.78	-52.3	134.4	2.5	2.8	0.091
		8:40:53	10	22.67	87.8	7.57	6.75	-50.9	135.6	1.8	2.9	0.090
		8:40:14	15	21.87	84.1	7.37	6.69	-47.4	137.9	1.5	2.6	0.086
		8:39:26	20	20.66	80.7	7.24	6.71	-48.7	138.3	3.9	3.1	0.090
WA-7		8:38:21	25	19.85	79.6	7.26	6.68	-47.2	140.2	2.9	3.0	0.089
Lehigh		8:37:42	30	19.22	79.9	7.38	6.65	-45.6	141.8	2.1	2.8	0.086
Lake Arm		8:37:06	35	18.71	80.0	7.46	6.65	-45.6	141.3	1.7	3.2	0.082
	6/21/2017	8:35:59	40	18.13	79.6	7.52	6.63	-44.2	142.0	1.1	2.5	0.079
		8:35:25	45	17.80	77.9	7.40	6.61	-43.5	142.6	1.8	2.8	0.078
		8:34:35	50	17.45	76.4	7.31	6.6	-42.9	142.7	1.1	3.9	0.077
		8:33:29	55	17.07	75.3	7.26	6.61	-43.3	142.6	2	4.1	0.077
		8:32:19	60	16.94	74.7	7.23	6.63	-44.2	142.5	2	3.9	0.078
		8:29:18	65	16.73	71.9	6.99	6.64	-44.9	142.7	2	4.0	0.079
		8:28:19	70	16.61	68.1	6.64	6.63	-44.4	144.4	3.2	4.1	0.080
		8:27:27	75	16.46	65.0	6.35	6.63	-44.6	144.8	4	3.5	0.080
		8:26:08	80	16.21	59.1	5.81	6.63	-44.6	145.4	5.4	3.8	0.079
		8:24:27	85	16.02	53.9	5.32	6.65	-45.9	145.9	9.2	2.9	0.080
		8:23:14	0.5	25.56	94.9	7.76	6.89	-58.6	107.9	1.50	3.6	0.097
		8:22:36	5	24.79	89.9	7.45	6.81	-53.9	111.9	1.30	5.5	0.094
		8:22:02	10	24.12	76.3	6.41	6.67	-46.3	117.2	2.20	7.2	0.094
		8:21:36	15	23.39	69.5	5.91	6.64	-44.3	118.9	1.60	3.6	0.095
		8:20:53	20	22.57	64.0	5.53	6.61	-42.7	120.3	1.50	3.2	0.094
WA-7		8:20:23	25	22.30	63.6	5.53	6.62	-43.2	120.4	1.50	3.6	0.097
Lehigh		8:19:59	30	21.99	62.7	5.48	6.62	-43.7	120.2	1.80	3.4	0.096
Lake Arm	7/19/2017	8:19:26	35	21.81	62.1	5.45	6.62	-43.4	121.0	1.70	3.7	0.098
		8:18:59	40	21.64	61.5	5.41	6.62	-43.6	121.1	1.60	4.4	0.096
		8:18:19	45	21.48	60.6	5.36	6.61	-43.1	121.9	1.90	3.6	0.094
		8:16:58	50	21.35	61.0	5.4	6.62	-43.7	122.3	2.00	3.8	0.096
		8:16:29	55	21.25	61.1	5.42	6.66	-45.6	119.6	2.00	3.2	0.091
		8:15:20	60	21.18	67.9	6.03	6.73	-50.0	118.9	3.30	5.0	0.100
		8:13:55	65	21.03	65.2	5.8	6.72	-49.1	120.0	2.90	4.5	0.098
		8:12:54	70	20.92	67.9	6.06	6.74	-50.2	119.9	3.10	4.8	0.098
		8:12:14	75	20.82	67.4	6.03	6.74	-50.1	120.4	4.9	4.0	0.098
		8:11:27	80	20.71	65.3	5.85	6.72	-49.3	122.0	4.2	4.4	0.096
		8:10:26	85	20.62	65.7	5.9	6.70	-48.4	123.9	7.2	4.4	0.086

2017 F.E. Walter Water Quality Profiles

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
		8:37:13	0.5	22.73	88.4	7.62	6.63	-44.2	94.6	0.5	2.6	0.089
		8:36:09	5	22.55	81.1	7.02	6.56	-40.3	97.7	0.6	2.5	0.090
		8:34:04	10	22.43	71.5	6.20	6.46	-34.7	102.7	0.8	1.7	0.090
		8:33:18	15	22.23	62.8	5.46	6.40	-31	105.7	0.9	3.2	0.087
		8:32:40	20	22.12	59.2	5.16	6.37	-29.4	106.9	1.0	1.9	0.084
		8:31:53	25	21.90	55.3	4.84	6.35	-28.4	107.7	0.8	2.7	0.083
WA-7		8:30:59	30	21.66	58	5.11	6.39	-30.7	106.0	0.9	3.6	0.083
Lehigh		8:30:23	35	21.55	59.3	5.23	6.42	-32.4	104.7	0.6	2.0	0.084
Lake Arm		8:29:36	40	21.48	61.5	5.43	6.46	-34.5	103.2	1.5	2.8	0.088
	8/16/2017	8:28:35	45	21.39	66.4	5.87	6.50	-36.8	102.2	1.8	2.7	0.091
		8:28:04	50	21.33	67	5.93	6.52	-37.8	101.5	2.1	2.3	0.091
		8:26:59	55	21.20	66.3	5.89	6.50	-36.8	102.7	2.5	1.8	0.089
		8:26:27	60	21.01	67.9	6.05	6.52	-38	102.3	3.3	2.2	0.090
		8:25:15	65	20.96	67.2	5.99	6.54	-39.1	101.6	2.3	2.3	0.089
		8:24:11	70	20.85	69.9	6.25	6.57	-40.8	100.4	5.0	3.7	0.089
		8:23:26	75	20.71	75.9	6.80	6.63	-44.3	98.0	7.0	2.2	0.093
		8:22:28	80	20.58	77.6	6.97	6.65	-45.3	97.8	9.4	3.6	0.093
		8:21:37	85	20.06	80.6	7.32	6.68	-47.3	97.5	17	2.6	0.094
		8:55:16	0.5	20.67	75.4	6.76	6.78	-52.9	101.2	2.9	1.9	0.084
		8:54:37	5	20.69	74.8	6.71	6.79	-53.3	100.9	2.7	2	0.084
		8:53:41	10	20.58	71.1	6.39	6.76	-51.3	102.8	3.5	1.8	0.085
WA-7		8:52:46	15	20.50	69.7	6.27	6.75	-51.1	103.2	1.9	1.7	0.084
Lehigh	9/6/2017	8:52:14	20	20.47	68.9	6.21	6.77	-52.0	102.3	2.2	1.1	0.085
Lake Arm		8:51:21	25	20.38	68.9	6.21	6.78	-52.4	102.2	2.4	0.8	0.084
		8:50:40	30	20.33	69.3	6.26	6.78	-52.7	102.1	2.7	1.3	0.084
		8:49:58	35	20.28	69.7	6.30	6.80	-53.6	101.3	2.5	1.1	0.084
		8:49:03	40	20.18	70.6	6.40	6.82	-55.0	100.4	2.6	0.5	0.085
		8:48:04	45	19.91	70.6	6.43	6.82	-55.0	100.7	3.6	0	0.085
		8:47:00	50	19.71	72.2	6.60	6.86	-57.0	99.3	4.1	0.5	0.086
		8:46:15	55	19.58	73.2	6.71	6.87	-57.9	98.4	5.8	0.1	0.086
		8:45:24	60	19.44	75.7	6.96	6.91	-59.7	96.7	6	0.8	0.089
		8:44:06	65	18.90	73.3	6.81	6.90	-59.5	97.5	27.6	0	0.092

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.: 7007296
Report: 05/22/17
Lab Contact: Richard Wheeler

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

Project Info: 6224 - Seasonal Monthly Walter Reservoir

Lab ID: 7007296-01 **Collected By:** Client **Sampled:** 05/10/17 09:40 **Received:** 05/10/17 17:20
Sample Desc: WA-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	05/10/17 18:44		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:44		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.31	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	30	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.7	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	16	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	920	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-02 **Collected By:** Client **Sampled:** 05/10/17 07:20 **Received:** 05/10/17 17:20
Sample Desc: WA-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	5	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	05/10/17 18:45		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:47		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	19	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	120	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-03 **Collected By:** Client **Sampled:** 05/10/17 07:20 **Received:** 05/10/17 17:20
Sample Desc: WA-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	5	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	05/10/17 18:48		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:48		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	41	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007296-04 **Collected By:** Client **Sampled:** 05/10/17 07:20 **Received:** 05/10/17 17:20
Sample Desc: WA-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	05/10/17 18:49		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:49		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	47	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.7	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	05/15/17		TMH

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Lab ID: 7007296-05 **Collected By:** Client **Sampled:** 05/10/17 10:00 **Received:** 05/10/17 17:20
Sample Desc: WA-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.12	mg/l	0.05	EPA 353.2	05/10/17 18:49		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:50		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.28	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.03	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	50	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	6.7	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	2	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	1600	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-06 **Collected By:** Client **Sampled:** 05/10/17 10:10 **Received:** 05/10/17 17:20
Sample Desc: WA-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.06	mg/l	0.05	EPA 353.2	05/10/17 18:50		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:51		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.29	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	26	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.1	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	13	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-07 **Collected By:** Client **Sampled:** 05/10/17 10:30 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	2	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	05/10/17 18:51		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:52		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	22	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.0	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	6	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	1700	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-08 **Collected By:** Client **Sampled:** 05/10/17 08:00 **Received:** 05/10/17 17:20
Sample Desc: WA-6 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	0.06	mg/l	0.05	SM 4500-P E	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	15	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	05/10/17 18:52		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:53		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/12/17		RES
Phosphate as P, Ortho	0.02	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.07	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	38	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.4	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	81	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-09 **Collected By:** Client **Sampled:** 05/10/17 08:00 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	5	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/10/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.06	mg/l	0.05	EPA 353.2	05/10/17 18:55		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:56		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	18	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.5	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007296-10 **Collected By:** Client **Sampled:** 05/10/17 08:00 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	4	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	05/10/17 18:56		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:57		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	16	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	4.6	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

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Lab ID: 7007296-11 **Collected By:** Client **Sampled:** 05/10/17 08:50 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	5	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	05/10/17 18:57		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 19:58		JLARESE
Nitrogen, Total Kjeldahl (TKN)	0.43	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:00	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	26	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.1	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	05/10/17 17:50		TNS
Total Coliform	120	mpn/100ml	1	SM 9223 B	05/11/17 10:45		PLW

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Lab ID: 7007296-12 **Collected By:** Client **Sampled:** 05/10/17 08:50 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	05/10/17 18:58		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:01		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.03	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	36	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.3	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

Lab ID: 7007296-13 **Collected By:** Client **Sampled:** 05/10/17 08:50 **Received:** 05/10/17 17:20
Sample Desc: WA-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	05/11/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	05/18/17		AEH
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	05/11/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	05/11/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	05/10/17 19:01		JLARESE
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	05/10/17 20:02		JLARESE
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	05/15/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	05/11/17 15:10	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	05/11/17		AEH
Solids, Total Dissolved	42	mg/l	5	SM 2540 C	05/15/17		TMH
Total Organic Carbon	5.7	mg/l	0.5	SM 5310 C	05/15/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	05/15/17		TMH

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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.

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

WORK ORDER
Chain of Custody

7007296

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6224 - Seasonal Monthly Walter 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 : G. WACIK
(Full Name)

7007296-01 WA-1 Surface NAP NAP M M NAP NAP NAP
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 5/10/17
Type: Grab **Time:** 0940

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

7007296-02 WA-2 Surface NAP NAP M M NAP NAP NAP
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 5/10/17
Type: Grab **Time:** 0720

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

7007296-03 WA-2 Mid-Depth NAP M M NAP NAP
BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 5/10/17
Type: Grab **Time:** 0720

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

CHL 5/10/17

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

Report Template:

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

Printed: 05/01/17 12:42:07PM

7007296

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : G. WACIK
(Full Name)

7007296-04 WA-2 Deep NAP NAP NAP NAP

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

Matrix: Non-Potable Water **Date:** 5/10/17
Type: Grab **Time:** 0720

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

7007296-05 WA-3 Surface NAP NAP NAP NAP NAP NAP

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

Matrix: Non-Potable Water **Date:** 5/10/17
Type: Grab **Time:** 1000

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

7007296-06 WA-4 Surface NAP NAP NAP NAP 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:** 5/10/17
Type: Grab **Time:** 1010

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	5/10/17 845 Date/Time	Received By	05/10/17 1555 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	05/10/17 1720 Date/Time

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

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

Printed: 05/01/17 12:42:07PM

Report Template:

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M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : G. WACIK
(Full Name)

7007296-07 WA-5 Surface NAP NAP NAP NAP m m NAP
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: 5/10/17
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

7007296-08 WA-6 Surface NAP NAP m m NAP NAP NAP
BOD, FC, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H), TC#s
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water Date: 5/10/17
Type: Grab Time: 0800

~~A - Pl 250ml NP, zero hdspc~~ did not receive 05/10/17
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

7007296-09 WA-6 Mid-Depth m NAP NAP NAP m
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: 5/10/17
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

Relinquished By	Date/Time	Received By	Date/Time
	5/10/17 315		05/10/17 1555
			05/10/17 1720

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

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

Report Template:

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

Printed: 05/01/17 12:42:07PM

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) G. WACIK

7007296-10 WA-6 Deep NAP NAP NAP NAP NAP

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

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

7007296-11 WA-7 Surface NAP NAP NAP NAP NAP NAP

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

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

7007296-12 WA-7 Mid-Depth NAP NAP NAP NAP NAP

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

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

Relinquished By	Date/Time	Received By	Date/Time
	5/10/17 1548		05/10/17 1555
			05/10/17 1720

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

Sample Kit Prepared By:	Date/Time

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

Report Template:

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

Printed: 05/01/17 12:42:07PM

7007296

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir
Comments:

Collected By : G. WACIK
(Full Name)

7007296-13 WA-7 Deep NAP NAP NAP
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: 5/10/17
Time: 0550

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

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

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 12:42:07PM

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

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Certificate of Analysis

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

Laboratory No.: 7009999
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: 6224 - Seasonal Monthly Walter Reservoir

Lab ID: 7009999-01 **Collected By:** Client **Sampled:** 06/21/17 07:25 **Received:** 06/21/17 17:25
Sample Desc: WA-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	6	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	06/22/17 18:14		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:38		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	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	79	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.7	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	820	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-02 **Collected By:** Client **Sampled:** 06/21/17 07:25 **Received:** 06/21/17 17:25
Sample Desc: WA-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	6	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	06/22/17 18:19		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:41		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	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.8	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

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

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Lab ID: 7009999-03 **Collected By:** Client **Sampled:** 06/21/17 07:25 **Received:** 06/21/17 17:25
Sample Desc: WA-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	06/22/17 18:20		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:42		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	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	74	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.8	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7009999-04 **Collected By:** Client **Sampled:** 06/21/17 07:25 **Received:** 06/21/17 17:25
Sample Desc: WA-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	06/23/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	06/22/17 18:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:43		RES
Nitrogen, Total Kjeldahl (TKN)	0.41	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	74	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	5.8	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	11	mg/l	3	SM 2540 D	06/22/17		AJS

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Lab ID: 7009999-05 **Collected By:** Client **Sampled:** 06/21/17 10:15 **Received:** 06/21/17 17:25
Sample Desc: WA-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	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	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	06/22/17 18:22		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:44		RES
Nitrogen, Total Kjeldahl (TKN)	0.42	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	73	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	9.3	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	120	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-06 **Collected By:** Client **Sampled:** 06/21/17 09:55 **Received:** 06/21/17 17:25
Sample Desc: WA-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	11	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	06/22/17 18:23		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:45		RES
Nitrogen, Total Kjeldahl (TKN)	0.52	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	97	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	7.7	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	44	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	92	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-07 **Collected By:** Client **Sampled:** 06/21/17 09:45 **Received:** 06/21/17 17:25
Sample Desc: WA-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	4	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	06/22/17 18:23		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:46		RES
Nitrogen, Total Kjeldahl (TKN)	0.30	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	72	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	6.4	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	44	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-08 **Collected By:** Client **Sampled:** 06/21/17 08:15 **Received:** 06/21/17 17:25
Sample Desc: WA-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	5	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	06/22/17 18:24		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:47		RES
Nitrogen, Total Kjeldahl (TKN)	0.30	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	0.05	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	51	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.9	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	15	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-09 **Collected By:** Client **Sampled:** 06/21/17 08:15 **Received:** 06/21/17 17:25
Sample Desc: WA-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	6	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	06/22/17 18:25		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:50		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	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	41	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	4.4	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7009999-10 **Collected By:** Client **Sampled:** 06/21/17 08:15 **Received:** 06/21/17 17:25
Sample Desc: WA-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	6	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	06/22/17 18:28		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:51		RES
Nitrogen, Total Kjeldahl (TKN)	0.86	mg/l	0.25	EPA 351.2	06/23/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	06/22/17		AJS

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Lab ID: 7009999-11 **Collected By:** Client **Sampled:** 06/21/17 08:35 **Received:** 06/21/17 17:25
Sample Desc: WA-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	5	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	06/22/17 18:29		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:52		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	06/22/17 15:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	85	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	44	/100ml	2	SM 9222 D	06/21/17 17:45		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	06/21/17 17:20		TNS

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Lab ID: 7009999-12 **Collected By:** Client **Sampled:** 06/21/17 08:35 **Received:** 06/21/17 17:25
Sample Desc: WA-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	7	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.12	mg/l	0.05	EPA 353.2	06/22/17 18:34		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:55		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	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	71	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	06/22/17		AJS

Lab ID: 7009999-13 **Collected By:** Client **Sampled:** 06/21/17 08:35 **Received:** 06/21/17 17:25
Sample Desc: WA-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	8	mg/l	2	SM 2320 B	06/23/17		MPB
Nitrogen, Ammonia	0.08	mg/l	0.05	ASTM D6919-03	06/22/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	06/22/17	C-05	EMW
Nitrogen, Nitrate	0.10	mg/l	0.05	EPA 353.2	06/22/17 18:35		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	06/22/17 16:56		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	06/22/17 15:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	06/23/17		AEH
Solids, Total Dissolved	54	mg/l	5	SM 2540 C	06/22/17		AJS
Total Organic Carbon	6.1	mg/l	0.5	SM 5310 C	06/26/17		ALD
Solids, Total Suspended	7	mg/l	3	SM 2540 D	06/22/17		AJS

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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.

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

WORK ORDER
Chain of Custody

7009999

Client Code: 3157 **Client:** Tetra Tech
Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter 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 Mack

Comments:

7009999-01 WA-1 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0725

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

7009999-02 WA-2 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0725

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

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

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

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

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

Printed: 06/06/17 12:21:18PM

Report Template: wko WorkOrder COC 1s

M.J. Reider Associates, Inc.

7009999

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7009999-03 WA-2 Mid-Depth

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0725

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H) NAP
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 - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7009999-04 WA-2 Deep

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0725

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H) NAP
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 - Vial Amber 40ml H3PO4, zero hdspc
F - Vial Amber 40ml H3PO4, zero hdspc
G - Vial Amber 40ml H3PO4, zero hdspc

7009999-05 WA-3 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 1115

NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s NAP SW NS
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, 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
H - Vial Amber 40ml H3PO4, zero hdspc

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

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

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

Report Template: wko WorkOrder COC ls

7009999

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wack

7009999-06 WA-4 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0955

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
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

7009999-07 WA-5 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0945

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

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

7009999-08 WA-6 Surface

Matrix: Non-Potable Water Date: 6/21/17
Type: Grab Time: 0815

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

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

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

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

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Report Template: WO WorkOrder COC 15

7009999

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wack

7009999-09 WA-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:** 6/21/17
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

7009999-10 WA-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:** 6/21/17
Type: Grab **Time:** 0816

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

7009999-11 WA-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:** 6/21/17
Type: Grab **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

Relinquished By	6/21/17 1526 Date/Time	Received By	062117 1515 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	062117 1725 Date/Time

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

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

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Report Template: wko WorkOrder COC is

M.J. Reider Associates, Inc.

7009999

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Mack

7009999-12 WA-7 Mid-Depth

BOD, PO4-D(H), NO2 353.2, NO3 353.2, O-PO4 H N4

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

Matrix: Non-Potable Water Date: 6/21/17

Type: Grab 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

7009999-13 WA-7 Deep

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H) N4

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

Matrix: Non-Potable Water Date: 6/21/17

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

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

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

Printed: 06/06/17 12:21:18PM

Report Template: wko WorkOrder COC_15

MJRA Terms & Conditions

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

Sample Submission, Sample Acceptance & Sampling Containers

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

Turnaround Times (TAT)

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

Analytical Results, Sample Collection Integrity & Subcontracting

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

Payment Terms

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

Warranty & Litigation

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

Reviewed and Approved by:

Richard Wheeler
Project Manager

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Certificate of Analysis

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

Laboratory No.: 7011016
Report: 07/27/17
Lab Contact: Richard Wheeler

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

Project Info: 6224 - Seasonal Monthly Walter Reservoir

Lab ID: 7011016-01 **Collected By:** Client **Sampled:** 07/19/17 09:18 **Received:** 07/19/17 16:50
Sample Desc: WA-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.07	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	0.09	mg/l	0.05	EPA 353.2	07/20/17 8:59		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:48		RES
Nitrogen, Total Kjeldahl (TKN)	0.56	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	60	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	6.1	mg/l	0.5	SM 5310 C	07/20/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	190	/100ml	2	SM 9222 D	07/19/17 17:20	Reportb	TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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NELAC accreditations for various drinking water, wastewater and solid & chemical materials analytes.

Lab ID: 7011016-02 **Collected By:** Client **Sampled:** 07/19/17 07:25 **Received:** 07/19/17 16:50
Sample Desc: WA-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.06	mg/l	0.05	EPA 353.2	07/20/17 9:02		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:51		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	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	57	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	5.0	mg/l	0.5	SM 5310 C	07/20/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	3	/100ml	2	SM 9222 D	07/19/17 17:20	Reporta	TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-03 **Collected By:** Client **Sampled:** 07/19/17 07:25 **Received:** 07/19/17 16:50
Sample Desc: WA-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.07	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	0.10	mg/l	0.05	EPA 353.2	07/20/17 9:03		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:52		RES
Nitrogen, Total Kjeldahl (TKN)	0.33	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	71	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	5.0	mg/l	0.5	SM 5310 C	07/20/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011016-04 **Collected By:** Client **Sampled:** 07/19/17 07:25 **Received:** 07/19/17 16:50
Sample Desc: WA-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	11	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.19	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	0.09	mg/l	0.05	EPA 353.2	07/20/17 9:04		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:53		RES
Nitrogen, Total Kjeldahl (TKN)	<0.25	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	69	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	6.1	mg/l	0.5	SM 5310 C	07/20/17		ALD
Solids, Total Suspended	9	mg/l	3	SM 2540 D	07/20/17		TMH

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Lab ID: 7011016-05 **Collected By:** Client **Sampled:** 07/19/17 10:05 **Received:** 07/19/17 16:50
Sample Desc: WA-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.13	mg/l	0.05	EPA 353.2	07/20/17 9:06		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:54		RES
Nitrogen, Total Kjeldahl (TKN)	0.54	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	78	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	6.7	mg/l	0.5	SM 5310 C	07/20/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	28	/100ml	2	SM 9222 D	07/19/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-06 **Collected By:** Client **Sampled:** 07/19/17 09:45 **Received:** 07/19/17 16:50
Sample Desc: WA-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	13	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	07/20/17 9:07		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:55		RES
Nitrogen, Total Kjeldahl (TKN)	1.15	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	64	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	8.8	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	9	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	380	/100ml	2	SM 9222 D	07/19/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-07 **Collected By:** Client **Sampled:** 07/19/17 09:35 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	3	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	2	mg/l	2	SM 5210 B	07/20/17		ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:08		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:56		RES
Nitrogen, Total Kjeldahl (TKN)	0.49	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	33	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	9.7	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	320	/100ml	2	SM 9222 D	07/19/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-08 **Collected By:** Client **Sampled:** 07/19/17 07:50 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.06	mg/l	0.05	EPA 353.2	07/20/17 9:09		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:57		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	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.05	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	4.6	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	3	/100ml	2	SM 9222 D	07/19/17 17:20	Report	TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-09 **Collected By:** Client **Sampled:** 07/19/17 07:50 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.06	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	0.10	mg/l	0.05	EPA 353.2	07/20/17 9:12		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 6:59		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	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	59	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	4.8	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011016-10 **Collected By:** Client **Sampled:** 07/19/17 07:50 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	5	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.06	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	07/20/17 9:13		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:00		RES
Nitrogen, Total Kjeldahl (TKN)	0.89	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	58	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	8.8	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	35	mg/l	3	SM 2540 D	07/20/17		TMH

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Lab ID: 7011016-11 **Collected By:** Client **Sampled:** 07/19/17 08:30 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	07/20/17		REB
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	07/20/17	C-05	ALD
Nitrogen, Nitrate	0.07	mg/l	0.05	EPA 353.2	07/20/17 9:14	C-21	RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:01		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	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	57	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	4.8	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	5	/100ml	2	SM 9222 D	07/19/17 17:20	Reportc	TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	07/19/17 17:05		PLW

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Lab ID: 7011016-12 **Collected By:** Client **Sampled:** 07/19/17 08:30 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.07	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	0.11	mg/l	0.05	EPA 353.2	07/20/17 9:19		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 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	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	65	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	4.8	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	07/20/17		TMH

Lab ID: 7011016-13 **Collected By:** Client **Sampled:** 07/19/17 08:30 **Received:** 07/19/17 16:50
Sample Desc: WA-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	07/20/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	2	SM 2320 B	07/20/17		MPB
Nitrogen, Ammonia	0.10	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	0.10	mg/l	0.05	EPA 353.2	07/20/17 9:20		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	07/20/17 7:05		RES
Nitrogen, Total Kjeldahl (TKN)	1.65	mg/l	0.25	EPA 351.2	07/24/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	07/20/17 11:40	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	07/20/17		AEH
Solids, Total Dissolved	67	mg/l	5	SM 2540 C	07/20/17		TMH
Total Organic Carbon	7.0	mg/l	0.5	SM 5310 C	07/21/17		ALD
Solids, Total Suspended	197	mg/l	3	SM 2540 D	07/20/17		TMH

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Notes and Definitions

C-05	The sample did not meet the minimum DO depletion of at least 2 mg/L.
C-21	The nitritate matrix spike and matrix spike dup were outside the acceptable range of 90-110% at 130.15% and 125.97%.
G-11	The sample was filtered after it was received at the laboratory.
Report	Sample was analyzed 1 hour and 30 minutes out of the recommended 8hour hold time for fecal coliform
Reporta	Sample was analyzed 1 hour and 55 minutes out of the recommended 8hour hold time for fecal coliform
Reportb	Sample was analyzed 2minutes out of the recommended 8hour hold time for fecal coliform
Reportc	Sample was analyzed 50 minutes out of the recommended 8hour hold time for fecal coliform

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107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7011016

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6224 - Seasonal Monthly Walter 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

7011016-01 WA-1 Surface

Matrix: Non-Potable Water Date: 7/19/17
Type: Grab Time: 0915

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

7011016-02 WA-2 Surface

Matrix: Non-Potable Water Date: 7/19/17
Type: Grab Time: 0725

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

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

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

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

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

Printed: 6/15/2017 7:51:27AM

Report Template: wko WorkOrder COC is

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7011016-03 WA-2 Mid-Depth

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

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 0725

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

7011016-04 WA-2 Deep

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

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 0725

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

7011016-05 WA-3 Surface

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

Matrix: Non-Potable Water **Date:** 7/19/17
Type: Grab **Time:** 1005

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

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

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

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7011016

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7011016-06 WA-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 **Date:** 7/19/17
Type: Grab **Time:** 0945

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

7011016-07 WA-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:** 7/19/17
Type: Grab **Time:** 0935

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

7011016-08 WA-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:** 7/19/17
Type: Grab **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	7/19/17 1530 Date/Time	Received By	7/19/17 1530 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/19/17 1650 Date/Time

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	2.4-5
Samples on Ice?	(Yes) No NA
Approved By:	
Entered By:	

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Report Template: WR6 Work Order COC IS

7011016

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wack

7011016-09 WA-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:** 7/19/17
Type: Grab **Time:** 0750

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

7011016-10 WA-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:** 7/19/17
Type: Grab **Time:** 0750

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

7011016-11 WA-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:** 7/19/17
Type: Grab **Time:** 0830

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

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

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

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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Report Template: wk6 WorkOrder COC ls

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Waeik

7011016-12 WA-7 Mid-Depth

Matrix: Non-Potable Water
Type: Grab

Date: 7/19/17
Time: 0831

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

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

7011016-13 WA-7 Deep

Matrix: Non-Potable Water
Type: Grab

Date: 7/19/17
Time: 0830

NAP **BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)**
Alk 2320B, NH3-N, TOC, TSS, 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
G - Vial Amber 40ml H3PO4, zero hdspc

Relinquished By	7/19/17 1530 Date/Time	Received By	7/19/17 1630 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	7/19/17 1650 Date/Time

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

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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Report Template: WRG WorkOrder COC rs

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

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Certificate of Analysis

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

Laboratory No.: 7013227
Report: 08/22/17
Lab Contact: Richard Wheeler

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

Project Info: 6224 - Seasonal Monthly Walter Reservoir

Lab ID: 7013227-01 **Collected By:** Client **Sampled:** 08/16/17 09:20 **Received:** 08/16/17 16:36
Sample Desc: WA-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	11	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	08/17/17 8:09		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:10		RES
Nitrogen, Total Kjeldahl (TKN)	0.51	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 17:50		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	55	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	6.7	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	3	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-02 **Collected By:** Client **Sampled:** 08/16/17 07:15 **Received:** 08/16/17 16:36
Sample Desc: WA-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	08/17/17 8:12		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:13		RES
Nitrogen, Total Kjeldahl (TKN)	0.45	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 17:50		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	48	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	5.7	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	5	/100ml	2	SM 9222 D	08/16/17 17:20	Reportb	TNS
Total Coliform	550	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-03 **Collected By:** Client **Sampled:** 08/16/17 07:15 **Received:** 08/16/17 16:36
Sample Desc: WA-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	08/17/17 8:13		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:14		RES
Nitrogen, Total Kjeldahl (TKN)	0.43	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 17:50		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	49	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	6.4	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013227-04 **Collected By:** Client **Sampled:** 08/16/17 07:15 **Received:** 08/16/17 16:36
Sample Desc: WA-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	0.08	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	08/17/17 8:14		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:15		RES
Nitrogen, Total Kjeldahl (TKN)	0.55	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 17:50		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	63	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	7.0	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	8	mg/l	3	SM 2540 D	08/17/17		TMH

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M.J. Reider Associates, Inc.

Lab ID: 7013227-05 **Collected By:** Client **Sampled:** 08/16/17 10:10 **Received:** 08/16/17 16:36
Sample Desc: WA-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	11	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.10	mg/l	0.05	EPA 353.2	08/17/17 8:15		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:16		RES
Nitrogen, Total Kjeldahl (TKN)	0.65	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 17:50		AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	71	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	8.2	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	15	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-06 **Collected By:** Client **Sampled:** 08/16/17 09:55 **Received:** 08/16/17 16:36
Sample Desc: WA-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	08/17/17 8:18		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:17		RES
Nitrogen, Total Kjeldahl (TKN)	0.81	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	56	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	8.6	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	34	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-07 **Collected By:** Client **Sampled:** 08/16/17 09:45 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	4	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	08/17/17 8:19		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:18		RES
Nitrogen, Total Kjeldahl (TKN)	0.42	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	42	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	5.8	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	15	/100ml	2	SM 9222 D	08/16/17 17:20		TNS
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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M.J. Reider Associates, Inc.

Lab ID: 7013227-08 **Collected By:** Client **Sampled:** 08/16/17 08:00 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	08/17/17 8:20		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:19		RES
Nitrogen, Total Kjeldahl (TKN)	0.47	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.05	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	54	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	5.6	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	08/16/17 17:20	Report	TNS
Total Coliform	770	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-09 **Collected By:** Client **Sampled:** 08/16/17 08:00 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	08/17/17 8:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:22		RES
Nitrogen, Total Kjeldahl (TKN)	0.81	mg/l	0.25	EPA 351.2	08/18/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	49	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	6.4	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013227-10 **Collected By:** Client **Sampled:** 08/16/17 08:00 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	08/17/17 8:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:23		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	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	55	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	6.4	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	22	mg/l	3	SM 2540 D	08/17/17		TMH

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Lab ID: 7013227-11 **Collected By:** Client **Sampled:** 08/16/17 08:20 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	08/17/17 8:22		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:24		RES
Nitrogen, Total Kjeldahl (TKN)	0.34	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	53	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	5.7	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	08/16/17 17:20	Reporta	TNS
Total Coliform	650	mpn/100ml	1	SM 9223 B	08/16/17 17:20		TNS

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Lab ID: 7013227-12 **Collected By:** Client **Sampled:** 08/16/17 08:20 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.10	mg/l	0.05	EPA 353.2	08/17/17 8:25		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:27		RES
Nitrogen, Total Kjeldahl (TKN)	0.37	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	51	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	6.4	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	08/17/17		TMH

Lab ID: 7013227-13 **Collected By:** Client **Sampled:** 08/16/17 08:20 **Received:** 08/16/17 16:36
Sample Desc: WA-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	08/16/17		AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	2	SM 2320 B	08/17/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	08/17/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	08/16/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	08/17/17 8:26		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	08/17/17 7:27		RES
Nitrogen, Total Kjeldahl (TKN)	0.53	mg/l	0.25	EPA 351.2	08/21/17		RES
Phosphate as P, Ortho	<0.01	mg/l	0.01	SM 4500-P E	08/16/17 18:00		AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	08/16/17		AEH
Solids, Total Dissolved	66	mg/l	5	SM 2540 C	08/17/17		TMH
Total Organic Carbon	7.1	mg/l	0.5	SM 5310 C	08/17/17		HRG
Solids, Total Suspended	15	mg/l	3	SM 2540 D	08/17/17		TMH

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Notes and Definitions

C-05	The sample did not meet the minimum DO depletion of at least 2 mg/L.
Report	Fecal coliform sample analyzed 1 hour and 20 minutes out of the recommended hold time of 8 hours for fecal coliform.
Reporta	Fecal coliform sample analyzed 1 hour out of the recommended hold time of 8 hours for fecal coliform.
Reportb	Fecal coliform sample analyzed 2 hours and 5 minutes out of the recommended hold time of 8 hours for fecal coliform.

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

WORK ORDER
Chain of Custody

7013227

Client Code: 3157
Client: Tetra Tech
Project Manager: Richard Wheeler
Project: 6224 - Seasonal Monthly Walter 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

7013227-01 WA-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: 8/16/17
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

7013227-02 WA-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: 8/16/17
Type: Grab 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

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

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	16.4°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.

7013227

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7013227-03 WA-2 Mid-Depth
BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, PO4-P H, TDS, TKN, TOC, TSS

Matrix: Non-Potable Water **Date:** 8/16/17
Type: Grab **Time:** 0715

- 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

7013227-04 WA-2 Deep
BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TDS, TKN, TOC, TSS, PO4-P H

Matrix: Non-Potable Water **Date:** 8/16/17
Type: Grab **Time:** 0715

- 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

7013227-05 WA-3 Surface
NO2 353.2, NO3 353.2, O-PO4 H, BOD, FC, PO4-D(H), TC#s
PO4-P H, TOC, TSS, Alk 2320B, NH3-N, TDS, TKN

Matrix: Non-Potable Water **Date:** 8/16/17
Type: Grab **Time:** 1010

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

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

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	10.4°C
Samples on Ice?	Yes No NA
Approved By:	CHI
Entered By:	

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Printed: 7/7/2017 6:38:25AM

Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

Client Code: 3157
Project Manager: Richard Wheeler

Client: Tetra Tech
Project: 6224 - Seasonal Monthly Walter Reservoir
Comments:

Collected By : (Full Name) Gregory Wacik

7013227-06 WA-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 **Date:** 8/16/17
Type: Grab **Time:** 0955

- 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

7013227-07 WA-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:** 8/16/17
Type: Grab **Time:** 0945

- 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

7013227-08 WA-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:** 8/16/17
Type: Grab **Time:** 0800

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

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

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	11.4°C
Samples on Ice?	Yes No NA
Approved By:	CHL
Entered By:	

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

7013227

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wack

7013227-09 WA-6 Mid-Depth NAP KJ SMT NAP

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:** 8/16/17

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

7013227-10 WA-6 Deep RM

SMT **BOD, NO2 353.2,** NAP **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:** 8/16/17

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

7013227-11 WA-7 Surface

NAP **NO2 353.2, NO3 353.2, O-PO4 H,** KJ **BOD,** SMT **FC,** AH **PO4-D(H),** ND **TC#s**

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

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

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

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

Sample Kit Prepared By:	Date/Time
Sample Temp (°C):	11.4°C
Samples on Ice?	Yes No NA
Approved By:	
Entered By:	CHL

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.

7013227

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) Gregory Wacik

7013227-12 WA-7 Mid-Depth

Matrix: Non-Potable Water Date: 8/16/17
Type: Grab Time: 0820

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
G - Vial Amber 40ml H3PO4, zero hdspc

7013227-13 WA-7 Deep

Matrix: Non-Potable Water Date: 8/16/17
Type: Grab Time: 0820

BOD, NO2 353.2, NO3 353.2, O-PO4 H, PO4-D(H)
Alk 2320B, NH3-N, TOC, TSS, 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
G - Vial Amber 40ml H3PO4, zero hdspc

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

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

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

Printed: 7/7/2017 6:38:25AM

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

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Certificate of Analysis

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

Laboratory No.: 7016203
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: 6224 - Seasonal Monthly Walter Reservoir

Lab ID: 7016203-01 **Collected By:** Client **Sampled:** 09/06/17 09:40 **Received:** 09/06/17 16:44
Sample Desc: WA-1 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	09/07/17 16:17		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:22		RES
Nitrogen, Total Kjeldahl (TKN)	0.44	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	81	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	4.9	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	4	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	5	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	870	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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M.J. Reider Associates, Inc.

Lab ID: 7016203-02 **Collected By:** Client **Sampled:** 09/06/17 08:10 **Received:** 09/06/17 16:44
Sample Desc: WA-2 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:19		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:25		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	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	81	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	280	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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Lab ID: 7016203-03 **Collected By:** Client **Sampled:** 09/06/17 08:10 **Received:** 09/06/17 16:44
Sample Desc: WA-2 Mid-Depth **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:20		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:25		RES
Nitrogen, Total Kjeldahl (TKN)	0.44	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	103	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016203-04 **Collected By:** Client **Sampled:** 09/06/17 08:10 **Received:** 09/06/17 16:44
Sample Desc: WA-2 Deep **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	9	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	09/07/17 16:21		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:26		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	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	80	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.1	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	3	mg/l	3	SM 2540 D	09/07/17		AJS

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Lab ID: 7016203-05 **Collected By:** Client **Sampled:** 09/06/17 10:30 **Received:** 09/06/17 16:44
Sample Desc: WA-3 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	12	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:22		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:27		RES
Nitrogen, Total Kjeldahl (TKN)	0.52	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	95	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	9.1	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	14	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	700	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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Lab ID: 7016203-06 **Collected By:** Client **Sampled:** 09/06/17 10:15 **Received:** 09/06/17 16:44
Sample Desc: WA-4 Surface **Sample Type:** Grab

	Result	Unit	Rep. Limit	Procedure	Analyzed	Analyte Notes	Analyst
Dissolved General Chemistry							
Phosphorus as P, Dissolved	<0.05	mg/l	0.05	SM 4500-P E	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	14	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.11	mg/l	0.05	EPA 353.2	09/07/17 16:23		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:28		RES
Nitrogen, Total Kjeldahl (TKN)	0.67	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	79	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	6.1	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	610	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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Lab ID: 7016203-07 **Collected By:** Client **Sampled:** 09/06/17 09:55 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	4	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	<0.05	mg/l	0.05	EPA 353.2	09/07/17 16:24		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:29		RES
Nitrogen, Total Kjeldahl (TKN)	0.52	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	68	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	4.9	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	48	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	340	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	>2400	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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M.J. Reider Associates, Inc.

Lab ID: 7016203-08 **Collected By:** Client **Sampled:** 09/06/17 08:35 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:25		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:30		RES
Nitrogen, Total Kjeldahl (TKN)	0.50	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	0.04	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	78	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	1000	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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Lab ID: 7016203-09 **Collected By:** Client **Sampled:** 09/06/17 08:35 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	7	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:28		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:33		RES
Nitrogen, Total Kjeldahl (TKN)	0.45	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	82	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016203-10 **Collected By:** Client **Sampled:** 09/06/17 08:35 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	6	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.08	mg/l	0.05	EPA 353.2	09/07/17 16:29		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:34		RES
Nitrogen, Total Kjeldahl (TKN)	0.73	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:20	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	80	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	4.9	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

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Lab ID: 7016203-11 **Collected By:** Client **Sampled:** 09/06/17 09:00 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:30	C-21	RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:35		RES
Nitrogen, Total Kjeldahl (TKN)	0.45	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	<0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	88	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

	Result	Unit	Rep. Limit	Procedure	Incubated	Analyte Notes	Analyst
Microbiology							
Fecal Coliform	<2	/100ml	2	SM 9222 D	09/06/17 17:25		PLW
Total Coliform	520	mpn/100ml	1	SM 9223 B	09/06/17 18:00		ECC

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Lab ID: 7016203-12 **Collected By:** Client **Sampled:** 09/06/17 09:00 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	8	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.09	mg/l	0.05	EPA 353.2	09/07/17 16:33		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:38		RES
Nitrogen, Total Kjeldahl (TKN)	0.52	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.02	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	58	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.2	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	<3	mg/l	3	SM 2540 D	09/07/17		AJS

Lab ID: 7016203-13 **Collected By:** Client **Sampled:** 09/06/17 09:00 **Received:** 09/06/17 16:44
Sample Desc: WA-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	09/06/17	G-11	AEH
General Chemistry							
Alkalinity, Total to pH 4.5	10	mg/l	2	SM 2320 B	09/13/17		MPB
Nitrogen, Ammonia	<0.05	mg/l	0.05	ASTM D6919-03	09/07/17		JCL
Biochemical Oxygen Demand	<2	mg/l	2	SM 5210 B	09/07/17	C-05	EMW
Nitrogen, Nitrate	0.12	mg/l	0.05	EPA 353.2	09/07/17 16:34		RES
Nitrogen, Nitrite	<0.05	mg/l	0.05	EPA 353.2	09/07/17 15:39		RES
Nitrogen, Total Kjeldahl (TKN)	0.89	mg/l	0.25	EPA 351.2	09/11/17		RES
Ortho-phosphate as P	<0.01	mg/l	0.01	SM 4500-P E	09/06/17 18:30	G-11	AEH
Phosphorus as P, Total	0.01	mg/l	0.01	SM 4500-P E	09/06/17		AEH
Solids, Total Dissolved	62	mg/l	5	SM 2540 C	09/07/17		AJS
Total Organic Carbon	5.4	mg/l	0.5	SM 5310 C	09/12/17		ALD
Solids, Total Suspended	130	mg/l	3	SM 2540 D	09/07/17		AJS

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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 recoveries were outside the acceptable range of 90-110% at 89.6% and 89.3%.

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

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M.J. Reider Associates, Inc.

107 Angelica St, Reading PA, 19611
610-374-5129 www.mjreider.com

WORK ORDER
Chain of Custody

7016203

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter 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) GREG WACIK

7016203-01 WA-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: 9/6/17
Type: Grab Time: 0946

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

7016203-02 WA-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: 9/6/17
Type: Grab Time: 0810

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

Relinquished By	9/6/17 315 Date/Time	Received By	9/6/17 1520 Date/Time
Relinquished By	Date/Time	Received at Laboratory By	9/6/17 1644 Date/Time

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

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

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Report Template: wko WorkOrder COC ls

M.J. Reider Associates, Inc.

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) GREG WACIK

7016203-03 WA-2 Mid-Depth

CMT DES AH

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

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

Matrix: Non-Potable Water Date: 9/6/17

Type: Grab Time: 0810

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

7016203-04 WA-2 Deep

CMT DES AH

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

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

Matrix: Non-Potable Water Date: 9/6/17

Type: Grab Time: 0810

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

7016203-05 WA-3 Surface

DES CMT P/A AH P/A

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

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

Matrix: Non-Potable Water Date: 9/6/17

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

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): 5	
Samples on Ice? Yes No NA	
Approved By:	
Entered By:	

M.J. Reider Associates, Inc.

7016203

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : GREG WACIK
(Full Name)

7016203-06 WA-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 Date: 9/6/17
Type: Grab 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

7016203-07 WA-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: 9/6/17
Type: Grab Time: 0955

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

7016203-08 WA-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: 9/6/17
Type: Grab 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

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

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

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) GREG WAGIK

7016203-09 WA-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: 9/6/17
Type: Grab 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

7016203-10 WA-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: 9/6/17
Type: Grab 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

7016203-11 WA-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: 9/6/17
Type: Grab Time: 0900

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

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

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

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

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M.J. Reider Associates, Inc.

7016203

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

Project Manager: Richard Wheeler **Project:** 6224 - Seasonal Monthly Walter Reservoir

Comments:

Collected By : (Full Name) GREG WACIK

7016203-12 WA-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 Date: 9/6/17
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

7016203-13 WA-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 Date: 9/6/17
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

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

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

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

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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

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