

DRAFT Technical Memorandum

Date: August 22, 2018

Project: 17-2076

To: Mr. Kevin Lindsay, PhD, LHg – Principal Hydrogeologist
GeoEngineers, Inc.

From: Brian Ginter, PE – MurraySmith
Phil Brown, RG, LHg – Northwest Groundwater Services, LLC

Re: Milton-Freewater Aquifer Storage and Recovery Feasibility Study Project -
Investigation of Water Treatment Alternatives (Task 3)

Introduction

This memorandum documents work completed under Task 3 of the Milton-Freewater Aquifer Storage and Recovery (ASR) Feasibility Study Project. Work under this task involves developing a water treatment alternative recommendation for meeting the requirements of ORS-690-350, and the Oregon Health Authority treatment technique requirements.

This memorandum also documents the water quality data for the proposed surface water supply to be used for ASR recharge and presents a comparison it to City of Walla Walla surface water and groundwater data to assess whether there are indications that geochemical compatibility will differ from Walla Walla's successful ASR project. The purpose of the comparison is to assess whether the samples are sufficiently similar to allow an opinion that geochemistry is, or is not, a significant issue with respect to ASR feasibility in Milton-Freewater.

Groundwater and Surface Water Comparison

Purpose

In support of Task 3 of the Milton-Freewater Aquifer Storage and Recovery Feasibility Study Project (ASR/FS), the source waters and receiving waters for the project were compared to the source waters and receiving waters of the Walla Walla ASR project, which has been operating successfully. The comparison was done to determine whether there is in obvious risk for geochemical compatibility issues to arise in the Milton-Freewater ASR project that would need to be addressed through pre- or post-recovery treatment.

Two methods were used to compare the cation and anion chemistry for the surface water which is the source water and groundwater for the AR project. Stiff diagrams were prepared to visually demonstrate the similarity of the waters. Piper plots were also prepared to compare some of the finer details of the chemistry in the water samples that are not easily seen in the stiff diagrams.

Methods

Laboratory results used for comparison were from the Milton-Freewater ASR sampling event conducted between March and April 2018, have been provided in Appendix 1 and summarized in Table 1. Source water or surface water samples for the Milton-Freewater ASR project are from the Walla Walla River at the point of diversion (sample ID: MF-ASR-WWR-030118) and the little Walla Walla River (sample IDs: MF-ASR-LWWR-1 and MF-ASR-LWWR-2). Receiving water (groundwater) samples for the Milton-Freewater ASR project are from Well No. 5 (sample ID: MF-ASR-W5-030118).

Historical source water (Mill Creek) in Walla Walla was sampled on February 24, 1999, and the historical receiving (groundwater) sample results used for comparison were collected on April 15, 1999 at Well No. 1 and Well No. 2. Both historical source and receiving waters were reported in the 1999 Walla Walla Baseline Source Water and Native Groundwater Quality Report, and the report tables have been provided here in Appendix 2. Field forms for these events have been provided in Appendix 3. The hydrographs for the Walla Walla River showing flow rates at the time the sample collection are provided in Appendix 4. Because of the proximity—both the source waters (with headwaters relatively close to each other in the Blue Mountains) and the same basalt aquifer are only 12 miles apart—the Walla Walla project appears to be a good geochemical analog for the project considered by Milton-Freewater.

A comparison of receiving waters was done by comparing general ion chemistry from Milton-Freewater Well No. 5 to Walla Walla ASR Wells No. 1 and No. 2, and a comparison for the source waters was done by comparing the samples collected from the Walla Walla and Little Walla Walla Rivers at Milton-Freewater to the Mill Creek characterization sample used for the Walla Walla ASR project. The Walla Walla ASR project at Well No. 1 did not exhibit geochemical stability issues and has been operating successfully for nearly 2 decades. Therefore, if the source water and receiving waters for Milton-Freewater ASR project closely resemble those for the Walla Walla ASR project, then speciation or stability problems associated with ion chemistry in the Milton-Freewater ASR project are unlikely. Although geochemical compatibility will be modeled as part of the permitting process, this early assessment was used to inform the water treatment assessment whether additional source water modification was needed to avoid a detrimental reaction.

The Stiff diagrams were created using Zeta Stiff Version 1.0, a stiff diagram generating software produced by ZetaWare (1998). GW-Chart Version 1.29.0.0 was used for creating the Piper plots. GWChart is a free USGS software that generates calibration plots and operated as a graphing tool for Model Analysis but also contains a Piper plotting feature.

Assumptions

Total alkalinity was reported for all samples as mg/L CaCO_3 . To construct the stiff diagrams and piper plots this needed to be converted to mg/L bicarbonate (HCO_3^-) and mg/L carbonate (CO_3^{2-}). Since the pH of all samples was reported to be below 8.5, the assumption was made that all of the total alkalinity is bicarbonate. This assumption is supported by the fact that carbonate was reported as non-detect for Walla Walla ASR Wells No. 1 and No. 2. To adjust between total alkalinity below pH 8.5 and bicarbonate a simple 1.22 conversion factor was used, and is justified as follows:

- $\text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{Ca}(\text{HCO}_3)_2$
- CaCO_3 has a molecular weight of 100 g/mol
- HCO_3^- has a molecular weight of 61 g/mol
- Each mol of $\text{Ca}(\text{HCO}_3)_2$ corresponds to one mol of CaCO_3 and contains two HCO_3^- which is 2×61 grams = 122 grams of HCO_3^- . The final conversion is as follows:
- $1.22 \times \text{Total Alkalinity as } \text{CaCO}_3 \text{ (mg/L)} = \text{Bicarbonate Alkalinity as } \text{HCO}_3^-$.

Results

Receiving Water – Groundwater

The stiff diagram for the groundwater comparison is provided in Figure 1. Visual inspection of the stiff diagram shows three very similar polygons. Milton-Freewater Well No. 5 (blue) closely resembles historical results from Walla Walla ASR Wells No. 1 and No. 2 (purple); however, the details in the piper diagram (Figure 2) indicate that chloride and sulfate are slightly elevated in Milton-Freewater ASR Well No. 5 compared to Walla Walla. The actual concentrations of chloride for these wells are 6.46 mg/L for Milton-Freewater Well No. 5 and 1.4 mg/L and 1.9 mg/L in Walla Walla ASR wells No. 1 and No. 2, respectively. All other ions are tightly grouped in similar positions on the piper diagram.

Source Water – Surface Water

The stiff diagram for the surface water comparison is provided in Figure 3. The three surface water samples for the Milton-Freewater ASR (point of diversion on the Walla Walla River and two Little Walla Walla River samples in blue) appear to closely resemble the historical Mill Creek sample from the Walla Walla ASR project (purple). The polygons for the Little Walla Walla appear most like the Mill Creek sample. However, inspection of the piper diagram (Figure 4) shows that chloride is slightly lower in the Milton-Freewater source water samples when compared to the Mill Creek sample. The actual concentrations for the Milton-Freewater ASR source waters range from 0.416 mg/L in the Little Walla Walla River to 0.500 mg/L in the Walla Walla River at the point of diversion. The concentration of chloride in Mill Creek was 2.9 mg/L in February 1999. All other ions are tightly grouped on the piper diagram.

Conclusion

This limited initial look at the potential for geochemical compatibility issues for the Milton-Freewater ASR finds that there is sufficient similarity to the Walla Walla water qualities that feasibility-limiting speciation reaction (precipitation/dissolution) do not appear likely. Although chloride varies slightly in both the receiving and source waters from those of the Walla Walla ASR, a speciation or stability problem related to this difference is not expected to occur because all other ions in the receiving and sources waters are nearly identical to those found in the Walla Walla ASR project. Consequently, modifying source water to mitigate reactivity prior to injection should not be considered at this phase of the Feasibility Study. A complete geochemical compatibility analysis will be completed as part of the Limited License application.

Review of Identified Diversion Locations and Water Treatment Alternatives

Overview

Under current State of Oregon rules for ASR, OAR 690-350-0020, the source water to be used for ASR recharge must be treated to meet drinking water standards. The Task 2 memorandum presented an analysis of potential diversion locations for supply of recharge water at potential ASR well sites and an assessment of available treatment techniques that may be applied to meet Oregon Health Authority regulations for treatment of surface water to drinking water standards prior to recharge. Four primary mechanical treatment alternatives were identified: Slow Sand Filtration, Conventional Rapid Sand Filtration, Packaged Treatment Units, and Membrane Filtration. In addition, Riverbank Filtration may be feasible, either as a primary treatment technique or in tandem with one of the 4 mechanical treatment options. This memorandum will focus on confirming the findings from Task 2, that membrane filtration is the preferred treatment methodology for treatment of Little Walla Walla River (or Walla Walla River) surface water for ASR injection. This conclusion is based on the following:

- Membrane filtration is a robust treatment alternative that can be adapted to a wide range of treatment requirements which may not fully be defined prior to pilot testing.
- Membrane treatment systems are most readily scaled for a variety of treatment capacity demands ranging from pilot testing for a single well to a centralized surface water treatment facility for transmission of finished water to a build-out ASR system with multiple wells.
- It may be feasible to rent/lease modular and mobile membrane treatment systems for ASR pilot testing to reduce risk of capital investment prior to validation of ASR feasibility.

A brief description of the key findings from the water quality testing results, presented early in this document, for the purposes of defining surface water treatment requirements is presented below.

Water Quality Results

Table 1 summarized the results from the water quality sampling of surface water in the Walla Walla River and Little Walla Walla River. For the purposes of this analysis, the water quality samples from the Little Walla River will be used as the basis for evaluation of feasible treatment techniques. In general, the results indicate the following:

- Samples were non-detect for all primary Safe Drinking Water Act (SDWA) regulated contaminants including SOCs and VOCs, and well mellow the Maximum Contaminant Level (MCL) for all secondary contaminants.
- Under low and high flow conditions in March, turbidity levels were consistently low (less than 10 NTUs) in the Little Walla Walla River.
- All samples were positive for the presence of Total Coliform and E.coli.

Treatment Requirements and Performance Standards

Oregon Administrative Rules Division 333, Chapter 61, establishes criteria under which filtration and treatment technique requirements are prescribed in lieu of MCLs for the following contaminants: Giardia lamblia, viruses, heterotrophic plate count bacteria, Legionella, Cryptosporidium, and turbidity. At every public water system with a surface water source or a groundwater source under the direct influence of surface water, water suppliers must provide treatment of source water that complies with these treatment technique requirements. Recharge water for ASR is required to meet these criteria prior to injection into the ASR well.

Of primary concern for selection of appropriate treatment techniques for this feasibility study is the removal of turbidity, Cryptosporidium, giardia and virus Inactivation. A brief description of each is presented below.

Turbidity

The presence and levels of turbidity in the raw water limits the feasibility of use of the Little Walla Walla River as an unfiltered source. If turbidity levels routinely exceed, 5 NTUs, which the 2 samples collected in March indicate that it is likely to occur, the reliable operation of a surface water intake on the Little Walla Walla River will require filtration. Each of the identified treatment alternatives will effectively reduce turbidity levels to meet drinking water standards. Depending on actual peak turbidity levels in the river during high flow events, additional treatment processes, including sedimentation and flocculation prior to filtration, may be required. One advantage of membrane filtration as the selected treatment technique is that increased levels of turbidity during higher flows may increase backwash requirements and reduce filtration efficiency, but overall filtered water quality can be expected to remain high. This would likely be more challenging with conventional or packaged filtration treatment systems that do not include pretreatment processes.

Collection of additional raw water quality turbidity at the proposed diversion locations should continue through the next year to obtain a better understanding of the range of turbidity levels that will need to be addressed by the selected treatment process.

Cryptosporidium and Giardia

All surface water sources are classified into one of four categories, or bins, based on the likely presence of cryptosporidium in the water. The classification process is part of routine water quality monitoring required by the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The bin classification of the surface water defines the level of removal (on a log₁₀ scale) of Cryptosporidium that must be achieved through treatment techniques. Since the diversion location will be a new surface water supply for the City, a conservative assumption is that the bin classification of the source will be Bin 4 requiring a 5.5-log removal of Cryptosporidium.

A source water monitoring plan, approved by the Oregon Health Authority, should be conducted in order to verify the Bin classification for this new surface water source.

Membrane filtration provides a robust level of removal for cryptosporidium. In Oregon, challenge studies have been performed on multiple membrane units resulting in verified cryptosporidium removal performance. All of these membrane units achieve a 4-log removal of cryptosporidium. In addition, they meet the required 3-log removal of giardia. As long as the source is not classified into Bin 3 or 4, no additional treatment processes will be required for Cryptosporidium removal.

Viruses

4-log removal or inactivation of viruses is required for a surface water source. This is most typically achieved through inactivation, either through disinfection by ultraviolet light (UV) or chlorine disinfection with adequate contact time. If additional cryptosporidium removal is required because of the LT2ESWTR Bin classification described above, then UV disinfection may effectively achieve both the required Cryptosporidium inactivation and 4-log inactivation of viruses.

Maintenance of a chlorine residual, achieved through the addition of liquid sodium hypochlorite post-filtration, is also recommended for finished water to be used for ASR recharge. A chlorine disinfectant residual will help limit bio-fouling potential in the well.

For the purposes of this study, it should be assumed that the treatment system will include both UV (for cryptosporidium inactivation and virus inactivation) and chlorine disinfection for maintenance of a disinfectant residual. If the LT2ESWTR Bin classification for the surface water is Bin 1 or 2 then UV disinfection would not be required and the chlorine disinfection system should be designed to achieve CT for 4-log inactivation of viruses.

Summary of Treatment Requirements

Based on the water quality data collected to date and a review of Oregon and EPA rules for treatment of surface water for drinking water systems, membrane filtration with chlorine disinfection is the minimum treatment requirement that can be expected. Additionally, raw water turbidity and LT2ESWTR Bin classification could require the addition of pre-filtration sedimentation processes and UV disinfection post-filtration. Alternately, if these additional processes are required, riverbank filtration may present an alternative to implementing additional treatment processes beyond membrane filtration.

For the purposes of pilot testing, a modular membrane treatment unit with UV disinfection will effectively meet drinking water standards using the most conservative assumptions regarding raw water quality.

BMG:bmg

Table 1: Milton-Freewater ASR Receiving and Source Water Analytical Results

Sample Location:			Well #5 Groundwater				Surface Water @ Point of Diversion on Walla Walla River				Surface Water @ Little Walla Walla River behind Well #5				Surface Water @ Little Walla Walla River behind Well #5				Notes
Sample ID:			MF-ASR-W5-030118				MF-ASR-WWR-030118				MF-ASR-LWWR-1				MF-ASR-LWWR-2				
Sample Date/Time:			3/1/18 9:45 AM				3/1/18 11:20 AM				3/15/18 10:55 AM				4/5/2018 14:40:00 PM ¹				
Batch:			180302017				180302020				180316032				180410059				
Lab Name:			Anatek Laboratorities				Anatek Laboratorities				Anatek Laboratorities				Anatek Laboratorities				
ANALYTE GROUP / Analyte	Units	Drinking Water Standard MCL/SMCL	MDL	RDL	Result	Q	MDL	RDL	Result	Q	MDL	RDL	Result	Q	MDL	RDL	Result	Q	
GENERAL CHEMISTRY (GC)																			Groundwater & Surface water
Alkalinity (total)	mg CaCO3/L	NA	2	2	80		2	2	30.0		2	2	26.0		2	2	28	^b	
Temperature	degrees Fahrenheit		----	----	----		----	----	----		----	----	----		----	----	----		
Chloride	mg/L	/250	0.01	0.1	6.46		0.01	0.1	0.500		0.01	0.1	0.420		0.01	0.1	0.416		
Fluoride	mg/L	4.0/2.0	0.071	0.1	0.123		0.071	0.1	ND		0.071	0.1	ND		0.071	0.1	ND		
Hardness	mg CaCO3/L	/250	0.1	1	82.2		0.1	1	23.8		0.1	1	21.0		0.1	1	22.1		
Nitrate+Nitrite (total N)	mg/L as N	10	0.01	0.1	0.493		0.01	0.1	ND		0.01	0.1	ND		0.01	0.1	ND		
Nitrate-N	mg/L as N	10	0.076	0.1	0.493		0.076	0.1	ND		0.076	0.1	ND		0.076	0.1	ND		
Nitrite-N	mg/L as N	1	0.063	0.1	ND		0.063	0.1	ND		0.063	0.1	ND		0.063	0.1	ND		
Orthophosphate as P	mg/L	NA	0.042	0.1	ND		0.042	0.1	ND		0.042	0.1	ND		0.042	0.1	ND		
Oxidation-Reduction Potential	millivolts	NA	----	----	-41		----	----	-18.5		----	----	-38.3		----	----	-28.6		
pH	pH units	/6.5-8.5	1	----	7.85		1	----	7.29		1	----	7.30		1		7.41		
Specific Conductance	µS/cm	/700	1	1	235		1	1	65.0		1	1	55.2		1	1	63.8		
Sulfate	mg/L	/250	0.057	0.1	10.6		0.057	0.1	0.822		0.057	0.1	0.648		0.057	0.1	0.609		
Total Dissolved Solids	mg/L	/500	30	50	129		30	50	47		30	50	76.0		30	50	74.0		
Turbidity	NTU	1	0.01	0.1	0.56		0.01	0.1	1.30		0.01	0.1	5.11		0.01	0.1	1.99		
Total Kjeldahl nitrogen	mg/L	NA	0.357	0.5	ND		0.357	0.5	ND		0.464	0.5	ND		0.464	0.5	ND		
TOTAL METALS (M)																			Groundwater & Surface water
Arsenic	mg/L	0.010	0.001	0.001	ND		0.001	0.001	ND		0.001	0.001	ND		0.001	0.001	ND	^a	
Calcium	mg/L	NA	0.03	0.1	19.6		0.01	0.1	5.71		0.03	0.1	5.12		0.03	0.1	5.37	^c	
Copper	mg/L	1.3*	0.001	0.001	0.00100		0.001	0.001	ND		0.001	0.001	0.00125		0.001	0.001	ND	^{a,c}	
Iron	mg/L	/0.3	0.0018	0.01	ND		0.0018	0.01	0.168		0.0018	0.01	0.941		0.0018	0.01	0.241	^c	
Iron (dissolved)	mg/L	NA	0.01	0.01	ND		0.01	0.01	0.0315		0.01	0.01	0.138		0.01	0.01	0.0176	^c	
Lead	mg/L	0.015 (AL)	0.001	0.001	ND		0.001	0.001	ND		0.001	0.001	ND		0.001	0.001	ND	^{a,b,c}	
Magnesium	mg/L	NA	0.001	0.1	8.06		0.001	0.1	2.24		0.001	0.1	1.99		0.001	0.1	2.11	^c	
Manganese	mg/L	/0.05	0.01	0.01	ND		0.01	0.01	ND		0.01	0.01	0.0121		0.01	0.01	ND	^c	
Manganese (dissolved)	mg/L	NA	0.01	0.01	ND		0.01	0.01	ND		0.01	0.01	ND		0.01	0.01	ND	^c	
Mercury	mg/L	0.002	0.00001	0.0001	ND		0.00001	0.0001	ND		0.00001	0.0001	ND		0.00001	0.0001	ND	^{a,b,c}	
Potassium	mg/L	NA	0.05	0.1	3.70		0.05	0.1	1.48		0.05	0.1	1.37		0.05	0.1	1.49	^c	
Sodium	mg/L	20**	0.05	0.1	8.96		0.05	0.1	2.7		0.05	0.1	2.15		0.05	0.1	2.64	^c	
Zinc	mg/L	/5	0.001	0.001	0.00372		0.001	0.001	0.00128		0.001	0.001	0.00198		0.001	0.001	ND	^c	
MISCELLANEOUS (MISC)																			Groundwater & Surface water
Corrosivity	Standard units	/non-corrosive	----	----	-0.134		----	----	-1.07		----	----	-1.14		----	----	-0.994		
BACTERIOLOGICALS (BAC)																			Surface water only
Total Coliform (Presence/Absence)	cfu/100mL		----	----	----		1	1	Present	⁴	1	1	Present	⁵	1	1	Present	⁵	
SYNTHETIC ORGANIC CHEMICALS (SOC)																			Surface water only
Chlordane, Technical	µg/L	2	----	----	----		0.0288	0.2	ND		0.0288	0.2	ND		0.0288	0.2	ND	^{a,b}	
Glyphosate ²	µg/L	700	----	----	----		3.2	5	ND		3.2	5	ND		3.2	5	ND	^a	
Heptachlor Epoxide	µg/L	0.2	----	----	----		0.0165	0.02	ND		0.0165	0.02	ND		0.0165	0.02	ND	^{a,b}	
Hexachlorobenzene	µg/L	1	----	----	----		0.0066	0.1	ND		0.0066	0.1	ND		0.0066	0.1	ND	^{a,b}	
Hexachlorocyclopentadiene	µg/L	50	----	----	----		0.011	0.1	ND		0.011	0.1	ND		0.011	0.1	ND	^{a,b}	
Lindane (BHC - GAMMA)	µg/L	0.2 as total PAH's	----	----	----		0.0152	0.04	ND		0.0152	0.04	ND		0.0152	0.04	ND	^{a,c}	
Aroclor 1016 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.08	0.08	ND		0.08	0.08	ND		0.08	0.08	ND	^{a,b}	
Aroclor 1221 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.5	1	ND		0.5	1	ND		0.5	1	ND	^{a,b}	
Aroclor 1232 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.1	0.5	ND		0.1	0.5	ND		0.1	0.5	ND	^{a,b}	
Aroclor 1242 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.1	0.3	ND		0.1	0.3	ND		0.1	0.3	ND	^{a,b}	

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Batch:			180302017				180302020				180316032				180410059				
Lab Name:			Anatek Laboratorities				Anatek Laboratorities				Anatek Laboratorities				Anatek Laboratorities				
ANALYTE GROUP / Analyte	Units	Drinking Water Standard MCL/SMCL	MDL	RDL	Result	Q	MDL	RDL	Result	Q	MDL	RDL	Result	Q	MDL	RDL	Result	Q	
Aroclor 1248 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.1	0.1	ND		0.1	0.1	ND		0.1	0.1	ND	a,b	
Aroclor 1254 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.1	0.1	ND		0.1	0.1	ND		0.1	0.1	ND	a,b	
Aroclor 1260 (PCB)	µg/L	0.5 as total PCB's	----	----	----		0.1	0.2	ND		0.1	0.2	ND		0.1	0.2	ND	a,b	
Total PCB	µg/L		----	----	----		0.095	0.5	ND		0.095	0.5	ND		0.095	0.5	ND		
Pentachlorophenol	µg/L	1	----	----	----		0.04	0.04	ND		0.04	0.04	ND		0.04	0.04	ND	a,b	
Malathion ³	µg/L		----	----	----		0.1	0.2	ND		0.1	0.2	ND		0.1	0.2	ND		
Chlorpyrifos ³	µg/L		----	----	----		0.0165	0.2	ND		0.0165	0.2	ND		0.0165	0.2	ND		
Azinphos-methyl ³	µg/L		----	----	----		0.1	0.1	ND		0.1	0.1	ND		0.1	0.1	ND		
VOLATILE ORGANIC CHEMICALS (VOC)																		Surface water only	
Benzene	µg/L	5	----	----	----		0.1	0.5	ND		0.1	0.5	ND		0.1	0.5	ND		
Ethylbenzene	µg/L	700	----	----	----		0.1	0.5	ND		0.1	0.5	ND		0.1	0.5	ND		
Toluene	µg/L	1000	----	----	----		0.1	0.5	ND		0.1	0.5	ND		0.1	0.5	ND		
Total Xylenes	µg/L	10000	----	----	----		0.1	0.5	ND		0.1	0.5	ND		0.1	0.5	ND		

Notes:

¹ - Chain of custody has the wrong date written on it. Sample was collected on 4/5/2018.

² - Glyphosphate was chosen as a herbicide proxy.

³ - Chosen as a pesticide proxy as it is a common organophosphate based on conversation with WA DEQ, will analyzed using EPA Method 8141 for water, not drinking water.

⁴ - Anatek Lab analyzed this sample accidentally and are not certified in Oregon to meet drinking water standards.

⁵ - Table Rock Analytical Laboratories analyzed for total coliform as they are certified to meet drinking water standards in Oregon.

BOLD = Result detected above method RDL.

Data Sources used to reduce analytical list:

- ^a - Listed in OAR 330-061-0030.
- ^b - Anderson Petty & Associates, 2011. City of Milton-Freewater, Oregon Water Management and Conservation Plan Update Addendum. May. p.16.
- ^c - GeoSystems Analysis, Inc., 2016. Surface Water and Groundwater Monitoring and Reporting Plan. May. Table 5.

* Action Level set by the EPA

** Guideline level recommended by the EPA

MCL = Maxiumim Contaminant Level

SMCL = Secondary Maximum Contaminant Level

MDL = Method Detection Limit

RDL = Representative Detection Limit

Q = Qualifier

pCi/L = Picocuries per liter

PCB = Polychlinated biphenyl

mg CaCO3/L = milligram of calcium carbonate per liter

µg/L = Micrograms per liter

µS/cm = Micro-Siemens per centimeter

mg/L = Milligrams per liter

NTU = Nephelometric turbidity unit

MV = Millivolts

ND = Not detected

**Figure 1: Milton-Freewater Stiff
Diagram Groundwater Comparison**

CATIONS

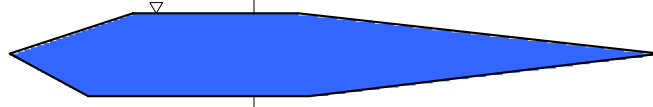
IONS

Na+K

Ca

Mg

0



Milton-Freewater Well #5

Na+K

Ca

Mg

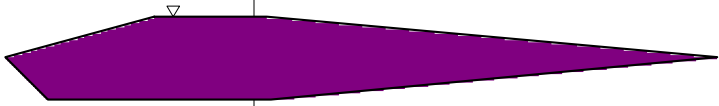


Walla Walla ASR Well #1 (historical)

Na+K

Ca

Mg



Walla Walla ASR Well #2 (historical)

Cl

HCO₃+CO₃

SO₄

Cl

HCO₃+CO₃

SO₄

Cl

HCO₃+CO₃

SO₄



Figure 2: Milton-Freewater Piper Diagram Groundwater Comparison

EXPLANATION

- Milton-Freewater ASR Well #5
- Walla Walla ASR Well #1 (historical)
- ▲ Walla Walla ASR Well #2 (historical)

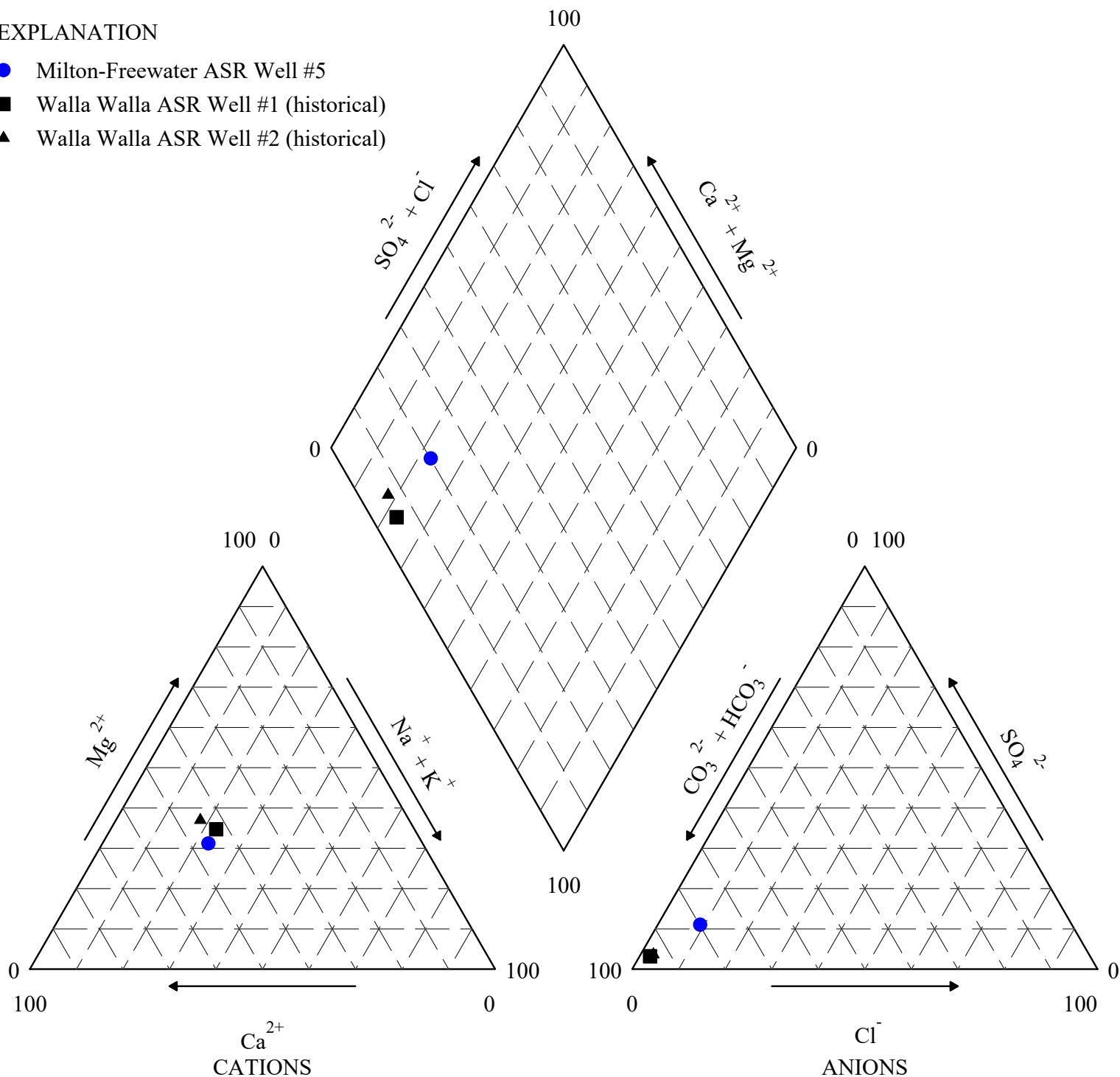


Figure 3: Milton-Freewater Stiff
Diagram Surface Water Comparison

CATIONS

IONS

Na+K

Ca

Mg

0

Cl

HCO₃+CO₃

SO₄

Point of Diversion Walla Walla River (SW)

Na+K

Ca

Mg

Cl

HCO₃+CO₃

SO₄

Little Walla Walla River (LWWR-1)

Na+K

Ca

Mg

Cl

HCO₃+CO₃

SO₄

Little Walla Walla River (LWWR-2)

Na+K

Ca

Mg

Cl

HCO₃+CO₃

SO₄

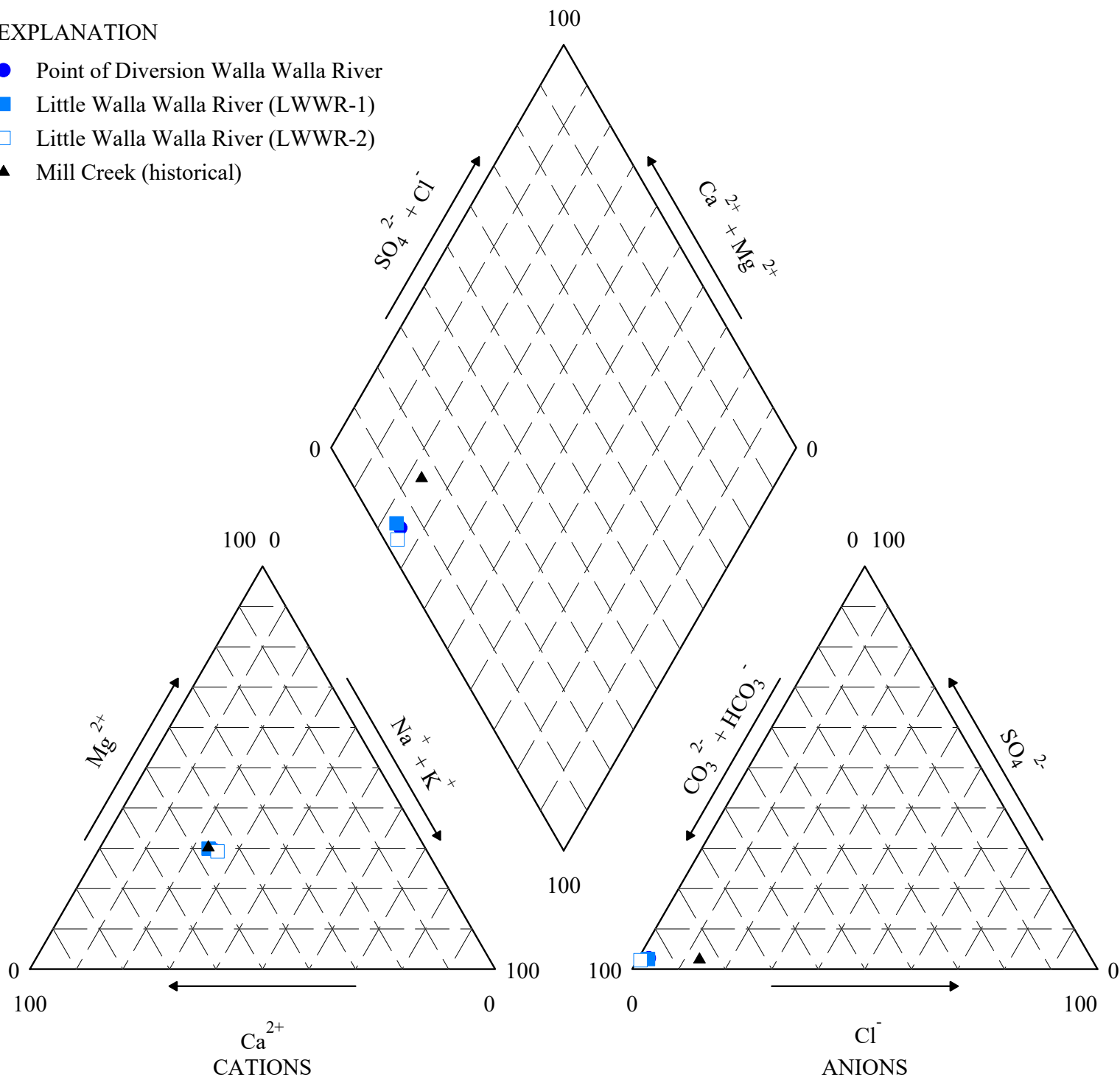
Mill Creek



Figure 4: Milton-Freewater Piper Diagram Surface Water Comparison

EXPLANATION

- Point of Diversion Walla Walla River
- Little Walla Walla River (LWWR-1)
- Little Walla Walla River (LWWR-2)
- ▲ Mill Creek (historical)



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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
 KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180302017
Project Name: MILTON-FREEWATER
 ASR 1556301

Analytical Results Report

Sample Number	180302017-001	Sampling Date	3/1/2018	Date/Time Received	3/2/2018	11:02 AM	
Client Sample ID	MF-ASR-W5-030118	Sampling Time	9:45 AM	Extraction Date			
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	80.0	mg CaCO3/L	2	3/6/2018	RPU	SM2320B	
Arsenic	ND	mg/L	0.001	3/7/2018	ETL	EPA 200.8	
Chloride	6.46	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
Conductivity	235	µmhos/cm	1	3/6/2018	RPU	SM 2510B	
Copper	0.00100	mg/L	0.001	3/7/2018	ETL	EPA 200.8	
Corrosivity	-0.134			3/14/2018	ETL	Calculation	
Dissolved Iron	ND	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Fluoride	0.123	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
Calcium	19.6	mg CaCO3/L	0.1	3/6/2018	SDR	EPA 200.7	
Hardness	82.2	mg CaCO3/L	1	3/6/2018	SDR	EPA 200.7	
Magnesium	8.06	mg CaCO3/L	0.1	3/6/2018	SDR	EPA 200.7	
Iron	ND	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Lead	ND	mg/L	0.001	3/7/2018	ETL	EPA 200.8	
Manganese	ND	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	3/7/2018	ETL	EPA 200.8	
NO3/N	0.493	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
NO3/N+NO2/N	0.493	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
NO2/N	ND	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
Oxidation-Reduction Potential	-41.0	millivolts		3/6/2018	RPU	SM 2580B	
pH	7.85	ph Units		3/6/2018	RPU	SM 4500pH-B	
PO4/P	ND	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
Potassium	3.70	mg/L	0.1	3/6/2018	SDR	EPA 200.7	
Sodium	8.96	mg/L	0.1	3/6/2018	SDR	EPA 200.7	
TDS	129	mg/L	50	3/8/2018 6:00:00 PM	RPU	SM 2540C	
Sulfate	10.6	mg/L	0.1	3/2/2018 8:03:00 PM	MER	EPA 300.0	
TKN	ND	mg/L	0.5	3/6/2018	RPU	SM4500NORGC	
Turbidity	0.56	NTU	0.1	3/6/2018	RPU	EPA 180.1	H1
Zinc	0.00372	mg/L	0.001	3/7/2018	ETL	EPA 200.8	

Authorized Signature



Todd Taruscio, Lab Manager

H1 Sample analysis performed past holding time.
 MCL EPA's Maximum Contaminant Level
 ND Not Detected
 PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
 The results reported relate only to the samples indicated.
 Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
 Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Friday, March 16, 2018

Page 1 of 1

Appendix 1
 Laboratory Results
 Northwest Groundwater Services, Inc

Anatek Labs, Inc.

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Login Report

Customer Name: EA ENGINEERING

Order ID: 180302017

8019 W QUINAULT AVE, STE D

Order Date: 3/2/2018

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

Sample #: 180302017-001 **Customer Sample #:** MF-ASR-W5-030118

Recv'd: ☒ **Matrix:** Drinking Water **Collector:** PATTY NEWMAN

Date Collected: 3/1/2018

Quantity: 4 **Date Received:** 3/2/2018 11:02:00 AM

Time Collected: 9:45 AM

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/14/2018	<u>Normal (~10 Days)</u>
ARSENIC	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
CHLORIDE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
CONDUCTIVITY	M	SM 2510B	3/14/2018	<u>Normal (~10 Days)</u>
COPPER	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
Corrosivity	M	Calculation	3/14/2018	<u>Normal (~10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
FLUORIDE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
IRON ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
LEAD	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
MANGANESE ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
NITRATE/N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
NITRITE/N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
OXIDATION-REDUCTION POTENTIAL	M	SM 2580B	3/14/2018	<u>Normal (~10 Days)</u>
pH	M	SM 4500pH-B	3/14/2018	<u>Normal (~10 Days)</u>
PHOSPHATE/P	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
SODIUM ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
SOLIDS - TDS	M	SM 2540C	3/14/2018	<u>Normal (~10 Days)</u>

Customer Name: EA ENGINEERING

8019 W QUINAULT AVE, STE D

KENNEWICK

WA

99336

Order ID: 180302017

Order Date: 3/2/2018

Contact Name: KEVIN LINDSEY

Comment:

Project Name: MILTON-FREEWATER
ASR 1556301

SULFATE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
TKN	M	SM4500NORGC	3/14/2018	<u>Normal (~10 Days)</u>
TURBIDITY	M	EPA 180.1	3/14/2018	<u>Normal (~10 Days)</u>
ZINC	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	3.9
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes
Total number of containers?	4

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Chain of Custody Record

180302 017 **EENG** Last 3/14/2019

	Due	
1st SAMP	3/1/2018	1st RCVD 3/2/2018
MILTON-FREEWATER ASB	15556301	

[illegible]

Table 1 Full Analytical Suite

ANALYTE GROUP / Analyte	Units	Drinking Water Standard / Criteria	Notes
GENERAL CHEMISTRY (GC)			Groundwater & Surface water
Alkalinity (total)	mg CaCO ₃ /L		^b
Temperature	degrees Fahrenheit		
Chloride	mg/L	250 (SMCL)	
Fluoride	mg/L	2.0 (SMCL), 4.0 (MCL)	
Hardness	mg CaCO ₃ /L	250 (SMCL)	
Nitrate+Nitrite (total N)	mg/L as N	10	
Nitrate-N	mg/L as N	10	
Nitrite-N	mg/L as N	1	
Orthophosphate as P	mg/L		
Oxidation-Reduction Potential	millivolts		
pH	pH units	6.5 to 8.5 (SMCL)	
Specific Conductance	µS/cm	700 (SMCL)	
Sulfate	mg/L	250 (SMCL)	
Total Dissolved Solids	mg/L	500 (SMCL)	
Turbidity	NTU	1	
Total Kjeldahl nitrogen			
TOTAL METALS (M)			Groundwater & Surface water
Arsenic	mg/L	0.010	^a
Calcium	mg/L		^c
Copper	mg/L	1.3*	^{a,c}
Iron	mg/L	0.3 (SMCL)	^c
Iron (dissolved)	mg/L		^c
Lead	mg/L	0.015*	^{a,b,c}
Magnesium	mg/L		^c
Manganese	mg/L	0.05 (SMCL)	^c
Manganese (dissolved)	mg/L		^c
Mercury	mg/L	0.002	^{a,b,c}
Potassium	mg/L		^c
Sodium	mg/L	20**	^c
Zinc	mg/L	5	^c
MISCELLANEOUS (MISC)			Groundwater & Surface water
Corrosivity	Standard units	Non-corrosive	
BACTERIOLOGICALS (BAC)			Surface water only
Total Coliform (Presence/Absence)	cfu/100mL	absent	Method SM 9221 B, C per the proposal Will be analyzed by Table Rock but Anatek will bill EA directly
SYNTHETIC ORGANIC CHEMICALS (SOC)			Surface water only
Chlordane, Technical	µg/L	2	^{a,b}
Glyphosate ¹	µg/L	700	^a
Heptachlor Epoxide	µg/L	0.2	^{a,b}
Hexachlorobenzene	µg/L	1	^{a,b}
Hexachlorocyclopentadiene	µg/L	50	^{a,b}
Lindane (BHC - GAMMA)	µg/L	0.2 as total PAH's	^{a,c}
Aroclor 1016 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1221 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1232 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1242 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1248 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1254 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1260 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Pentachlorophenol	µg/L	1	^{a,b}
Malathion ²	µg/L		
Chlorpyrifos ²	µg/L		
Azinphos-methyl ²	µg/L		
VOLATILE ORGANIC CHEMICALS (VOC)			Surface water only
Benzene	µg/L	5	
Ethylbenzene	µg/L	700	
Toluene	µg/L	1000	
Total Xylenes	µg/L	10000	

Notes:¹ - Glyphosate was chosen as a herbicide proxy.² - Chosen as a pesticide proxy as it is a common organophosphate based on conversation with WA DEQ, will analyzed using EPA Method 8141 for water, not drinking water.**Data Sources used to reduce analytical list:**^a - Listed in OAR 330-061-0030.^b - Anderson Petty & Associates, 2011. City of Milton-Freewater, Oregon Water Management and Conservation Plan Update Addendum. May. p.16.^c - GeoSystems Analysis, Inc., 2016. Surface Water and Groundwater Monitoring and Reporting Plan. May. Table 5.

* Action Level set by the EPA

** Guideline level recommended by the EPA

MCL = Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

MDL = Method Detection Limit

RL = Reporting Limit

µg/L = Micrograms per liter

µS/cm = Micro-Siemens per centimeter

mg/L = Milligrams per liter

NTU = Nephelometric turbidity unit

MV = Millivolts

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180302020
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180302020-001	Sampling Date	3/1/2018	Date/Time Received	3/2/2018 11:06 AM
Client Sample ID	MF-ASR-WWR-030118	Sampling Time	11:20 AM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	30.0	mg CaCO ₃ /L	2	3/6/2018	RPU	SM2320B	
Arsenic	ND	mg/L	0.001	3/12/2018	HSW	EPA 200.8	
E. Coli	PRESENT	cfu/100ml	1	3/2/2018	LAC	SM9223B	
Total Coliform	PRESENT	cfu/100ml	1	3/2/2018	LAC	SM9223B	
Chloride	0.500	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
Conductivity	65.0	µmhos/cm	1	3/6/2018	RPU	SM 2510B	
Copper	ND	mg/L	0.001	3/12/2018	HSW	EPA 200.8	
Corrosivity	-1.07			3/14/2018	ETL	Calculation	
Dissolved Iron	0.0315	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	3/6/2018	SDR	EPA 200.7	
Fluoride	ND	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
Glyphosate	ND	ug/L	5	3/6/2018 9:06:00 PM	MER	EPA 547	
Calcium	5.81	mg CaCO ₃ /L	0.1	3/9/2018	SDR	EPA 200.7	
Hardness	23.8	mg CaCO ₃ /L	1	3/9/2018	SDR	EPA 200.7	
Magnesium	2.24	mg CaCO ₃ /L	0.1	3/9/2018	SDR	EPA 200.7	
Pentachlorophenol	ND	ug/L	0.04	3/7/2018 4:11:00 AM	MAH	EPA 515.4	
Iron	0.168	mg/L	0.01	3/14/2018	SDR	EPA 200.7	
Lead	ND	mg/L	0.001	3/12/2018	HSW	EPA 200.8	
Manganese	ND	mg/L	0.01	3/9/2018	SDR	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	3/12/2018	HSW	EPA 200.8	
NO ₃ /N	ND	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
NO ₃ /N+NO ₂ /N	ND	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
NO ₂ /N	ND	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
Oxidation-Reduction Potential	-18.5	millivolts		3/6/2018	RPU	SM 2580B	
Aroclor 1016 (PCB-1016)	ND	ug/L	0.08	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1221 (PCB-1221)	ND	ug/L	1	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1232 (PCB-1232)	ND	ug/L	0.5	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1242 (PCB-1242)	ND	ug/L	0.3	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1248 (PCB-1248)	ND	ug/L	0.1	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1254 (PCB-1254)	ND	ug/L	0.1	3/7/2018 9:18:00 PM	MAH	EPA 505	
Aroclor 1260 (PCB-1260)	ND	ug/L	0.2	3/7/2018 9:18:00 PM	MAH	EPA 505	
Chlordane	ND	ug/L	0.2	3/7/2018 9:18:00 PM	MAH	EPA 505	
PCBs	ND	ug/L	0.5	3/7/2018 9:18:00 PM	MAH	EPA 505	
pH	7.29	ph Units		3/6/2018	RPU	SM 4500pH-B	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Attn: KEVIN LINDSEY

Batch #: 180302020
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180302020-001	Sampling Date	3/1/2018	Date/Time Received	3/2/2018 11:06 AM
Client Sample ID	MF-ASR-WWR-030118	Sampling Time	11:20 AM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
PO4/P	ND	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
Potassium	1.48	mg/L	0.1	3/9/2018	SDR	EPA 200.7	
Chlorpyrifos	ND	ug/L	0.2	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
gamma-BHC (Lindane)	ND	ug/L	0.04	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
Heptachlor epoxide	ND	ug/L	0.02	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
Hexachlorobenzene	ND	ug/L	0.1	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
Hexachlorocyclopentadiene	ND	ug/L	0.1	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
Malathion	ND	ug/L	0.2	3/15/2018 7:04:00 PM	BMM	EPA 525.2	
Azinphos-methyl	ND	ug/L	0.2	3/17/2018	BMM	EPA 525.2	
Sodium	2.77	mg/L	0.1	3/9/2018	SDR	EPA 200.7	
TDS	47	mg/L	50	3/8/2018 6:00:00 PM	RPU	SM 2540C	
Sulfate	0.822	mg/L	0.1	3/2/2018 8:46:00 PM	MER	EPA 300.0	
TKN	ND	mg/L	0.5	3/6/2018	RPU	SM4500NORGC	
Turbidity	1.30	NTU	0.1	3/6/2018	RPU	EPA 180.1	H1
Benzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Zinc	0.00128	mg/L	0.001	3/12/2018	HSW	EPA 200.8	

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Attn: KEVIN LINDSEY

Batch #: 180302020
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180302020-001A	Sampling Date	3/1/2018	Date/Time Received	3/2/2018 11:06 AM
Client Sample ID	MF-ASR-WWR-030118A	Sampling Time	11:20 AM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Calcium	5.71	mg/L	0.1	3/14/2018	SDR	EPA 200.7	
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1,1-Trichloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1,2-Trichloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1-Dichloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1-Dichloroethene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,1-dichloropropene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2,3-Trichloropropane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2,4-Trimethylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2-Dibromo-3-chloropropane(ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2-Dibromoethane (EDB)	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2-Dichlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2-Dichloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,2-Dichloropropane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,3,5-Trimethylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,3-Dichlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,3-Dichloropropane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,3-Dichloropropene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
1,4-Dichlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
2,2-Dichloropropane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
2-Chlorotoluene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
4-Chlorotoluene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Acetone	ND	ug/L	2.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Benzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Bromobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Bromochloromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Bromodichloromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Bromoform	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Bromomethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Carbon Tetrachloride	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Chlorobenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Chloroethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:Cert0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Wednesday, March 21, 2018

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Appendix 1
Laboratory Results
Northwest Groundwater Services, Inc

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180302020
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180302020-001A	Sampling Date	3/1/2018	Date/Time Received	3/2/2018 11:06 AM
Client Sample ID	MF-ASR-WWR-030118A	Sampling Time	11:20 AM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chloroform	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Chloromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
cis-1,2-dichloroethene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
cis-1,3-Dichloropropene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Dibromochloromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Dibromomethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Dichlorodifluoromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Hexachlorobutadiene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Isopropylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
m+p-Xylene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Methylene chloride	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Naphthalene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
n-Butylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
n-Propylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
o-Xylene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
p-isopropyltoluene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
sec-Butylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Styrene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
tert-Butylbenzene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Tetrachloroethene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
trans-1,2-Dichloroethene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
trans-1,3-Dichloropropene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Trichloroethene	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Trichlorofluoromethane	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	
Vinyl Chloride	ND	ug/L	0.5	3/9/2018 1:26:00 PM	SAT	EPA 524.3	

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

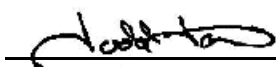
Batch #: 180302020
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180302020-002	Sampling Date	3/1/2018	Date/Time Received	3/2/2018	11:06 AM
Client Sample ID	TRIP BLANK	Sampling Time				
Matrix	Drinking Water					
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Benzene	ND	ug/L	0.5	3/9/2018 2:07:00 PM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	3/9/2018 2:07:00 PM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	3/9/2018 2:07:00 PM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	3/9/2018 2:07:00 PM	SAT	EPA 524.3	

Authorized Signature



Todd Taruscio, Lab Manager

H1 Sample analysis performed past holding time.
MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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Login Report

Customer Name: EA ENGINEERING

Order ID: 180302020

8019 W QUINAULT AVE, STE D

Order Date: 3/2/2018

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

Sample #: 180302020-001 **Customer Sample #:** MF-ASR-WWR-030118

Recv'd: ☒ **Matrix:** Drinking Water **Collector:** PATTY NEWMAN

Date Collected: 3/1/2018

Quantity: 16 **Date Received:** 3/2/2018 11:06:00 AM

Time Collected: 11:20 AM

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/14/2018	<u>Normal (~10 Days)</u>
ARSENIC	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
BACT - TOTAL/ECOLI COLILERT	M	SM9223B	3/14/2018	<u>Normal (~10 Days)</u>
CHLORIDE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
CONDUCTIVITY	M	SM 2510B	3/14/2018	<u>Normal (~10 Days)</u>
COPPER	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
Corrosivity	M	Calculation	3/14/2018	<u>Normal (~10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
FLUORIDE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
GLYPHOSATE 547	M	EPA 547	3/14/2018	<u>Normal (~10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
HERBICIDES 515.4	M	EPA 515.4	3/14/2018	<u>Normal (~10 Days)</u>
IRON ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
LEAD	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
MANGANESE ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>
NITRATE/N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
NITRITE/N	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
OXIDATION-REDUCTION POTENTIAL	M	SM 2580B	3/14/2018	<u>Normal (~10 Days)</u>
PESTICIDES 505	M	EPA 505	3/14/2018	<u>Normal (~10 Days)</u>
pH	M	SM 4500pH-B	3/14/2018	<u>Normal (~10 Days)</u>

Customer Name: EA ENGINEERING

8019 W QUINULT AVE, STE D
KENNEWICK WA 99336

Order ID: 180302020

Order Date: 3/2/2018

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

PHOSPHATE/P	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	3/14/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2 EXTENDED	M	EPA 525.2	3/14/2018	<u>Normal (~10 Days)</u>
SODIUM ICP	M	EPA 200.7	3/14/2018	<u>Normal (~10 Days)</u>
SOLIDS - TDS	M	SM 2540C	3/14/2018	<u>Normal (~10 Days)</u>
SULFATE	M	EPA 300.0	3/14/2018	<u>Normal (~10 Days)</u>
TKN	M	SM4500NORGC	3/14/2018	<u>Normal (~10 Days)</u>
TURBIDITY	M	EPA 180.1	3/14/2018	<u>Normal (~10 Days)</u>
VOLATILES 524.3	M	EPA 524.3	3/14/2018	<u>Normal (~10 Days)</u>
ZINC	M	EPA 200.8	3/14/2018	<u>Normal (~10 Days)</u>

Sample #: 180302020-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☒ **Matrix:** Drinking Water **Collector:**

Date Collected: 3/1/2018

Quantity: 1 **Date Received:** 3/2/2018 11:06:00 AM

Time Collected:

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.3	M	EPA 524.3	3/14/2018	<u>Normal (~10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	5.5
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes
Total number of containers?	16

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Chain of Custody Record

180302 020	EENG	Last Due	3/14/2018
1st SAMP	3/1/2018	1st RCVD	3/2/2018
MILTON-FREEWATER ASR 1556301			

Anatek
Log-In #

Company Name:

EA Engineering, Inc., PBC

Project Manager:

Kevin Lindsey

Turn Around Time & Reporting

Address:
8019 W Quinault Ave., Suite 201

Project Name & #

Milton-Freewater ASR 1556301

City: **Kennewick** State: **WA** Zip: **99336**

Email Address :

PNEWMAN@EAEST.COM

Phone: (509) 591-0264

Purchase Order #

Fax: **Sampler Name & phone:**
Patty Newman 509-591-0876

Sampler Name & phone:
Patty Newman 509-591-0876

Please refer to our normal turn around times at:
<http://www.anateklabs.com/services/guidelines/reporting.asp>

Normal _____ Phone _____
 Next Day* _____ Mail _____
 2nd Day* _____ Fax _____
 Other* _____ Email _____

*All rush order requests must be prior approved.

Note Special Instructions/Comments

SEE ATTACHED

SEE ATTACHED TABLE FOR ANALYTES

Analyze bacteria per Poth N. - W 31-518

[illegible]

Inspection Checklist

Received Intact?	Y	N
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Labels & Chains Agree?

Containers Sealed:

VOC Head Space?

UFS

Temperature ($^{\circ}\text{C}$): 20 + 20 = 40

Preservative: HCl, SS, MgThio, MA/AA

17501

Date & Time:

Inspected By

Table 1 Full Analytical Suite

ANALYTE GROUP / Analyte	Units	Drinking Water Standard / Criteria	Notes
GENERAL CHEMISTRY (GC)			Groundwater & Surface water
Alkalinity (total)	mg CaCO ₃ /L		^b
Temperature	degrees Fahrenheit		
Chloride	mg/L	250 (SMCL)	
Fluoride	mg/L	2.0 (SMCL), 4.0 (MCL)	
Hardness	mg CaCO ₃ /L	250 (SMCL)	
Nitrate+Nitrite (total N)	mg/L as N	10	
Nitrate-N	mg/L as N	10	
Nitrite-N	mg/L as N	1	
Orthophosphate as P	mg/L		
Oxidation-Reduction Potential	millivolts		
pH	pH units	6.5 to 8.5 (SMCL)	
Specific Conductance	µS/cm	700 (SMCL)	
Sulfate	mg/L	250 (SMCL)	
Total Dissolved Solids	mg/L	500 (SMCL)	
Turbidity	NTU	1	
Total Kjeldahl nitrogen			
TOTAL METALS (M)			Groundwater & Surface water
Arsenic	mg/L	0.010	^a
Calcium	mg/L		^c
Copper	mg/L	1.3*	^{a,c}
Iron	mg/L	0.3 (SMCL)	^c
Iron (dissolved)	mg/L		^c
Lead	mg/L	0.015*	^{a,b,c}
Magnesium	mg/L		^c
Manganese	mg/L	0.05 (SMCL)	^c
Manganese (dissolved)	mg/L		^c
Mercury	mg/L	0.002	^{a,b,c}
Potassium	mg/L		^c
Sodium	mg/L	20**	^c
Zinc	mg/L	5	^c
MISCELLANEOUS (MISC)			Groundwater & Surface water
Corrosivity	Standard units	Non-corrosive	
BACTERIOLOGICALS (BAC)			Surface water only
Total Coliform (Presence/Absence)	cfu/100mL	absent	Method SM 9221 B, C per the proposal Will be analyzed by Table Rock but Anatek will bill EA directly
SYNTHETIC ORGANIC CHEMICALS (SOC)			Surface water only
Chlordane, Technical [—]	µg/L	2	^{a,b}
Glyphosate ^{1 —}	µg/L	700	^a
Heptachlor Epoxide [—]	µg/L	0.2	^{a,b}
Hexachlorobenzene [—]	µg/L	1	^{a,b}
Hexachlorocyclopentadiene [—]	µg/L	50	^{a,b}
Lindane (BHC - GAMMA) [—]	µg/L	0.2 as total PAH's	^{a,c}
Aroclor 1016 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1221 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1232 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1242 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1248 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1254 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1260 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Pentachlorophenol [→]	µg/L	1	^{a,b}
Malathion ^{2 —}	µg/L		
Chlorpyrifos ^{2 —}	µg/L		
Azinphos-methyl ^{2 —}	µg/L		
VOLATILE ORGANIC CHEMICALS (VOC)			Surface water only
Benzene	µg/L	5	
Ethylbenzene	µg/L	700	
Toluene	µg/L	1000	
Total Xylenes	µg/L	10000	

Notes:¹ - Glyphosphate was chosen as a herbicide proxy.² - Chosen as a pesticide proxy as it is a common organophosphate based on conversation with WA DEQ, will analyzed using EPA Method 8141 for water, not drinking water.**Data Sources used to reduce analytical list:**^a - Listed in OAR 330-061-0030.^b - Anderson Petty & Associates, 2011. City of Milton-Freewater, Oregon Water Management and Conservation Plan Update Addendum. May. p.16.^c - GeoSystems Analysis, Inc., 2016. Surface Water and Groundwater Monitoring and Reporting Plan. May. Table 5.

* Action Level set by the EPA

** Guideline level recommended by the EPA

MCL = Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

MDL = Method Detection Limit

RL = Reporting Limit

µg/L = Micrograms per liter

µS/cm = Micro-Siemens per centimeter

mg/L = Milligrams per liter

NTU = Nephelometric turbidity unit

MV = Millivolts

Anatek Labs, Inc.

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180316032
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180316032-001	Sampling Date	3/15/2018	Date/Time Received	3/16/2018 9:45 AM
Client Sample ID	MF-ASR-LWWR-1	Sampling Time	10:55 AM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	26.0	mg CaCO ₃ /L	2	3/21/2018 1:15:00 PM	RPU	SM2320B	
Arsenic	ND	mg/L	0.001	3/20/2018	HSW	EPA 200.8	
Chloride	0.420	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
Conductivity	55.2	µmhos/cm	1	3/21/2018 1:15:00 PM	RPU	SM 2510B	
Copper	0.00125	mg/L	0.001	3/20/2018	HSW	EPA 200.8	
Corrosivity	-1.14			3/27/2018	ETL	Calculation	
Dissolved Iron	0.138	mg/L	0.01	3/19/2018	SDR	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	3/19/2018	SDR	EPA 200.7	
Fluoride	ND	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
Glyphosate	ND	ug/L	5	3/29/2018 11:02:00 AM	MER	EPA 547	
Calcium	5.12	mg CaCO ₃ /L	0.1	3/19/2018	SDR	EPA 200.7	
Hardness	21.0	mg CaCO ₃ /L	1	3/19/2018	SDR	EPA 200.7	
Magnesium	1.99	mg CaCO ₃ /L	0.1	3/19/2018	SDR	EPA 200.7	
Pentachlorophenol	ND	ug/L	0.04	3/22/2018 2:00:00 AM	MAH	EPA 515.4	
Iron	0.941	mg/L	0.01	3/19/2018	SDR	EPA 200.7	
Lead	ND	mg/L	0.001	3/20/2018	HSW	EPA 200.8	
Manganese	0.0121	mg/L	0.01	3/19/2018	SDR	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	3/20/2018	HSW	EPA 200.8	
NO ₃ /N	ND	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
NO ₃ /N+NO ₂ /N	ND	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
NO ₂ /N	ND	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
Oxidation-Reduction Potential	-38.3	millivolts		3/21/2018 1:15:00 PM	RPU	SM 2580B	
Aroclor 1016 (PCB-1016)	ND	ug/L	0.08	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1221 (PCB-1221)	ND	ug/L	1	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1232 (PCB-1232)	ND	ug/L	0.5	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1242 (PCB-1242)	ND	ug/L	0.3	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1248 (PCB-1248)	ND	ug/L	0.1	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1254 (PCB-1254)	ND	ug/L	0.1	3/23/2018 12:09:00 AM	MAH	EPA 505	
Aroclor 1260 (PCB-1260)	ND	ug/L	0.2	3/23/2018 12:09:00 AM	MAH	EPA 505	
Chlordane	ND	ug/L	0.2	3/23/2018 12:09:00 AM	MAH	EPA 505	
PCBs	ND	ug/L	0.5	3/23/2018 12:09:00 AM	MAH	EPA 505	
pH	7.30	ph Units		3/21/2018 1:15:00 PM	RPU	SM 4500pH-B	
PO ₄ /P	ND	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
Potassium	1.37	mg/L	0.1	3/19/2018	SDR	EPA 200.7	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

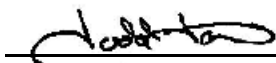
Batch #: 180316032
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number 180316032-001 **Sampling Date** 3/15/2018 **Date/Time Received** 3/16/2018 9:45 AM
Client Sample ID MF-ASR-LWWR-1 **Sampling Time** 10:55 AM
Matrix Drinking Water
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlorpyrifos	ND	ug/L	0.2	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
gamma-BHC (Lindane)	ND	ug/L	0.04	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
Heptachlor epoxide	ND	ug/L	0.02	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
Hexachlorobenzene	ND	ug/L	0.1	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
Hexachlorocyclopentadiene	ND	ug/L	0.1	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
Malathion	ND	ug/L	0.2	3/21/2018 11:03:00 PM	BMM	EPA 525.2	
Azinphos-methyl	ND	ug/L	0.1	3/26/2018 3:49:00 PM	BMM	EPA 525.2	
Sodium	2.15	mg/L	0.1	3/19/2018	SDR	EPA 200.7	
TDS	76.0	mg/L	50	3/21/2018 5:00:00 PM	RPU	SM 2540C	
Sulfate	0.648	mg/L	0.1	3/16/2018 6:41:00 PM	MER	EPA 300.0	
TKN	ND	mg/L	0.5	4/4/2018 9:00:00 AM	MER	SM4500NORGC	
Turbidity	5.11	NTU	0.1	3/16/2018 3:00:00 PM	RPU	EPA 180.1	
Benzene	ND	ug/L	0.5	3/21/2018 11:11:00 AM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	3/21/2018 11:11:00 AM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	3/21/2018 11:11:00 AM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	3/21/2018 11:11:00 AM	SAT	EPA 524.3	
Zinc	0.00198	mg/L	0.001	3/20/2018	HSW	EPA 200.8	

Authorized Signature



Todd Taruscio, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Tuesday, April 10, 2018

Page 2 of 2
Appendix 1
Laboratory Results
Northwest Groundwater Services, Inc

Anatek Labs, Inc.

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Login Report

Customer Name: EA ENGINEERING

Order ID: 180316032

8019 W QUINAULT AVE, STE D

Order Date: 3/16/2018

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

Sample #: 180316032-001 **Customer Sample #:** MF-ASR-LWWR-1

Recv'd: ☒ **Matrix:** Drinking Water **Collector:** PATTY NEWMAN

Date Collected: 3/15/2018

Quantity: 16 **Date Received:** 3/16/2018 9:45:00 AM

Time Collected: 10:55 AM

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/28/2018	<u>Normal (~10 Days)</u>
ARSENIC	M	EPA 200.8	3/28/2018	<u>Normal (~10 Days)</u>
CHLORIDE	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
CONDUCTIVITY	M	SM 2510B	3/28/2018	<u>Normal (~10 Days)</u>
COPPER	M	EPA 200.8	3/28/2018	<u>Normal (~10 Days)</u>
Corrosivity	M	Calculation	3/28/2018	<u>Normal (~10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
FLUORIDE	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
GLYPHOSATE 547	M	EPA 547	3/28/2018	<u>Normal (~10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
HERBICIDES 515.4	M	EPA 515.4	3/28/2018	<u>Normal (~10 Days)</u>
IRON ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
LEAD	M	EPA 200.8	3/28/2018	<u>Normal (~10 Days)</u>
MANGANESE ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	3/28/2018	<u>Normal (~10 Days)</u>
NITRATE/N	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
NITRITE/N	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
OXIDATION-REDUCTION POTENTIAL	M	SM 2580B	3/28/2018	<u>Normal (~10 Days)</u>
PESTICIDES 505	M	EPA 505	3/28/2018	<u>Normal (~10 Days)</u>
pH	M	SM 4500pH-B	3/28/2018	<u>Normal (~10 Days)</u>
PHOSPHATE/P	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>

Customer Name: EA ENGINEERING

8019 W QUINULT AVE, STE D
KENNEWICK WA 99336

Order ID: 180316032

Order Date: 3/16/2018

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

POTASSIUM ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	3/28/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2 EXTENDED	M	EPA 525.2	3/28/2018	<u>Normal (~10 Days)</u>
SODIUM ICP	M	EPA 200.7	3/28/2018	<u>Normal (~10 Days)</u>
SOLIDS - TDS	M	SM 2540C	3/28/2018	<u>Normal (~10 Days)</u>
SULFATE	M	EPA 300.0	3/28/2018	<u>Normal (~10 Days)</u>
TKN	M	SM4500NORGC	3/28/2018	<u>Normal (~10 Days)</u>
TURBIDITY	M	EPA 180.1	3/28/2018	<u>Normal (~10 Days)</u>
VOLATILES 524.3	M	EPA 524.3	3/28/2018	<u>Normal (~10 Days)</u>
ZINC	M	EPA 200.8	3/28/2018	<u>Normal (~10 Days)</u>

Sample #: 180316032-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☒ **Matrix:** Drinking Water **Collector:**

Date Collected: 3/15/2018

Quantity: 1 **Date Received:** 3/16/2018 9:45:00 AM

Time Collected:

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.3	M	EPA 524.3	3/28/2018	<u>Normal (~10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	No
What is the temperature of the sample(s)? (°C)	1.9
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes
Total number of containers?	15



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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Chain of Custody Record

Company Name: EA Engineering, Inc., PBC		Project Manager: Kevin Lindsey	
Address: 8019 W Quinault Ave., Suite 201		Project Name & #: Milton-Freewater ASR 1556301	
City: Kennewick	State: WA Zip: 99336	Email Address: PNEWMAN@EAEST.COM	
Phone: (509) 591-0264		Purchase Order #:	
Fax:		Sampler Name & phone: Patty Newman 509-591-0876	
Provide Sample Description			
Lab ID	Sample Identification	Sampling Date/Time	Matrix
	MF-ASR-LWW-1	03/15/2018 1055	W
List Analyses Requested			
Preservative: <input type="checkbox"/> # of Containers: <input type="checkbox"/> 15 5L <input checked="" type="checkbox"/> See Attached			
Note Special Instructions/Comments			
*****SEE ATTACHED*****			
SEE ATTACHED TABLE FOR ANALYTES			
One pesticide & 6-phosphate used collected bottle			
Turn Around Time & Reporting			
Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp			
Normal <input checked="" type="checkbox"/> Next Day* <input type="checkbox"/> 2nd Day* <input type="checkbox"/> Other* <input type="checkbox"/>			
*All rush order requests must be prior approved.			
Phone <input type="checkbox"/> Mail <input type="checkbox"/> Fax <input type="checkbox"/> Email <input type="checkbox"/>			
Inspection Checklist			
Received Intact? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N			
Labels & Chains Agree? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N			
Containers Sealed? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N			
VOC Head Space? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N			
UPS			
Temperature (°C): 1.9 10.1			
Preservative: HCL, H2SO4, SS, BOD, etc.			
Date & Time: 3/16/18 14:30			
Inspected By: [Signature]			

180316 032 **EENG** Last Due 3/28/2018
1st SAMP 3/15/2018 1st RCVD 3/16/2018
MILTON-FREEWATER ASR 1556301

Table 1 Full Analytical Suite

ANALYTE GROUP / Analyte	Units	Drinking Water Standard / Criteria	Notes
GENERAL CHEMISTRY (GC)			Groundwater & Surface water
Alkalinity (total)	mg CaCO ₃ /L		^b
Temperature	degrees Fahrenheit		
Chloride	mg/L	250 (SMCL)	
Fluoride	mg/L	2.0 (SMCL), 4.0 (MCL)	
Hardness	mg CaCO ₃ /L	250 (SMCL)	
Nitrate+Nitrite (total N)	mg/L as N	10	
Nitrate-N	mg/L as N	10	
Nitrite-N	mg/L as N	1	
Orthophosphate as P	mg/L		
Oxidation-Reduction Potential	millivolts		
pH	pH units	6.5 to 8.5 (SMCL)	
Specific Conductance	µS/cm	700 (SMCL)	
Sulfate	mg/L	250 (SMCL)	
Total Dissolved Solids	mg/L	500 (SMCL)	
Turbidity	NTU	1	
Total Kjeldahl nitrogen			
TOTAL METALS (M)			Groundwater & Surface water
Arsenic	mg/L	0.010	^a
Calcium	mg/L		^c
Copper	mg/L	1.3*	^{a,c}
Iron	mg/L	0.3 (SMCL)	^c
Iron (dissolved)	mg/L		^c
Lead	mg/L	0.015*	^{a,b,c}
Magnesium	mg/L		^c
Manganese	mg/L	0.05 (SMCL)	^c
Manganese (dissolved)	mg/L		^c
Mercury	mg/L	0.002	^{a,b,c}
Potassium	mg/L		^c
Sodium	mg/L	20**	^c
Zinc	mg/L	5	^c
MISCELLANEOUS (MISC)			Groundwater & Surface water
Corrosivity	Standard units	Non-corrosive	
BACTERIOLOGICALS (BAC)			Surface water only
Total Coliform (Presence/Absence)	cfu/100mL	absent	Method SM 9221 B, C per the proposal Will be analyzed by Table Rock but Anatek will bill EA directly
SYNTHETIC ORGANIC CHEMICALS (SOC)			Surface water only
Chlordane, Technical	µg/L	2	^{a,b}
Glyphosate ¹	µg/L	700	^a
Heptachlor Epoxide	µg/L	0.2	^{a,b}
Hexachlorobenzene	µg/L	1	^{a,b}
Hexachlorocyclopentadiene	µg/L	50	^{a,b}
Lindane (BHC - GAMMA)	µg/L	0.2 as total PAH's	^{a,c}
Aroclor 1016 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1221 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1232 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1242 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1248 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1254 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1260 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Pentachlorophenol	µg/L	1	^{a,b}
Malathion ²	µg/L		
Chlorpyrifos ²	µg/L		
Azinphos-methyl ²	µg/L		
VOLATILE ORGANIC CHEMICALS (VOC)			Surface water only
Benzene	µg/L	5	
Ethylbenzene	µg/L	700	
Toluene	µg/L	1000	
Total Xylenes	µg/L	10000	

Notes:¹ - Glyphosate was chosen as a herbicide proxy.² - Chosen as a pesticide proxy as it is a common organophosphate based on conversation with WA DEQ, will analyzed using EPA Method 8141 for water, not drinking water.**Data Sources used to reduce analytical list:**^a - Listed in OAR 330-061-0030.^b - Anderson Petty & Associates, 2011. City of Milton-Freewater, Oregon Water Management and Conservation Plan Update Addendum, May. p.16.^c - GeoSystems Analysis, Inc., 2016. Surface Water and Groundwater Monitoring and Reporting Plan. May. Table 5.

* Action Level set by the EPA

** Guideline level recommended by the EPA

MCL = Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

MDL = Method Detection Limit

RL = Reporting Limit

µg/L = Micrograms per liter

µS/cm = Micro-Siemens per centimeter

mg/L = Milligrams per liter

NTU = Nephelometric turbidity unit

MV = Millivolts

* sent to table Rock

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180410059
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180410059-001	Sampling Date	4/8/2018	Date/Time Received	4/10/2018 11:24 AM
Client Sample ID	MF-ASR-LWWR-2	Sampling Time	2:40 PM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	28	mg CaCO ₃ /L	2	4/18/2018 2:30:00 PM	RPU	SM2320B	
Arsenic	ND	mg/L	0.001	4/16/2018 12:32:00 PM	HSW	EPA 200.8	
Chloride	0.416	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
Conductivity	63.8	µmhos/cm	1	4/13/2018 5:00:00 PM	RPU	SM 2510B	
Copper	ND	mg/L	0.001	4/16/2018 12:32:00 PM	HSW	EPA 200.8	
Corrosivity	-0.994			4/24/2018	ETL	Calculation	
Dissolved Iron	0.0176	mg/L	0.01	4/17/2018 12:00:44 PM	SDR	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	4/17/2018 12:00:44 PM	SDR	EPA 200.7	
Fluoride	ND	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
Glyphosate	ND	ug/L	5	4/10/2018 10:52:00 PM	MER	EPA 547	
Calcium	5.37	mg CaCO ₃ /L	0.1	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
Hardness	22.1	mg CaCO ₃ /L	1	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
Magnesium	2.11	mg CaCO ₃ /L	0.1	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
Pentachlorophenol	ND	ug/L	0.04	4/20/2018 1:31:00 AM	MAH	EPA 515.4	
Iron	0.241	mg/L	0.01	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
Lead	ND	mg/L	0.001	4/18/2018 3:32:00 PM	HSW	EPA 200.8	
Manganese	ND	mg/L	0.01	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	4/16/2018 12:32:00 PM	HSW	EPA 200.8	
NO ₃ /N	ND	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
NO ₃ /N+NO ₂ /N	ND	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
NO ₂ /N	ND	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
Oxidation-Reduction Potential	-28.6	millivolts		4/13/2018	RPU	SM 2580B	
Aroclor 1016 (PCB-1016)	ND	ug/L	0.08	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1221 (PCB-1221)	ND	ug/L	1	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1232 (PCB-1232)	ND	ug/L	0.5	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1242 (PCB-1242)	ND	ug/L	0.3	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1248 (PCB-1248)	ND	ug/L	0.1	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1254 (PCB-1254)	ND	ug/L	0.1	4/18/2018 12:23:00 AM	MAH	EPA 505	
Aroclor 1260 (PCB-1260)	ND	ug/L	0.2	4/18/2018 12:23:00 AM	MAH	EPA 505	
Chlordane	ND	ug/L	0.2	4/18/2018 12:23:00 AM	MAH	EPA 505	
PCBs	ND	ug/L	0.5	4/18/2018 12:23:00 AM	MAH	EPA 505	
pH	7.41	ph Units		4/13/2018 5:00:00 PM	RPU	SM 4500pH-B	
PO ₄ /P	ND	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
Potassium	1.49	mg/L	0.1	4/17/2018 12:52:30 PM	SDR	EPA 200.7	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 180410059
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180410059-001	Sampling Date	4/8/2018	Date/Time Received	4/10/2018 11:24 AM
Client Sample ID	MF-ASR-LWWR-2	Sampling Time	2:40 PM		
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlorpyrifos	ND	ug/L	0.2	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
gamma-BHC (Lindane)	ND	ug/L	0.04	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
Heptachlor epoxide	ND	ug/L	0.02	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
Hexachlorobenzene	ND	ug/L	0.1	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
Hexachlorocyclopentadiene	ND	ug/L	0.1	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
Malathion	ND	ug/L	0.2	4/25/2018 1:45:00 AM	BMM	EPA 525.2	
Azinphos-methyl	ND	ug/L	0.1	4/26/2018 7:21:00 AM	BMM	EPA 525.2	
Sodium	2.64	mg/L	0.1	4/17/2018 12:52:30 PM	SDR	EPA 200.7	
TDS	74.0	mg/L	50	4/11/2018 4:00:00 PM	RPU	SM 2540C	
Sulfate	0.609	mg/L	0.1	4/10/2018 11:19:00 PM	MER	EPA 300.0	
TKN	ND	mg/L	0.5	4/20/2018	RPU	SM4500NORGC	
Turbidity	1.99	NTU	0.1	4/10/2018 4:00:00 PM	RPU	EPA 180.1	
Benzene	ND	ug/L	0.5	4/12/2018 3:16:00 PM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	4/12/2018 3:16:00 PM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	4/12/2018 3:16:00 PM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	4/12/2018 3:16:00 PM	SAT	EPA 524.3	
Zinc	ND	mg/L	0.001	4/16/2018 12:32:00 PM	HSW	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: EA ENGINEERING
Address: 8019 W QUINAULT AVE, STE D
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

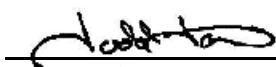
Batch #: 180410059
Project Name: MILTON-FREEWATER
ASR 1556301

Analytical Results Report

Sample Number	180410059-002	Sampling Date	4/8/2018	Date/Time Received	4/10/2018 11:24 AM
Client Sample ID	TRIP BLANK	Sampling Time			
Matrix	Drinking Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Benzene	ND	ug/L	0.5	4/12/2018 3:57:00 PM	SAT	EPA 524.3	
Ethylbenzene	ND	ug/L	0.5	4/12/2018 3:57:00 PM	SAT	EPA 524.3	
Toluene	ND	ug/L	0.5	4/12/2018 3:57:00 PM	SAT	EPA 524.3	
Total Xylene	ND	ug/L	0.5	4/12/2018 3:57:00 PM	SAT	EPA 524.3	

Authorized Signature



Todd Taruscio, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: EA ENGINEERING

Order ID: 180410059

8019 W QUINAULT AVE, STE D

Order Date: 4/10/2018

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

Sample #: 180410059-001 **Customer Sample #:** MF-ASR-LWWR-2

Recv'd: ☒ **Matrix:** Drinking Water **Collector:** PATTY NEWMAN

Date Collected: 4/8/2018

Quantity: 14 **Date Received:** 4/10/2018 11:24:00 AM

Time Collected: 2:40 PM

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	4/20/2018	<u>Normal (~10 Days)</u>
ARSENIC	M	EPA 200.8	4/20/2018	<u>Normal (~10 Days)</u>
CHLORIDE	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
CONDUCTIVITY	M	SM 2510B	4/20/2018	<u>Normal (~10 Days)</u>
COPPER	M	EPA 200.8	4/20/2018	<u>Normal (~10 Days)</u>
Corrosivity	M	Calculation	4/20/2018	<u>Normal (~10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
FLUORIDE	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
GLYPHOSATE 547	M	EPA 547	4/20/2018	<u>Normal (~10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
HERBICIDES 515.4	M	EPA 515.4	4/20/2018	<u>Normal (~10 Days)</u>
IRON ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
LEAD	M	EPA 200.8	4/20/2018	<u>Normal (~10 Days)</u>
MANGANESE ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	4/20/2018	<u>Normal (~10 Days)</u>
NITRATE/N	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
NITRITE/N	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
OXIDATION-REDUCTION POTENTIAL	M	SM 2580B	4/20/2018	<u>Normal (~10 Days)</u>
PESTICIDES 505	M	EPA 505	4/20/2018	<u>Normal (~10 Days)</u>
pH	M	SM 4500pH-B	4/20/2018	<u>Normal (~10 Days)</u>
PHOSPHATE/P	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>

Customer Name: EA ENGINEERING

8019 W QUINULT AVE, STE D

KENNEWICK

WA

99336

Order ID: 180410059

Order Date: 4/10/2018

Contact Name: KEVIN LINDSEY

Project Name: MILTON-FREEWATER
ASR 1556301

Comment:

POTASSIUM ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	4/20/2018	<u>Normal (~10 Days)</u>
SEMIVOLATILES 525.2 EXTENDED	M	EPA 525.2	4/20/2018	<u>Normal (~10 Days)</u>
SODIUM ICP	M	EPA 200.7	4/20/2018	<u>Normal (~10 Days)</u>
SOLIDS - TDS	M	SM 2540C	4/20/2018	<u>Normal (~10 Days)</u>
SULFATE	M	EPA 300.0	4/20/2018	<u>Normal (~10 Days)</u>
TKN	M	SM4500NORGC	4/20/2018	<u>Normal (~10 Days)</u>
TURBIDITY	M	EPA 180.1	4/20/2018	<u>Normal (~10 Days)</u>
VOLATILES 524.3	M	EPA 524.3	4/20/2018	<u>Normal (~10 Days)</u>
ZINC	M	EPA 200.8	4/20/2018	<u>Normal (~10 Days)</u>

Sample #: 180410059-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☒ **Matrix:** Drinking Water **Collector:**

Date Collected: 4/8/2018

Quantity: 1 **Date Received:** 4/10/2018 11:24:00 AM

Time Collected:

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.3	M	EPA 524.3	4/20/2018	<u>Normal (~10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	5.6
Samples received with a COC?	Yes
Samples received within holding time?	No
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes
Total number of containers?	14

Table 1 Full Analytical Suite

ANALYTE GROUP / Analyte	Units	Drinking Water Standard / Criteria	Notes
GENERAL CHEMISTRY (GC)			Groundwater & Surface water
Alkalinity (total)	mg CaCO ₃ /L		^b
Temperature	degrees Fahrenheit		
Chloride	mg/L	250 (SMCL)	
Fluoride	mg/L	2.0 (SMCL), 4.0 (MCL)	
Hardness	mg CaCO ₃ /L	250 (SMCL)	
Nitrate+Nitrite (total N)	mg/L as N	10	
Nitrate-N	mg/L as N	10	
Nitrite-N	mg/L as N	1	
Orthophosphate as P	mg/L		
Oxidation-Reduction Potential	millivolts		
pH	pH units	6.5 to 8.5 (SMCL)	
Specific Conductance	µS/cm	700 (SMCL)	
Sulfate	mg/L	250 (SMCL)	
Total Dissolved Solids	mg/L	500 (SMCL)	
Turbidity	NTU	1	
Total Kjeldahl nitrogen			
TOTAL METALS (M)			Groundwater & Surface water
Arsenic	mg/L	0.010	^a
Calcium	mg/L		^c
Copper	mg/L	1.3*	^{a,c}
Iron	mg/L	0.3 (SMCL)	^c
Iron (dissolved)	mg/L		^c
Lead	mg/L	0.015*	^{a,b,c}
Magnesium	mg/L		^c
Manganese	mg/L	0.05 (SMCL)	^c
Manganese (dissolved)	mg/L		^c
Mercury	mg/L	0.002	^{a,b,c}
Potassium	mg/L		^c
Sodium	mg/L	20**	^c
Zinc	mg/L	5	^c
MISCELLANEOUS (MISC)			Groundwater & Surface water
Corrosivity	Standard units	Non-corrosive	
BACTERIOLOGICALS (BAC)			Surface water only
			Method SM 9221 B, C per the proposal
			Will be analyzed by Table Rock but
Total Coliform (Presence/Absence)	cfu/100mL	absent	Anatek will bill EA directly
SYNTHETIC ORGANIC CHEMICALS (SOC)			Surface water only
Chlordane, Technical	µg/L	2	^{a,b}
Glyphosate ¹	µg/L	700	^a
Heptachlor Epoxide	µg/L	0.2	^{a,b}
Hexachlorobenzene	µg/L	1	^{a,b}
Hexachlorocyclopentadiene	µg/L	50	^{a,b}
Lindane (BHC - GAMMA)	µg/L	0.2 as total PAH's	^{a,c}
Aroclor 1016 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1221 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1232 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1242 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1248 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1254 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Aroclor 1260 (PCB)	µg/L	0.5 as total PCB's	^{a,b}
Pentachlorophenol	µg/L	1	^{a,b}
Malathion ²	µg/L		
Chlorpyrifos ²	µg/L		
Azinphos-methyl ²	µg/L		
VOLATILE ORGANIC CHEMICALS (VOC)			Surface water only
Benzene	µg/L	5	
Ethylbenzene	µg/L	700	
Toluene	µg/L	1000	
Total Xylenes	µg/L	10000	

Notes:¹ - Glyphosate was chosen as a herbicide proxy.² - Chosen as a pesticide proxy as it is a common organophosphate based on conversation with WA DEQ, will analyzed using EPA Method 8141 for water, not drinking water.**Data Sources used to reduce analytical list:**^a - Listed in OAR 330-061-0030.^b - Anderson Petty & Associates, 2011. City of Milton-Freewater, Oregon Water Management and Conservation Plan Update Addendum. May. p.16.^c - GeoSystems Analysis, Inc., 2016. Surface Water and Groundwater Monitoring and Reporting Plan. May. Table 5.

* Action Level set by the EPA

** Guideline level recommended by the EPA

MCL = Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

MDL = Method Detection Limit

RL = Reporting Limit

µg/L = Micrograms per liter

µS/cm = Micro-Siemens per centimeter

mg/L = Milligrams per liter

NTU = Nephelometric turbidity unit

MV = Millivolts



State of Oregon - Drinking Water Program
Microbiological Analysis (Coliform) Reporting Form for Public Water Supplies (v3.2)

TABLE ROCK ANALYTICAL LABORATORY

PO Box 746 / 419 SW 5th St. Pendleton, OR 97801

Phone 541-276-0385 Fax 541-276-2041

ORELAP #OR100081

PWS# 41

PWS Name:

City, County:

Phone:

Fax:

Return address for report:

Name: EA Engineering

Address:

City, State, Zip:

Bottle#:

☐ Results do not meet NELAC Standards-See below

Lab Sample ID#: 180405N1

Sample Collected Date/Time: 04/05/2018 14:40
MM DD YYYY Hour: Min

☐ AM

Chlorinated: ☒ Yes

☐ PM

Free Chlorine: _____ mg/L

Collected By: JT

DISTRIBUTION Sample Type: ☐ Routine ☐ *Repeat ☐ Temporary Routine ☒ Special

*Date of Initial Positive: MM/DD/YYYY

*Original Positive ID#:

Address: MF-ASR-LWWR-2

Sampled at (ex. "SINK"):

SOURCE Sample Type: ☐ *Triggered ☐ *Confirmation ☐ Assessment ☐ Special

*Date of Initial Positive: MM/DD/YYYY

*Original Positive ID#:

Source ID: SRC-

Source name (ex. "WELL #1"):

LAB USE ONLY

Sample Received Date/Time: 04/05/2018 15:35
MM DD YYYY Hour: Min

☐ AM

Initials: JE

Temp: 94 °C

☐ PM

Evidence of cooling? ☒ Yes ☐ No

Analysis Start Date/Time: 04/05/2018 15:47
MM DD YYYY Hour: Min

☐ AM

Initials: JN

☐ PM

ORELAP
Method(s):
Check all that apply.

- ☒ Colilert® ☐ Colilert-18® ☐ Collsure® ☐ Chromocult® ☐ Collscan® ☐ ReadyCult®
☐ SM 9221 B (MTF) + ☐ E or ☐ F ☐ SM 19th Ed. ☐ SM 20th Ed. ☐ SM 21st Ed.
☐ SM 9221 D (P-A M) + ☐ E or ☐ F
☐ SM 9222 B (MF) + ☐ 9221E or ☐ 9221F or ☐ 9222G
☒ SM 9223 ☐ CollTag® ☐ MI agar ☐ m-CollBlue® ☐ Other:

Test Results:

Total Coliforms: ☒ Present ☐ Absent

E. Coll: ☒ Present ☐ Absent

Analysis Complete Date/Time: 4/6/18 13:18
MM DD YYYY Hour: Min

☐ AM

☒ PM

Analyst: BR

Review by: BLR

4/6/18
MM DD YYYY

Reported By: BLRead

Report Date 4/6/18
MM DD YYYY

Sample Invalidation:

- ☐ Over 30 hours
☐ Leak
☐ Heavy non-coliform growth
☐ Other

DHS USE ONLY

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAC unless otherwise noted. This report shall not be reproduced except in full, without written consent of this laboratory. Send results to DHS-DWP P.O. Box 14350, Portland, OR 97293-0350

NELAC standards not met:

- ☐ not received in lab-supplied bottle
☐ not incubated at proper temperature
☐ other

Comments:

Called 4/4/18

State of Oregon - Drinking Water Services
Microbiological Analysis (Coliform) Reporting Form for Public Water Supplies (v3.3)

PWS# 41 PWS Name: <u>MF ASR 1556301</u> City, County: _____ Phone: _____ Fax: <u>pnewman@equest.com</u> <small>Return address for reports</small> Name: <u>EA Engineering</u> Address: <u>205 SE Spokane St., Suite 300</u> City, State, Zip: <u>Portland, OR 97202</u>	ORELAP#: OR100061 Lab Name: <u>Table Rock Analytical Laboratory</u> Address: <u>PO Box 746 / SW 5th St Pendleton, OR 97801</u> Phone: <u>541-276-0385</u> Fax: <u>541276-2041</u> Bottle#: _____ <input type="checkbox"/> Results do not meet NELAC Standards Lab Sample ID#: <u>180316A1</u>
Sample Collected Date/Time: <u>3/15/18</u> <u>10:55</u> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM Chlorinated: <input type="checkbox"/> No <input type="checkbox"/> Yes <small>MM DD YYYY Hour: Min</small> Collected By: <u>Patty Newman</u> Free Chlorine: _____ mg/L	
DISTRIBUTION Sample Type: <input type="checkbox"/> Routine <input type="checkbox"/> *Repeat <input type="checkbox"/> Temporary Routine <input checked="" type="checkbox"/> Special *Date of Initial Positive: _____ *Original Positive ID#: _____ <small>MM DD YYYY</small> Address: <u>MF-ASR-LWWR-1</u> Sampled at (ex. "SINK"): _____	
SOURCE Sample Type: <input type="checkbox"/> *Triggered <input type="checkbox"/> *Confirmation <input type="checkbox"/> Assessment <input type="checkbox"/> Special *Date of Initial Positive: _____ *Original Positive ID#: _____ <small>MM DD YYYY</small> Source ID: <u>SRC-</u> Source name (ex. "WELL #1"): _____	
LAB USE ONLY Sample Received Date/Time: <u>3/16/18</u> <u>09:35</u> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM Initials: <u>BLR</u> Temp: <u>9.0</u> °C <small>MM DD YYYY Hour: Min</small> Evidence of cooling? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Analysis Start Date/Time: <u>3/16/18</u> <u>11:55</u> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM Initials: <u>BLR</u> <small>MM DD YYYY Hour: Min</small>	
ORELAP Method(s): <input checked="" type="checkbox"/> Colilert® <input type="checkbox"/> Colilert-18® <input type="checkbox"/> Collisure® <input type="checkbox"/> Chromocult® <input type="checkbox"/> Coliscan® <input type="checkbox"/> ReadyCult® <small>Check all that apply.</small> <input type="checkbox"/> SM 9221 B (MTF) + <input type="checkbox"/> E or <input type="checkbox"/> F <input type="checkbox"/> SM 19th Ed. <input type="checkbox"/> SM 20th Ed. <input type="checkbox"/> SM 21st Ed. <input type="checkbox"/> SM 9221 D (P-A M) + <input type="checkbox"/> E or <input type="checkbox"/> F <input type="checkbox"/> SM 9222 B (MF) + <input type="checkbox"/> 9221E or <input type="checkbox"/> 9221F or <input type="checkbox"/> 9222G <input checked="" type="checkbox"/> SM 9223 <input type="checkbox"/> ColiTag® <input type="checkbox"/> MI agar <input type="checkbox"/> m-ColiBlue® <input type="checkbox"/> Other: _____	
Test Results: Total Coliforms: <input checked="" type="checkbox"/> Present <input type="checkbox"/> Absent E. Coli: <input checked="" type="checkbox"/> Present <input type="checkbox"/> Absent	Analysis Complete Date/Time: <u>03/17/2018</u> <u>07:25</u> <input type="checkbox"/> AM <input type="checkbox"/> PM <small>MM DD YYYY Hour: Min</small> Analyst: <u>TR</u> Review by: <u>BLR</u> 3/18/18 <small>MM DD YYYY</small>
Reported By: <u>BLR</u> Report Date: <u>3/18/18</u> <small>MM DD YYYY</small>	
Sample Invalidation: <input type="checkbox"/> Over 30 hours <input type="checkbox"/> Leak <input type="checkbox"/> Heavy non-coliform growth <input type="checkbox"/> Other _____	OHA USE ONLY Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAC unless otherwise noted. This report shall not be reproduced except in full, without written consent of this laboratory. Send results to OHA-DWS P.O. Box 14350, Portland, OR 97293-0350

Table F-1

Baseline Source Water and Native Groundwater Quality
Geochemical Parameters

APPENDIX 2

Parameter (mg/L)	Sample ID						
	Source Water		Native Groundwater				
	Mill Creek - 022499	Well #1	Well #1 - 022499	Well No. 1	Well #2	Well #2 - 022499	Well No. 2
Alkalinity	26	83	94	63	91	96	91
Aluminum	ND	.006	ND	ND	ND	ND	ND
Ammonia	ND	ND	ND	ND	ND	ND	nd
Bicarbonate		83			91		
Calcium	6.1	17	18	13	20	21	17
Carbonate		ND			ND		
Chloride	2.9	1.4	1.5	3	1.9	1.9	ND
Fluoride	ND	0.2	0.3	.2	ND	ND	.3
Iron, Dissolved	0.09	ND	ND	ND	ND	ND	ND
Iron, Total	0.09	ND	ND	.07	ND	ND	ND
Magnesium	2.4	8.4	9	5.8	10	10	8.3
Manganese, Dissolved	ND	ND	ND	ND	ND	ND	ND
Manganese, Total	ND	0.0017	ND	ND	.0017	ND	ND
Nitrate	.12	1	0.91	.3	2.2	2.2	.3
Organic Nitrogen	ND	NT	ND		NT	0.7	
Potassium		2.9			3.2		
Silica	28	47	47	39	45	45	49
Silver	ND	ND	ND	ND	ND	ND	ND
Sodium	3.5	8.7	10	7	7.4	8.4	9.8
Sulfate	0.7	2.7	2.9	2	3.4	3.3	3
TDS	60	140	130	100	160	140	150
TOC	1.2	ND	ND	1.4	ND	ND	ND
TSS	6	ND	2	ND	ND	3	ND
Zinc	ND	ND	ND	ND	ND	ND	ND

mg/L = milligrams per liter

Table F-2
Baseline Source Water and Native Groundwater Quality
Department of Health (DOH) Constituents

Group	Parameter	Sample ID			MCL Primary Standard (mg/L)	Secondary MCL Standard (mg/L)
		Source Water	Native Groundwater, 4/15/99			
		Mill Creek - 022499	Well #1	Well #2		
INORGANIC COMPOUNDS - PHYSICALS						
	Asbestos (MFL)	ND	ND	.6	7 MFL	
	Color (C.U.)	5	ND	ND	15	
	Foaming Agents	NR	ND	ND		0.5
	Hardness (mg/L)	25	83	91		
	pH (S.U.)	NR	7.77	7.39		6.5 _ 8.5
	Sodium (mg/L)	3.4	8.7	7.4		
	TDS (mg/L)	21	140	160	500	
	Turbidity (NTU)	1.8	.11	.27	5 (NTU)	
INORGANIC COMPOUNDS - NUTRIENTS (all units are mg/L)						
	Nitrate-N	.12	1	2.2	10	
	Nitrite-N	ND	ND	ND	1	
INORGANIC COMPOUNDS - METALS (all units are mg/L)						
	Aluminum	.4	.006	ND		0.05 _ 0.2
	Antimony	ND	ND	ND	0.006	
	Arsenic	ND	ND	ND	0.05	
	Barium	.006	.0038	.0008	2	
	Beryllium	ND	ND	ND	0.004	
	Cadmium	ND	ND	ND	0.005	
	Calcium	6.1	17	20		250
	Chloride	2.8	1.4	1.9		
	Chromium	ND	ND	ND	0.1	
	Copper	.03	.0012	.0012	0.2 (SRL)	1
	Cyanide	ND	ND	ND	0.2	
	Fluoride	ND	.2	ND	4	2
	Iron	.25	ND	ND		0.3
	Lead	ND	.0022	.001	0.05	0.015

NR = Not reported by the analytical laboratory

Baseline_DOH.xls Page 2

Table F-2

Baseline Source Water and Native Groundwater Quality

Department of Health (DOH) Constituents

Group	Parameter	Sample ID			MCL Primary Standard (mg/L)	Secondary MCL Standard (mg/L)
		Source Water	Native Groundwater, 4/15/99			
		Mill Creek - 022499	Well #1	Well #2		
	Magnesium	2.4	8.4	10		
	Manganese	ND	.0017	.0017		0.05
	Mercury	ND	ND	ND	0.002	
	Nickel	ND	.052	ND	0.1	
	Selenium	ND	ND	ND	0.05	
	Silver	ND	ND	ND		0.1
	Sulfate	.7	2.7	3.4		250
	Thallium	ND	ND	ND	0.002	
	Zinc	ND	ND	ND		5
SYNTHETIC ORGANIC COMPOUNDS						
	2,4,5-TP	ND	ND	ND	0.05	
	2,4-D	ND	ND	ND	0.07	
	Adipates	NR	ND	ND	0.4	
	Alachlor	ND	ND	ND	0.002	
	Atrazine	ND	ND	ND	0.003	
	Benzo(a)Pyrene	ND	ND	ND	0.0002	
	Carbofuran	ND	ND	ND	0.04	
	Chlordane	ND	ND	ND	0.002	
	Dalapon	ND	ND	ND	0.2	
	DBCP	ND	ND	ND	0.0002	
	Dinoseb	ND	ND	ND	0.007	
	Dioxin	ND	ND	ND	0.03	
	Diquat	ND	ND	ND	0.02	
	EDB	ND	ND	ND	5e-005	
	Endothall	ND	ND	ND	0.1	
	Endrin	ND	ND	ND	0.002	
	Glyphosate	ND	ND	ND	0.7	

NR = Not reported by the analytical laboratory

Baseline_DOH.xls Page 3

Appendix 2

1999 Walla Walla Baseline Source Water and Native Groundwater Quality Report Tables
Northwest Groundwater Services, Inc

Table F-3

Well No. 1 Cycle 1 Pre-Injection Groundwater, Source Water and Recovered Water Quality
Geochemical Parameters

Parameter Name (mg/L)	Pre-Injection Groundwater CW1-PI-41299	Source Water CW1-SW1-41399	Sample ID			
			CW1-R25-41599	CW1-R40-41599	CW1-R60-41599	CW1-R90-41699
Alkalinity	90	23	39	49	60	79
Aluminum	ND	ND	ND	ND	ND	ND
Ammonia						ND
Bicarbonate						
Calcium	17	5.4	8.2	10	12	16
Carbonate						
Chloride	1.7	3.6	4	3	3	3
Fluoride	.2	ND	ND	.2	.2	.3
Iron, Dissolved	ND	ND	ND	ND	ND	ND
Iron, Total	ND	.08	ND	ND	ND	ND
Magnesium	8.4	2.2	3.8	4.7	5.7	7.5
Manganese, Dissolved	ND	ND	ND	ND	ND	ND
Manganese, Total	ND	ND	ND	ND	ND	ND
Nitrate	1	.08	.2	.2	.3	.5
Organic Nitrogen	ND	ND	ND	ND	ND	ND
Potassium						
Silica	51	31	41	43	45	46
Silver	ND	ND	ND	ND	ND	ND
Sodium	9	2.8	4.8	6.4	7.4	9.1
Sulfate	3.5	1.2	2	2	2	3
TDS	160	59	88	110	99	130
TOC	ND	1	.9	.8	.6	.8
TSS	ND	ND	ND	9	2	3
Zinc	ND	ND	ND	ND	ND	.29

mg/L = milligrams per liter

3/1/2018

MF ASR

7:10 • Calibrating YSI:

pH - mtrial: 4.01, calibrated: 4.00
 - mtrial: 7.00, calibrated: 7.00
 - mtrial: 10.15, calibrated: 10.03

Cond. - mtrial: 1.422, calibrated: 1.409 mS/cm

D.O. - mtrial: 9.06, calibrated: 10.0 mg/L
 - mtrial: 106.7%, calibrated: 100.0%

9:00 • At MF Public Works Office

9:09 • Turned on Well #5 (pre-lubing)

9:13 • Checked out Key well

9:16 • back at Well #5 (still pre-lubing)

9:17 • Well #5 running

9:33 • all set-up, collecting WQ parameters.

Time	pH	Cond.	D.O. %	ORP	Temp
9:34	5.31	0.202	21.6	233.5	14.87
9:35	4.92	0.180	20.0	250.6	14.85
9:36	4.34	0.200	18.8	258.6	14.84
9:37	4.30	0.203	18.2	258.0	14.82
9:38	4.15	0.202	17.8	252.6	14.82
9:39	4.30	0.199	17.6	243.9	14.83 <i>Rite in the Rain.</i>

3/1/2018 (cont.)

Time	pH	Cond.	% DO	ORP	Temp
------	----	-------	------	-----	------

9:40	4.14	0.197	236.0 → 17.2		14.82
------	------	-------	-------------------------	--	-------

9:41	4.29	0.200	16.9	225.3	14.81
------	------	-------	------	-------	-------

9:42	4.33	0.200	16.7	216.8	14.81
------	------	-------	------	-------	-------

9:45. collect sample:

MF-ASR-W5-030118

10:00 • inspected "farm Labor Camp Well" =
right next to diversion.

10:15 • Preparing to sample at
Walla Walla River (right
at the diversion).
(before)

• little WW River does not have
water flowing to it.

10:45 • all set-up and pumping water from
WWR.

3/1/2018 (cont.)

Time	pH	Cond.	% DO	ORP	Temp
10:51	-3.09	0.068	113.9	440.0	5.21
10:54	-2.89	0.065	114.4	295.8	5.25
10:57	-1.81	0.095	105.5	230.2	5.27
11:00	-0.28	0.237	104.0	206.0	5.33
11:03	1.11	0.225	103.8	96.2	5.40
11:06	2.06	0.209	105.6	45.6	5.46
11:09	1.85	0.270	105.2	45.8	5.50

• collected sample @ 11:20
MF-ASR-WWR-030118

turbidity: time	NTU	(no decimal)
10:45	0	
10:52	0	
10:54	0	

• at the diversion @ Cemetery Bridge
~250 ft upstream (south)

Rite in the Rain.

3/15/2018

MF ASR

8:00 • Calibrating YSI:

pH: mmm = 3.93, calibrated = 4.01

mm = 7.14, calibrated = 7.00

(4.49) Sp. Cond.: mmm = 4245 $\frac{\mu S}{cm}$, calibrated = 4490

ORP: mmm = 221.7, calibrated = 228.1

(8.54) DO: mmm = 32.65, calibrated = 8.53

(763.27) % DO: mmm = 88.9%, calibrated = 100.3%

10:10 • In MF, at little walla walla river,
right behind well #5 location.

10:25 • Set up to collect wa parameters

Time	Temp (°C)	Cond. ($\mu S/cm$)	DO (%)	pH	ORP
10:26	3.28	53	109.8	6.46	114.1
10:28	3.28	54	106.3	6.51	110.2
10:32	3.28	55	103.8	6.66	100.1
10:36	3.31	56	102.6	6.77	93.2
10:40	3.34	55	102.4	6.85	88.5
10:44	3.36	54	102.2	6.90	85.0

turbidity	time	NTU	time	NTU
	1036	4	1042	5
	1038	2	1044	3

3/15/2018 (cont.)

10:55 • collected sample:

"MF-ASR-LWWR-1"

@ 10:55 am

11:20 • off-site.

4/5/18

11:53 Calibrating YSI in office

	Cal	initial	final
sp cond	4.49 $\frac{\mu S}{cm}$	2.547	4.490
pH	4.01	4.05	4.01
	7.00	7.03	7.00
	10.00	9.93	9.99
ORP	+228 mV	226.2	228.1
DO	%	101.6	100.2

on site 13:59

Time	Temp	sp Cond	DO	pH	ORP
1402	5.45	0.106	123.7	7.24	100.9
1408	5.32	0.103	107.5	7.22	86.8
1415	5.34	0.108	106.9	7.36	78.4
1420	5.35	0.108	106.5	7.40	75.3
1427	5.36	0.105	106.0	7.45	72.6
1434	5.38	0.103	105.7	7.47	71.8
1441	5.40	0.103	105.4	7.50	70.1

Rite in the Rain.

4 / 5 / 18

Time NTU

1419 0

1437 5

1447 13

1454
off side to deliver Bect. to
Table Rock Lab

1800 241 3673 Cody

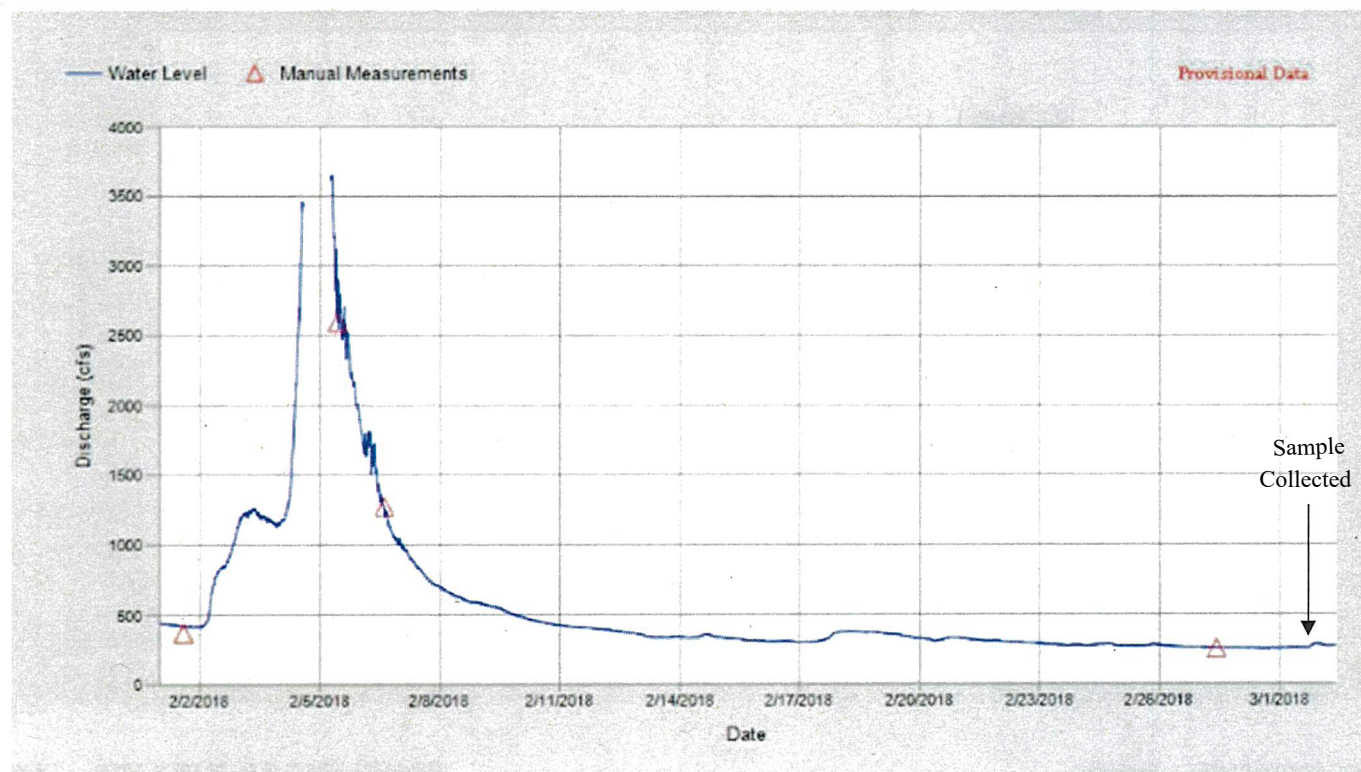
Rite in the Rain

A-1: Monthly Walla Walla River Hydrograph for Samples Collected March 1, 2018

Monthly Chart Report

Site: Walla Walla River at Milton-Freewater

Units: ft³/s
Identifier: Discharge.Data@5105



Report Date: March 2, 2018 09:30



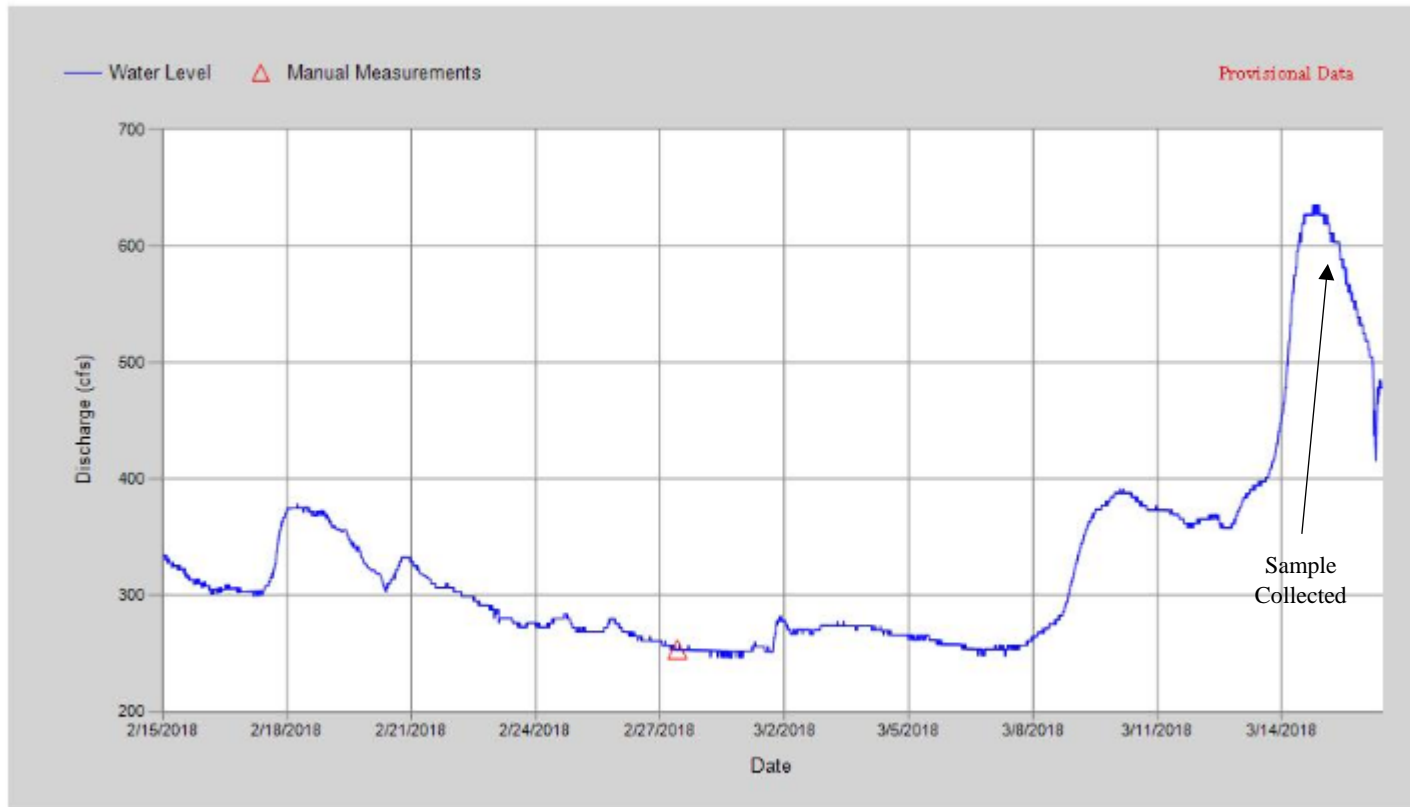
Source: Walla Walla Basin Watershed Council: <http://www.wwbwc.org/monitoring/surfacewater/24-monitoring/surface-water/70-grove.html>

A-2: Monthly Walla Walla River Hydrograph for Samples Collected on March 3, 2018

Monthly Chart Report

Site: Walla Walla River at Milton-Freewater

Units: ft³/s
Identifier: Discharge.Data@S105



Report Date: March 16, 2018 11:30



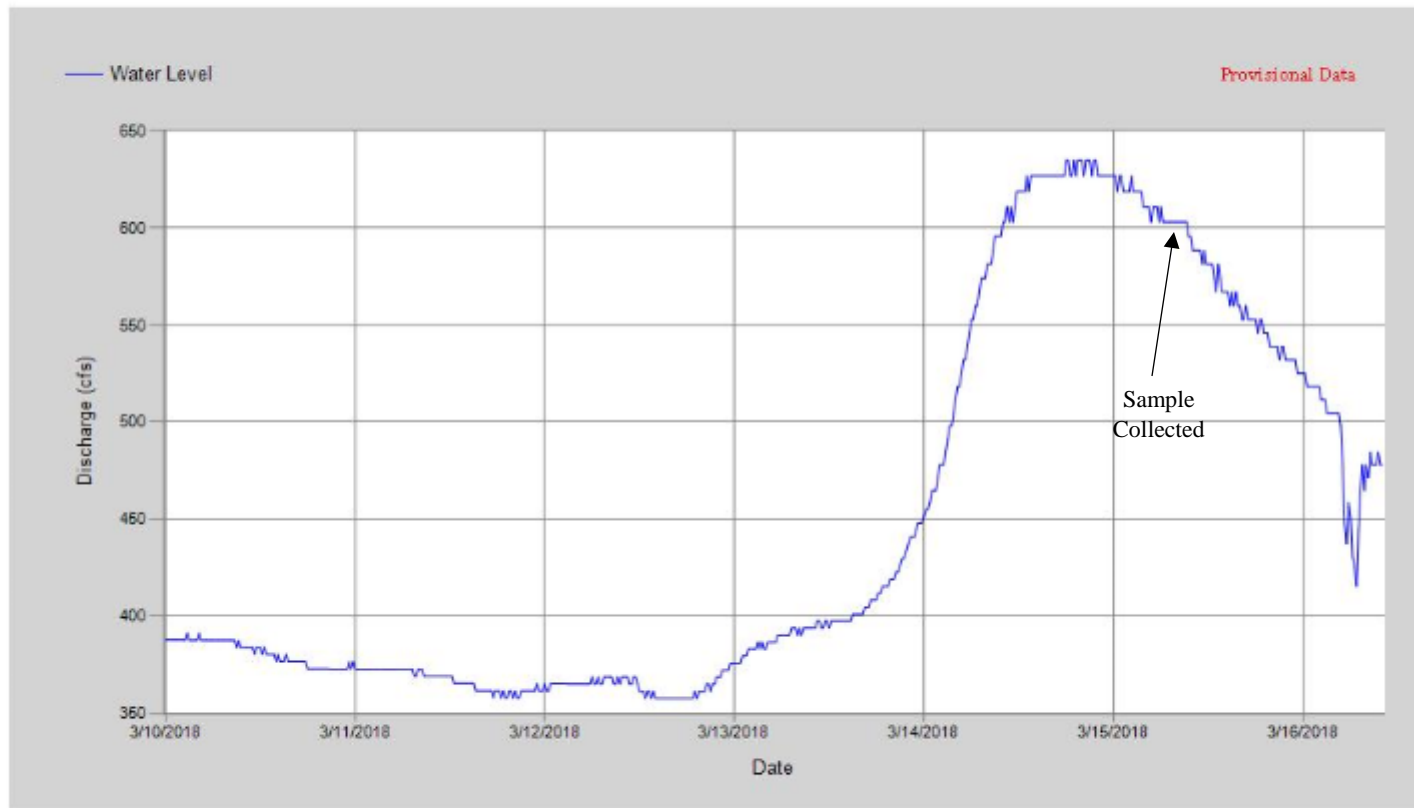
Source: Walla Walla Basin Watershed Council: <http://www.wwbwc.org/monitoring/surfacewater/24-monitoring/surface-water/70-grove.html>

A-3: Weekly Walla Walla River Hydrograph for Samples Collected on March 3, 2018

Seven Day Chart Report

Site: Walla Walla River at Milton-Freewater

Units: ft³/s
Identifier: Discharge.Data@S105



Report Date: March 16, 2018 11:30



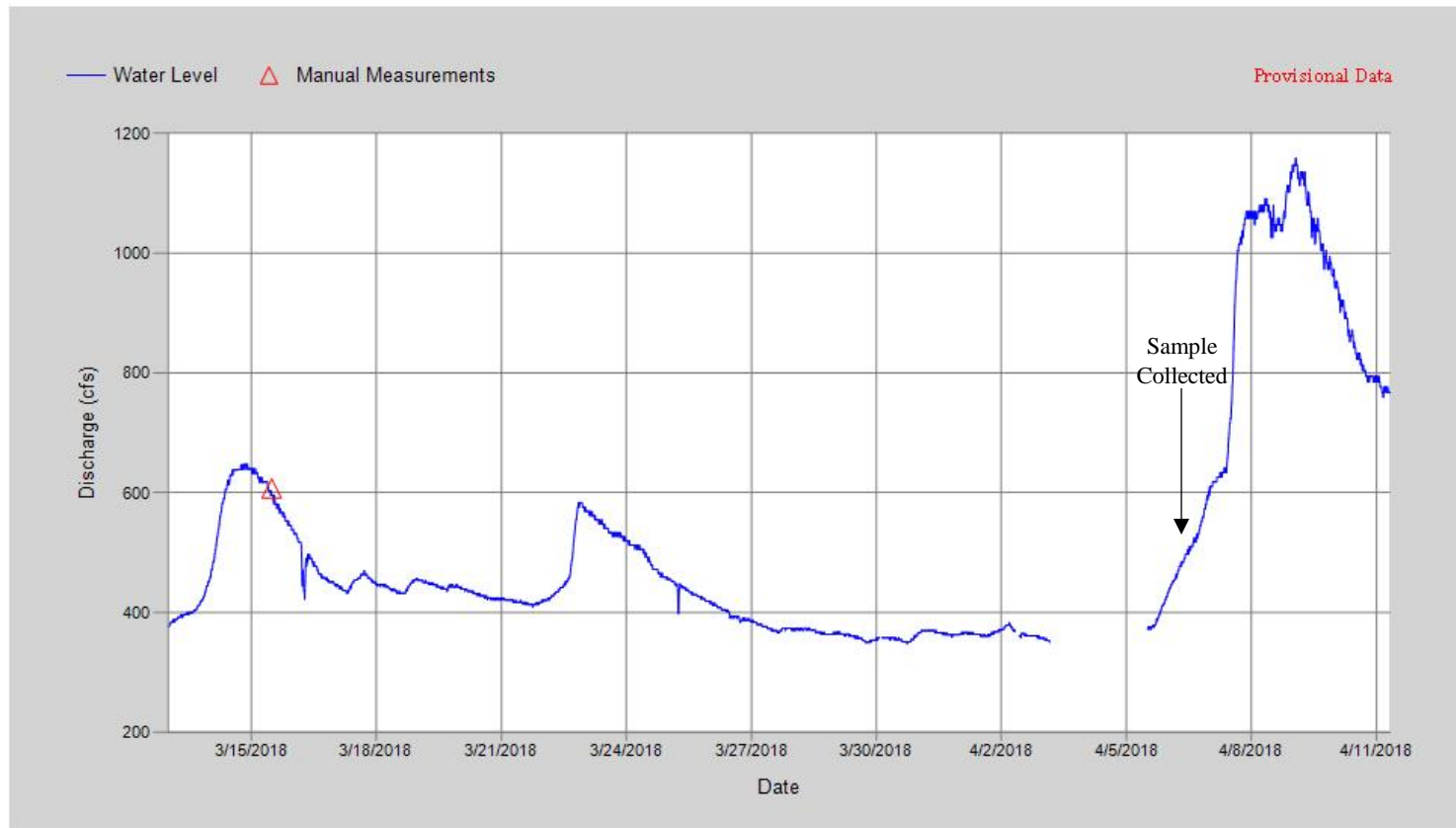
Source: Walla Walla Basin Watershed Council: <http://www.wwbwc.org/monitoring/surfacewater/24-monitoring/surface-water/70-grove.html>

A-4: Monthly Walla Walla River Hydrograph for Samples collected on April 5, 2018

Monthly Chart Report

Site: Walla Walla River at Milton-Freewater

Units: ft^3/s
Identifier: Discharge.Data@S105



Report Date: April 11, 2018 09:30



Source: Walla Walla Basin Watershed Council: <http://www.wwbwc.org/monitoring/surfacewater/24-monitoring/surface-water/70-grove.html>