WATER QUALITY SAMPLING PLAN

Stanislaus Regional Water Authority

Draft Date: June 22, 2016; July 14, 2016
Final Date: September 7, 2016

To: Stanislaus Regional Water Authority (SRWA)
Technical Advisory Committee

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Subject: **Source Water Characterization Sampling Plan for the SRWA Surface Water Supply Project**

The Stanislaus Regional Water Authority (SRWA), a joint powers authority between the Cities of Turlock and Ceres (Cities), is embarking on a new water supply project to provide treated surface water to the Cities to supplement their existing groundwater supply. The source water for this new water treatment plant (WTP) is the Tuolumne River. The proposed intake is an existing Infiltration Gallery located four to five feet below the river bottom.

The following document is intended to provide background information on the project and describe the river water monitoring program needed for source water characterization and to fulfill the required Source Water Quality Analysis component of the domestic water supply permit application for the WTP. Source water monitoring is proposed in two phases: Phase 1 intensive monitoring to facilitate process train selection and treatment system design, and Phase 2 long-term reduced monitoring of any changes in water quality prior to construction and startup of the treatment plant. The sampling program described in this document is for the first phase of intensive monitoring. The long-term sampling plan will be prepared after review of the Phase 1 monitoring results.

1 - PROJECT LOCATION AND BACKGROUND

The source water for this project is the Tuolumne River. The Tuolumne River originates in the Sierra Nevada and flows west through the San Joaquin Valley before joining the San Joaquin River southwest of the San Joaquin River National Wildlife Refuge. The Infiltration Gallery is located in the Lower Tuolumne River watershed. This Lower Tuolumne River watershed begins in the foothills around La Grange Reservoir and ends at the Infiltration Gallery location (Figure 1)—about 25 miles upstream of the confluence with the San Joaquin River (Brown and Caldwell, 2008). At La Grange Dam, the water is diverted into Turlock Irrigation District's (TID's) and Modesto Irrigation District's (MID's) irrigation canals, and also released into the lower Tuolumne River, which is the water supply at the Infiltration Gallery. The location of this Infiltration Gallery is shown in Figure 2, relative to the Cities of Hughson and Waterford, with an enlargement of the site location shown in Figure 3.

The watersheds for Turlock Lake and the Lower Tuolumne River include steep grassland and woodland of the Sierra Nevada foothills on the far eastern side, transitioning to the plains of the Central Valley downstream. Approximately 17% of the watersheds are dedicated to agriculture (Brown and Caldwell, 2008).

The SRWA plans to construct a new 30 mgd surface water treatment plant (WTP) to provide high quality, treated water to the Cities of Ceres and Turlock, to largely supplement their current groundwater supply. The intake for this new WTP is a partially constructed Infiltration Gallery, with piping already in-place below the riverbed (Figure 3). This piping is comprised of 16, 45-foot long sections of 24-inch slotted pipe, covered by four to five feet of pea gravel, washed rock and river cobble. The wet well and raw water pump station to which these pipes will ultimately be connected has not been constructed.

Since there are no nearby WTPs on the Tuolumne River, characterization of the source water quality will be an important part of the design process, facilitating selection and construction of cost-effective and efficient treatment process capable of producing a stable supply of high-quality potable water to the Cities of Ceres and Turlock.

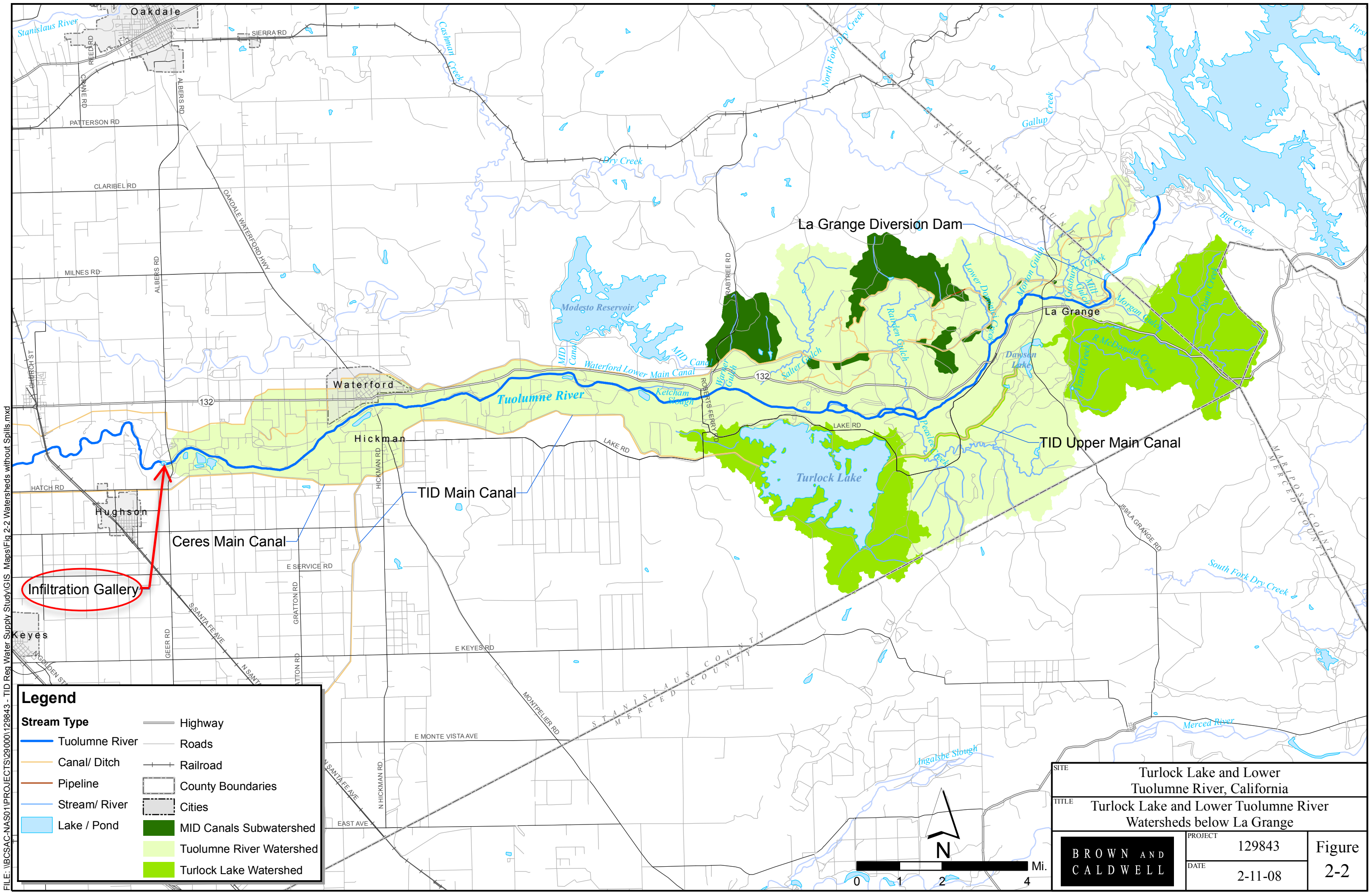

Figure 1. Lower Tuolumne River Watershed (Brown and Caldwell, 2008)

Figure 2. Infiltration Gallery Location on the Tuolumne River

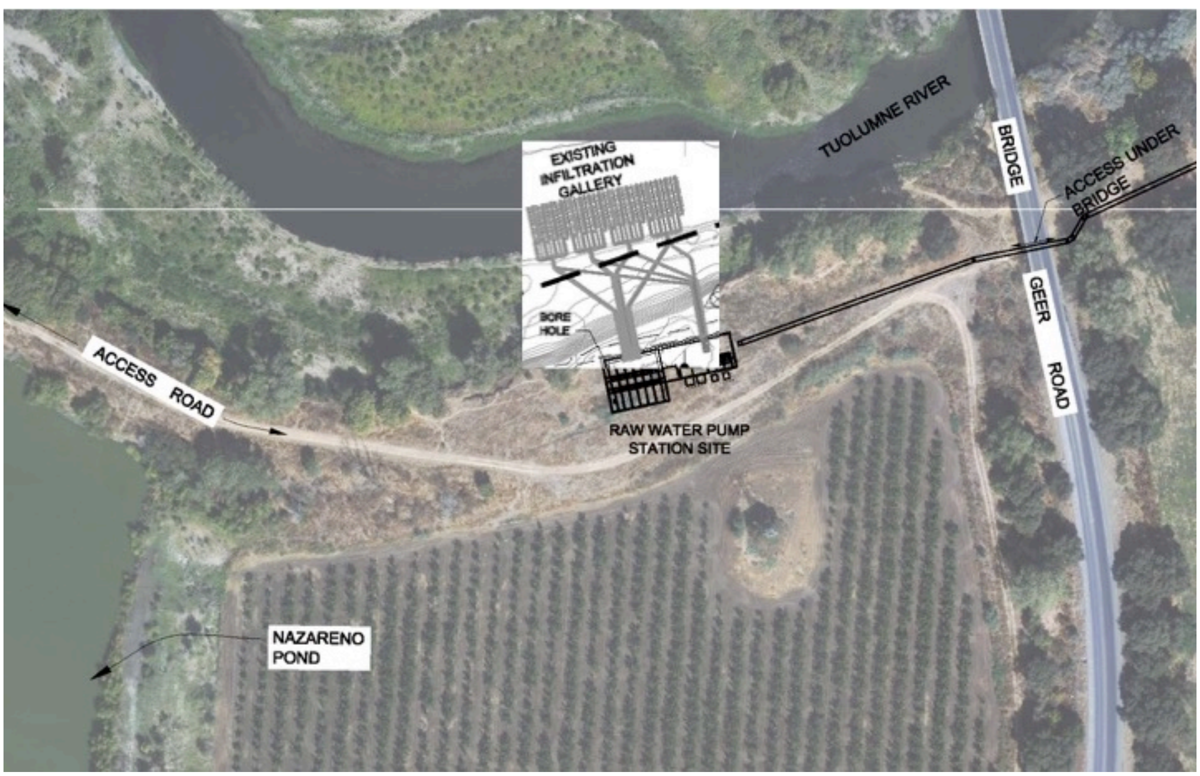

Figure 3. Enlargement of Infiltration Gallery Location on the Tuolumne River

2 - POTENTIAL CONTAMINATION SOURCES

The following potential sources of contamination were identified in the TID Watershed Sanitary Survey (WSS) of the Lower Tuolumne River and Turlock Lake (Brown and Caldwell, 2008), and online visual searches using Google Earth (US Dept. of State Geographer © 2016 Google) between La Grange Dam and the Infiltration Gallery. Locations of the main potential contaminating activities are shown in Figure 4, and discussed below:

- City of Waterford Wastewater Treatment Plant (WWTP). This is the only municipal WWTP in this reach of the River that could impact water quality at the Infiltration Gallery site; the remainder of the study area uses septic systems for wastewater disposal. The WWTP has a capacity of 1 mgd and an average flow of approximately 0.585 mgd. The facility uses four reinforced concrete aeration ponds (128,000 ft^2) on the North side of the River, followed by storage ponds. The effluent from the storage ponds is pumped to four drying beds/percolation basins across (South side) the Tuolumne River. As of 2006, the facility met existing requirements of the Central Valley Regional Water Quality Control Board, but upgrades were needed to meet secondary treatment standards and future discharge standards (City of Waterford, 2006).

- Dairy, Poultry and Ranch Operations[1]. There are a number of dairy, poultry, and ranch operations near the bank of the River: J & T Cattle Co. Bret Warner Ranch, Right Fork Cattle Co., Golding Farms, Hayes Ranch, Donald & Patricia Mason Farm, Sunset Farms, Alberto Dairy, Michel Ranch and Dairy, Foster Poultry Farms, and Jeg Ranch. Only the larger operations are shown in Figure 4.

- Geer Road Landfill. The Geer Road Landfill, which is closed now, is located directly across the river from the site of the Infiltration Gallery. As discussed in the 2008 TID WSS, although there are no active solid waste or hazardous waste disposal facilities within the study area, this closed landfill continues to be regulated by RWQCB waste discharge requirements during its closure (Brown and Caldwell, 2008). Per a Brown and Caldwell Technical Memorandum, the RWQCB does not consider the landfill to be a threat to the water quality of the Tuolumne River (Brown and Caldwell, April 13, 2004). Additionally, results from the Second

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[1] According to the United States Department of Agriculture (USDA, 2012), Stanislaus County ranks 7th among California's 58 counties in total value of agricultural products sold, 4th in value of livestock, poultry, and their products, and 3rd in value of sales for both poultry and eggs, as well as milk from cows (4th overall in the United States). In addition to livestock, the top three crops, in terms of land area, grown locally include almonds (3rd in the state and U.S.), forage land (hay and haylage, grass silage, and greenchop; 10th in the state and 84th in the U.S.), and corn for silage (3rd in the state and 4th in the U.S.). In terms of land use, approximately 50% of the county's farmland is pastureland and 44% is cropland.

Semiannual and Annual 2015 Detection, Evaluation and Corrective Action Monitoring Report do not indicate degradation of the Tuolumne River from the landfill site (Tetra Tech BAS, January 2016). Toluene was the only volatile organic chemical (VOC) detected in the Tuolumne River samples collected to monitor the landfill.

- Recreational Areas: There are several recreational areas nearby and in the upper reaches of the Lower Tuolumne watershed, including La Grange Off-Highway Vehicle Use, Basso Bridge River Access, Turlock Lake State Recreational Area, and Fox Grove County Park.
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- Pesticide and Herbicide Application to Agricultural Areas[1]: Given the large percentage of the watershed dedicated to agriculture, stormwater and irrigation runoff from these areas is a known source of contamination to the River. The Lower Tuolumne River, downstream of Don Pedro Reservoir, is listed as an impaired water body under USEPA Clean Water Act Section 303(d) (California State Water Resources Control Board, 2010).

This sampling plan considers all of these potential contamination sources, so that the future treatment facility will be effectively designed to produce a finished water meeting all State and Federal regulatory standards.

Figure 4. Potential Sources of Contamination in Project Vicinity

3 - HISTORICAL MONITORING LOCATIONS AND WATER QUALITY DATA

As part of the source water characterization process, historical water quality data collected on the Tuolumne River at locations between Don Pedro Reservoir and the confluence of Dry Creek at Modesto were reviewed. These water quality data and any observed temporal or spatial trends in water quality, in relation to treatment train selection and drinking water regulations, are discussed in a separate Technical Memorandum (currently in preparation by Trussell Technologies, anticipated submission in July 2016). These sampling locations are indicated in Figure 5. These historical water quality data have been used in developing the proposed sampling plan, particularly with respect to specific pesticides used in the area and other select constituents related to the potential contaminating activities described above.

The monitoring agencies and corresponding unique ID(s) associated with each of the historic sampling locations shown in Figure 5 are as listed below in Table 1.

Table 1. Historic Sampling Locations in the Lower Tuolumne River Watershed

Monitoring Agency or Reference Document	Location ID	Approx. Miles from Infiltration Gallery[1]	Location Description	Monitored Parameters	Monitoring Dates
USGS California Water Science Center National Water Information System	A	+ 23.9	USGS Station Code 11289650; Upstream of Infiltration Gallery near Old La Grange Bridge	Temperature, Flow from La Grange Dam	Oct 2007 – April 2016
MID Modesto Regional Water Treatment Plant (MRWTP) WSS	B	+ 13.90	Inlet to Modesto Reservoir from La Grange Dam	Cryptosporidium, Giardia	May 2009 – Sept 2012
	C	--	MRWTP raw water intake in Modesto Reservoir	General, Turbidity, TOC, Microbiological, Cryptosporidium, Giardia, Metals,	Jan 2009 – Dec 2012
TID WSS of the Lower Tuolumne River and Turlock Lake, plus additional monitoring data collected May 2007 to April 2008	D	+ 21.7	Near Roberts Ferry Bridge	General, Turbidity, Bromide, Nutrients, Fe, Mn, TOC, DOC, DO, Chlorophyll, Microbiological, Pesticides, SOCs	May 2006 - Oct 2008
	E	+ 13.90	Near Basso Bridge	General, Turbidity, Bromide, Nutrients, Fe, Mn, TOC, DOC, DO, Chlorophyll, Microbiological, Pesticides, SOCs	May 2006 - Oct 2008
SWRCB California Environmental Data Exchange Network (CEDEN)	F	+ 9.45	SWRCB Station Code 535PS0265; Four miles upstream of Hickman Rd.	General, Turbidity, Nutrients (1 data point)	Aug 2009 – Aug 2012
	G	+ 5.71	SWRCB Station Code 535TR5xxx; Waterford Road	Field data, Microbiological, Cryptosporidium, Giardia	Aug 2009 – Aug 2012
	H	+ 0.1	SWRCB Station Code: 535STC218; Fox Grove	Field data, Microbiological, Cryptosporidium, Giardia	Aug 2009 – Aug 2012
TID WSS of the Lower Tuolumne River and Turlock Lake, plus additional monitoring data collected May 2007 to April 2008	I	0	At Infiltration Gallery near Geer Road	General, Turbidity, Bromide, Nutrients, Fe, Mn, TOC, DOC, DO, Chlorophyll, Microbiological, Pesticides, SOCs	May 2006 - Oct 2008
TID Regional Surface Water Supply Pilot Study Report	J	- 2.54	Tuolumne River at Hughson WWTP	General, Fe, Mn, TOC, Turbidity	Sept 2006 – April 2007

Monitoring Agency or Reference Document	Location ID	Approx. Miles from Infiltration Gallery[1]	Location Description	Monitored Parameters	Monitoring Dates
SWRCB California Environmental Data Exchange Network (CEDEN)	K	- 6.96	SWRCB Station Code: 535STC217; Ceres River Bluff Park	Field data, Microbiological, Cryptosporidium, Giardia	Aug 2009 – Aug 2012
City of Modesto – Stormwater Management Program	L	- 7.74	Near Mitchell Road	Nutrients, Microbiological	Feb 2006 – June 2015
SWRCB California Environmental Data Exchange Network (CEDEN)	M	- 9.86	SWRCB Station Code: 535STC216; Modesto City-County Airport at Legion Park	Field data, Microbiological, Cryptosporidium, Giardia	Aug 2009 – Aug 2012

Figure 5. Historic Sampling Locations in Relation to Potential Contaminating Activities

Based on initial review of these historical data, preliminary findings and planned sampling frequencies for select parameters are discussed below:

- **Turbidity**. Turbidity at the Infiltration Gallery site is low—consistently less than 10 NTU—and does not seem to exhibit seasonal fluctuations (Figure 6). It is difficult to tell if or how much the turbidity increases in response to a significant storm event. Additionally, filtration through the rock and gravel media above the Infiltration Gallery is expected to reduce storm related turbidity spikes, should they occur in the River. Given the remote nature of the Infiltration Gallery, the proposed sampling frequency for turbidity is twice per month. However, SRWA plans to operate a pilot Infiltration Gallery at representative flow rates to monitor turbidity and particulate removal through the rock and gravel media, under ambient and simulated high turbidity conditions.

- **Total Organic Carbon (TOC)**. The average TOC concentration at the Infiltration Gallery site is somewhat higher than at upstream locations and downstream locations. The average at the Infiltration Gallery was 3.3 mg/L (ranging from 1.4 mg/L – 6.5 mg/L) versus 2.9 mg/L at Robert Ferry Bridge approximately 14 river miles upstream, and 1.7 mg/L at Mitchell Road downstream near Modesto. The concentrations reported at the Infiltration Gallery location are high enough that disinfection by-product (DBP) formation will be a concern with free chlorine unless TOC reduction is achieved during treatment. According to the 2008 TID pilot report, total trihalomethane (TTHM) formation in samples of raw water (based on a 3 mg/L chlorine dose) was close to 100 micrograms per liter (μg/L), and well above the regulatory limit of 80 μg/L.

  TOC concentrations reported at the Infiltration Gallery location seem uncharacteristically high and variable, as shown in Figures 7 and 8. In order to obtain a better understanding of the TOC levels at this location, and potentially to characterize seasonal and storm related influences, TOC will be measured monthly as part of this monitoring program. These data will aid in evaluating TOC removal requirements under the Enhanced Coagulation component of the Disinfection and Disinfection Byproducts Rule (D/DBPR), which is discussed in more detail later in this document.

- **Ammonia, Nitrite, and Nitrate.** The nitrate levels measured in the study area reflect the presence of upstream cattle and poultry facilities, and possibly the City of Waterford's WWTP percolation ponds. Ammonia (NH_3) and nitrite (NO_2) concentrations at the Infiltration Gallery location were below detection, but nitrate (NO_3) concentrations were measured between 1.3 mg/L and 3.8 mg/L as NO_3 (Figure 9). Nitrate concentrations at the upstream Basso Bridge and Roberts Ferry Bridge sites were below the detection level. These nitrate concentrations measured at the Infiltration Gallery location are not a regulatory concern and nowhere near the primary MCL of 45 mg/L as NO_3. They are, however, indicative of the potential for biological and algae growth in stagnant areas of the river, along with the potential for taste and odor occurrences. Nutrients as well as threshold odor number (TON) are included in the proposed monitoring program.

- **Pesticides and Other Synthetic Organic Chemicals (SOCs)**. Because of the numerous pesticides available on the market for agricultural and residential use, the number of pesticides, herbicides and other SOCs included in this sampling program has been narrowed to focus on only those with an enforceable regulatory limit and those used in the Lower Tuolumne River watershed. The SOCs included in this sampling program include (a) those constituents with a primary or secondary maximum contaminant level (pMCL or sMCL), (b) those detected above the analytical detection limit in the available historical data, and (c) those with high application rates (>5,000 lbs/yr or applied to >10,000 acres) in the watershed. Pesticide application within the Lower Tuolumne River watershed is discussed in a later section of this Sampling Plan. The pesticides and other SOCs measured above their respective analytical detection limits are shown in Table 2. The sources of historical SOC data were TID's 2007-2008 sampling database, the California Department of Pesticide Regulation (CDPR) Surface Water Monitoring of Pesticides database, and the 2007 TID Treatment Process Evaluation TM (Brown & Caldwell, 2007).

- **Total Coliform and E. coli.** The median total coliform concentration at the Infiltration Gallery location (between May 2006 and October 2008) was 130 MPN/100mL, based on 73 data points. Higher total coliform concentrations were reported both upstream and downstream, but with substantially smaller datasets. The median concentration at Waterford Road (5.7 miles upstream) was 1,733 MPN/100mL, and the median concentration at Ceres River Bluff Park (7 miles downstream) was 2,076 MPN/100mL.

  The median *E. coli* concentration at the Infiltration Gallery location was 12.7 MPN/100mL. Higher *E. coli* levels were measured upstream and downstream of the Infiltration Gallery location, but again with significantly fewer data points. A plot of the of median, maximum and minimum E. coli concentrations between Waterford Road (5.7 miles upstream) and Mitchell Road (7.7 miles downstream) are shown in Figure 10.

  In order to effectively characterize the microbial quality of the Tuolumne River at the Infiltration Gallery location, total coliform and *E. coli* samples will be collected twice per month. DDW may elect to follow the DDW Surface Water Treatment Rule Guidance Document for guidelines on additional *Giardia* and virus treatment, depending on measured microbial concentrations. These guidelines are discussed in more detail later in this Sampling Plan. DDW has requested that sampling for these constituents be more frequent than monthly.

Water quality data gathered as part of this proposed sampling program will be compared with the historical water quality data in a follow-up report that will be submitted to DDW as part of the required Source Water Quality Analysis component of the Drinking Water Permit.

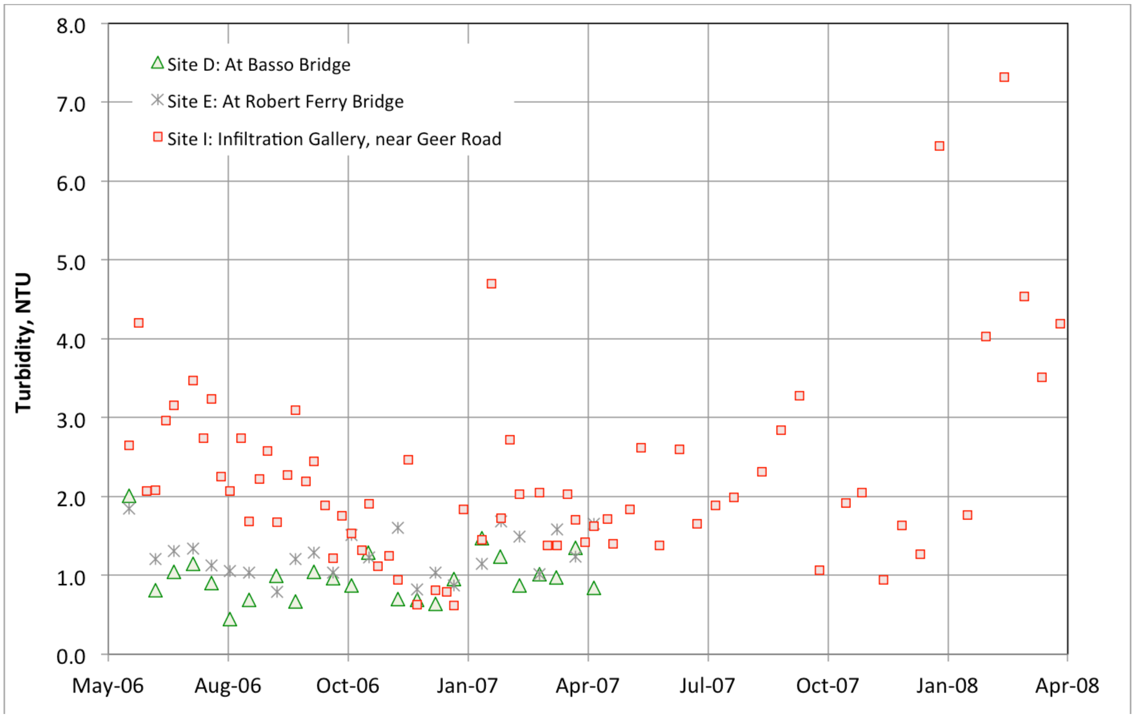

Figure 6. Turbidity of the Tuolumne River Sites D, E, and I Corresponding to TID's Sampling Locations

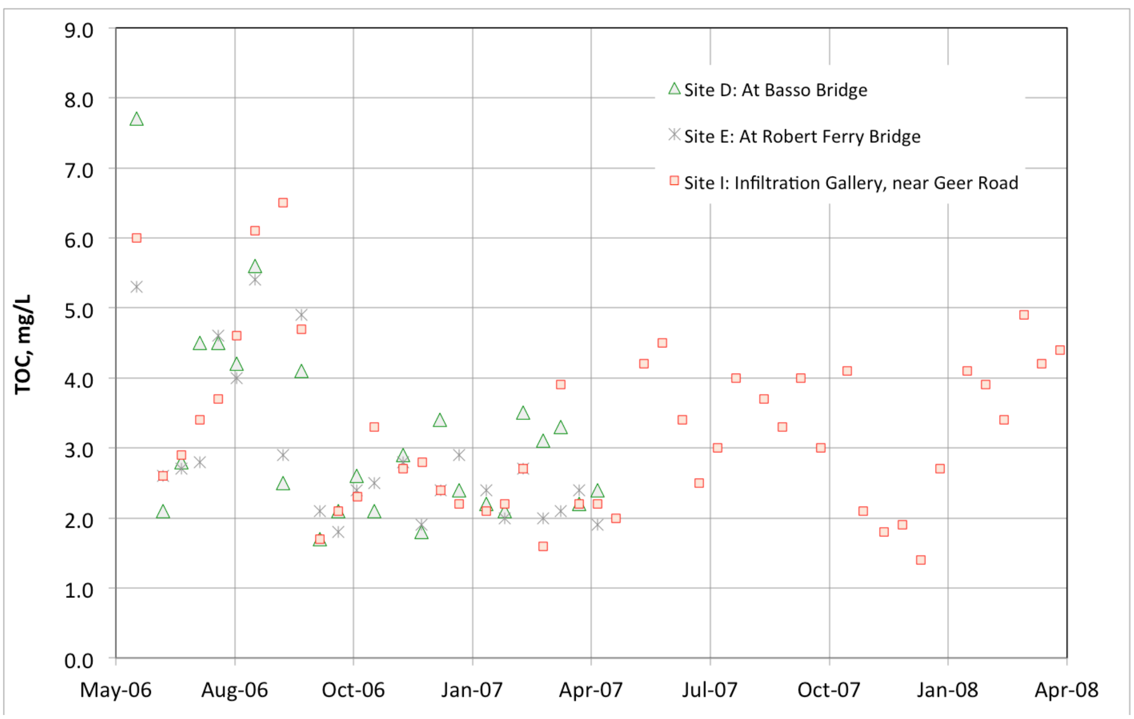

Figure 7. TOC of the Tuolumne River Sites D, E, and I Corresponding to TID's Watershed Sanitary Survey Sampling Locations

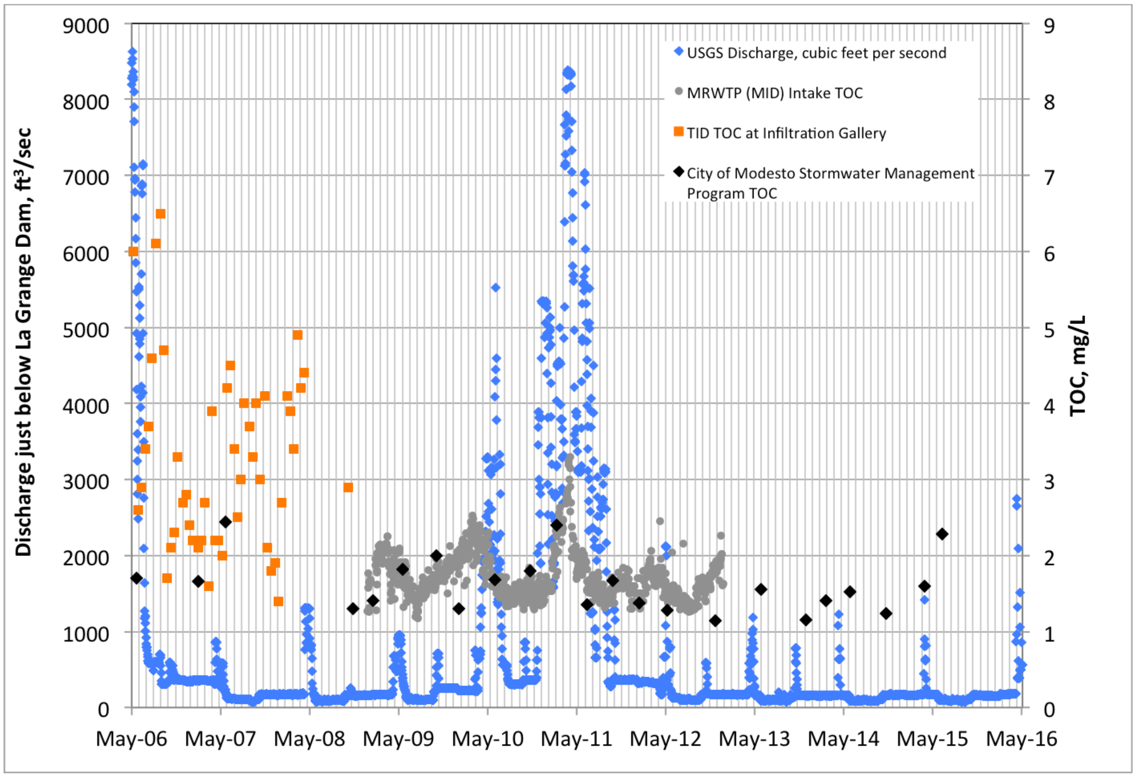

Figure 8. TOC of Modesto Reservoir and the Tuolumne River at the Infiltration Gallery and Downstream Modesto near Mitchell Road

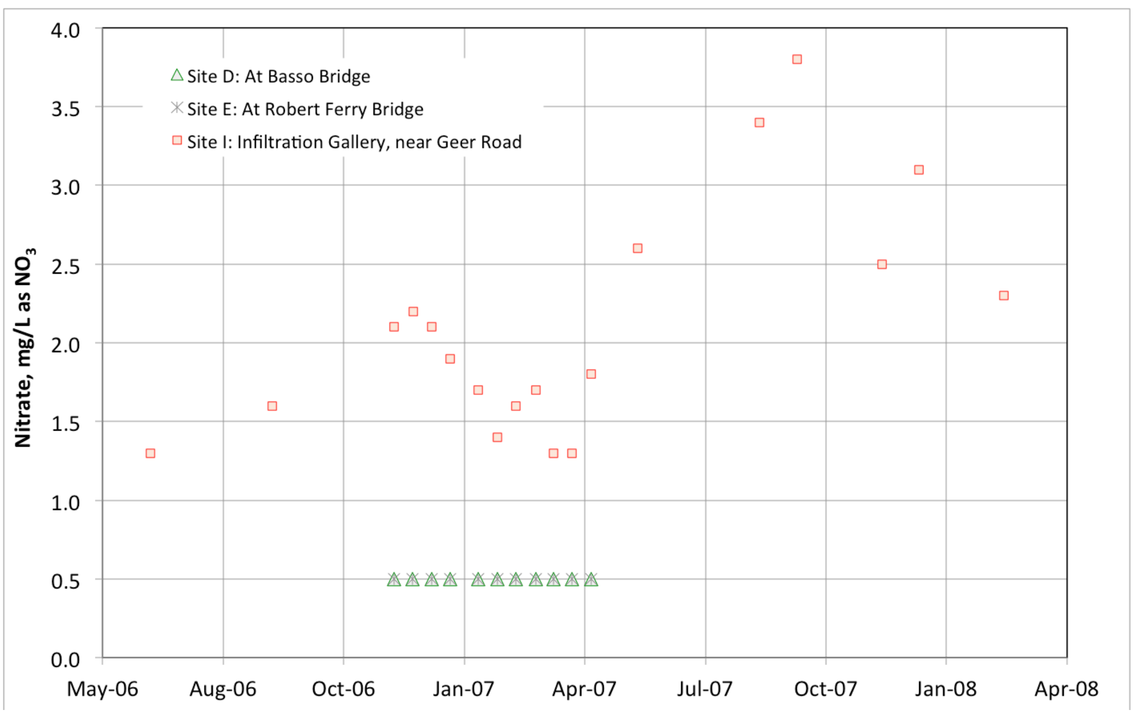

Figure 9. Nitrate of the Tuolumne River Sites D, E, and I Corresponding to TID's Watershed Sanitary Survey Sampling Locations (values plotted at 0.5 mg/L are non-detects)

Table 2. Summary of Detected Pesticides and SOCs on the Tuolumne River, between La Grange Dam and Modesto

Location	Year	Pesticides Detected	Reference
Between La Grange Dam and Modesto	1995	Diazinon Napropamide Simazine Chlorpyrifos Chlorthal-dimethyl Trifluralin	California Department of Pesticide Regulation (CDPR)
Waterford LM Spill; Regional Board Irrigation Lands Monitoring site code: 535MIDWFS	2005 - 2008	Diuron Glyphosate Isoxaben Norflurazon Oryzalin Prodiamine	California Department of Pesticide Regulation (CDPR)
Between La Grange Dam and Modesto	Unknown	Chlorpyrifos Chlorthal-dimethyl Diazinon Malathion Metolachlor Napropamide Simazine	CDPR and reported in 2007 TID Treatment Process Evaluation TM
Fox Grove County Park	2007-2008	2,4-Dichlorophenylacetic acid 3,4-Dinitrotoluene Bis(2-Ethylhexyl) Phthalate EPN (ENT) N-Nitrosopyrrolidine Tert-Butyl alcohol (TBA)	TID Pilot Study and WSS Database

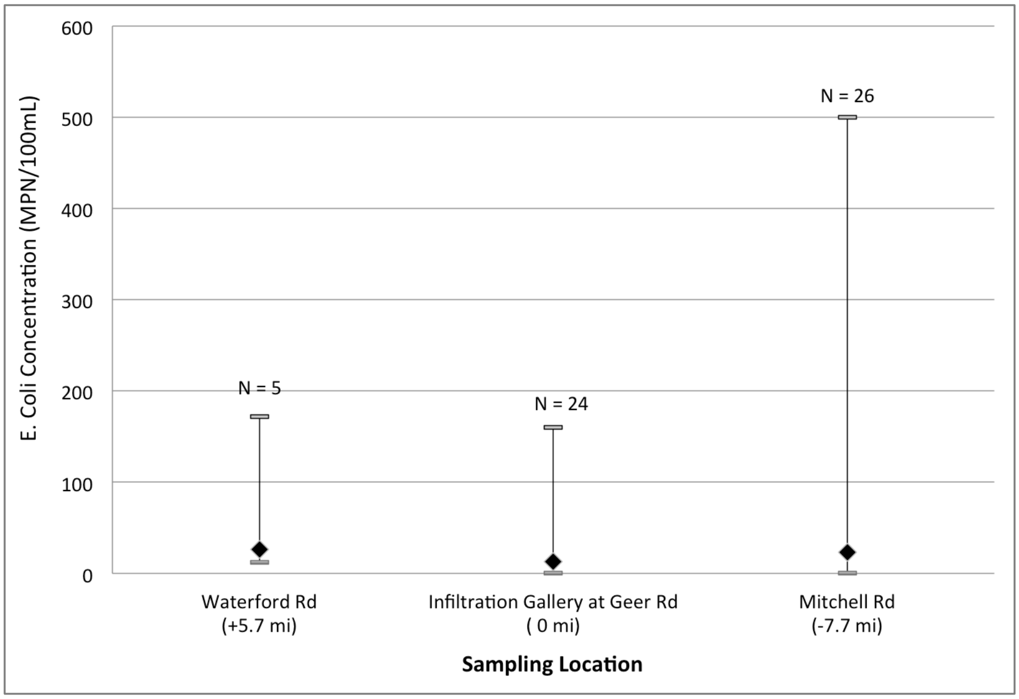

Figure 10. E. Coli Concentrations Measured at the Infiltration Gallery Location and Upstream and Downstream Locations

4 - PESTICIDE USAGE IN THE WATERSHED

As stated in the previous section, the Lower Tuolumne River (downstream of Don Pedro Reservoir) is listed as an impaired water body under USEPA Clean Water Act Section 303(d) (California State Water Resources Control Board, 2010). This designation is largely due to the presence of several pesticides, including chlopyrifos, diazinon, Group A pesticides (aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane - including lindane, endosulfan, and toxaphene), as well as pollution from mercury, water temperature, and an unknown toxicity. As of 2014, total maximum daily loads (TMDLs) were established by the California Regional Water Quality Control Board Central Valley Region to limit diazinon and chlorpyrifos in the San Joaquin River and Sacramento River basins.

The pesticides of local concern for this project were determined through an evaluation of pesticide usage in the local watersheds. CDPR maintains a Pesticide Use Reporting (PUR) database and the most recent available dataset for the project area was from 2014 (CDPR, 2016). The project area was defined using geographic information system (GIS) software (ArcMap 10.3, 2016) to include the Lower Tuolumne River downstream of Don Pedro Reservoir to the confluence with Dry Creek on the east side of Modesto, as well as Turlock Lake, and the Modesto Reservoir. The location information from GIS was used to filter the pesticide use data from the PUR database (CDPR, 2016), from which the top pesticides applied within the project area were determined on the basis of mass (lbs/yr) using a threshold of 5,000 lbs applied per year, as well as by area treated (acres) with a threshold of 10,000 acres treated. These top pesticides are presented in Tables 3 and 4, respectively. The top 5 pesticides used in the project area on a mass basis are further defined by use for specific crops in Table 5.

Of these many pesticides applied in the Lower Tuolumne River watershed, only pesticides with an appropriate analytical method can be included in the sampling program. Eurofins Eaton Analytical Laboratory was used as the "reference" laboratory regarding availability of an analytical method; they are a large State certified commercial laboratory that analyzes for all regulated and potentially future regulated contaminants, along with a long list of pharmaceutical and personal care products (PPCPs). If Eurofins does not have an analytical method for a specific contaminant, it is assumed the contaminant cannot be readily measured and therefore it is not included in the sampling program.

Table 3. Top Pesticides Applied in the Project Area by Mass (CDPR, 2016)

Chemical Name	Mass Applied (lbs/year)	Area Treated (acres)
Mineral Oil [2]	220,210	27,311
Sulfur [2]	113,438	10,443
1,3-Dichloropropene	98,091	319
Methyl Bromide	90,452	286
Glyphosate, Isopropylamine Salt	48,081	31,209
Copper Hydroxide	47,160	14,212
Kaolin [2]	34,514	1,105
Petroleum Oil, Unclassified [2]	33,353	3,283
Glyphosate, Potassium Salt	31,311	14,160
Chlorothalonil	20,133	6,826
Mancozeb [1]	10,373	5,219
Pendimethalin	9,867	4,048
Oxyfluorfen	8,989	28,536
Paraquat Dichloride	8,982	12,122
2,4-D, Dimethylamine Salt	6,932	7,603
Chloropicrin	6,753	125
Copper Sulfate (Basic) [2]	5,167	1,508
Copper Oxide (ous) [2]	5,101	1,036

[1] No method available at reference commercial laboratory, Eurofins Eaton Analytical Laboratory
[2] Not considered a synthetic organic chemical

Table 4. Top Pesticides Applied in the Project Area by Area (CDPR, 2016)

Chemical Name	Mass Applied (lbs/year)	Area Treated (acres)
Bacillus Thuringiensis [1]	155	157,278
Piperonyl Butoxide [1]	155	157,278
Reynoutria Sachalinensis [1]	155	157,278
Streptomyces Lydicus WYEC 108 [1]	155	157,278
Abamectin [1]	572	32,293
Glyphosate, Isopropylamine Salt	48,081	31,209
Oxyfluorfen	8,989	28,536
Mineral Oil [2]	220,210	27,311
Bifenthrin [1]	2,206	19,715
Methoxyfenozide [1]	3,760	15,464
Pyraclostrobin [1]	1,458	15,208
Saflufenacil [1]	546	14,425
Copper Hydroxide [2]	47,160	14,212
Glyphosate, Potassium Salt	31,311	14,160
Boscalid [1]	2,358	12,340
Paraquat Dichloride	8,982	12,122
Sulfur [2]	113,438	10,443

[1] No method available at reference commercial laboratory, Eurofins Eaton Analytical Laboratory
[2] Not considered a synthetic organic chemical

Table 5. Top Five Pesticides Applied in the Project Area by Mass and Crop

Pesticide	Application	Mass Applied (lbs/year)	Area Treated (acres)
Mineral Oil	Almond	179,884	21,624
	Walnut	29,872	4,842
	Peach	5,545	438
	Cherry	3,635	292
	Apple	698	50
	Other	1,274	116
Sulfur	Grape, wine	97,388	8,508
	Peach	9,363	1,172
	Outdoor Transplants	6,320	692
	Other	366	72
1,3-Dichloropropene	Almond	33,783	102
	Walnut	29,793	113
	Outdoor Plants in Containers	18,181	54

Pesticide	Application	Mass Applied (lbs/year)	Area Treated (acres)
	Outdoor Transplants	10,657	33
	Peach	5,677	17
Methyl Bromide	Almond	88,858	273
	Outdoor Plants in Containers	1,177	13
	Walnut	338	–
	Cherry	40	–
	Peach	39	–
Glyphosate, Isopropylamine salt	Almond	31,726	21,039
	Walnut	6,636	4,954
	Corn (Forage - fodder)	2,757	2,146
	Outdoor Plants in Containers	1,982	537
	Grape, wine	1,488	581
	Other	3,491	1,952

5 - SUMMARY OF REGULATORY REQUIREMENTS

Compliance with State and Federal drinking water regulations is a primary driver for process train selection of the new WTP. Consequently, these same regulations are also a primary driver of the constituents selected for this sampling plan. It is important to effectively characterize the quality of this source water in order to design a plant that will produce a high-quality finished water that meets all current drinking water regulations. A summary of these key regulations are discussed in the sections below.

5.1 Maximum Contaminant Levels (MCLs)

The proposed project will be subject to all applicable State of California and Federal drinking water regulations. The constituents with corresponding primary and secondary MCLs are specified in the following sections of Title 22 of the California Code of Regulations.

- §64431 – Maximum Contaminant Levels—Inorganic Chemicals
- §64442 – MCLs and Monitoring – Gross Alpha Particle Activity, Radium-226, Radium-228, and Uranium
- §64444 – Maximum Contaminant Levels – Organic Chemicals
- §64449 – Secondary Maximum Contaminant Levels and Compliance
- §64533 – Maximum Contaminant Levels for Disinfection Byproducts
- §64674 – Lead and Copper Rule – Large Water System Requirements

5.2 Pathogen Treatment

In addition to the MCLs, treatment techniques have been legislated which regulate microbial treatment through removal and disinfection. Microbial contaminant monitoring efforts will be driven by the following regulations:

- Surface Water Treatment Rule (SWTR)
- Total Coliform Rule (TCR)
- Interim Enhanced Surface Water Treatment Rule (IESWTR)
- Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), which requires at least monthly monitoring of *Cryptosporidium*, *E. Coli*, and turbidity over a 2-year period

The SWTR was promulgated in 1989. It required that all public water systems (PWS) using surface water or groundwater under the direct influence of surface water, which practiced conventional or direct filtration, do the following:

1. Achieve 4-log (99.99%) removal/inactivation of viruses and 3-log (99.9%) removal/inactivation of *Giardia lamblia*,
2. Maintain a disinfectant concentration of at least 0.2 mg/L at the entrance to the distribution system, and maintain a detectable disinfectant residual throughout the distribution system, and
3. Maintain a combined filter effluent turbidity less than 0.5 NTU.

The IESWTR, promulgated in 1998, built on the treatment techniques required by the SWTR and required PWSs that filter to achieve a 2-log removal of *Cryptosporidium* by increasing the stringency of the combined filter effluent turbidity standards to 0.3 NTU.

The LT2ESWTR, promulgated in 2006, requires utilities to monitor their source water on a monthly basis for *Cryptosporidium*, *E. coli*, and turbidity. Depending on the maximum running annual average (RAA) *Cryptosporidium* concentration, the water is placed into a "Bin" which dictates the level of treatment required to achieve the required log removal/inactivation of *Cryptosporidium*. Bin classification is summarized in Table 6. The required level of *Cryptosporidium* treatment is determined by the source water's Bin classification and the type of filtration technology employed, as shown in Table 7.

Table 6. Bin Classification as Stipulated Under LT2ESWTR

Bin	*Cryptosporidium* Concentration (oocysts/L)
1	<0.075
2	0.075 to <1.0
3	1.0 to <3.0
4	≥3.0

Table 7. Treatment Requirements for *Cryptosporidium* Treatment Based on Bin Classifications Under LT2ESWTR

Bin Classif-ication	Conventional, Diatomaceous Earth, or Slow Sand Filtration	Direct Filtration	Alternative Filtration Technologies
Bin 1	No additional treatment	No additional treatment	No additional Treatment
Bin 2	1-log treatment[1]	1.5-log treatment[1]	As determined by State[1]
Bin 3	2-log treatment[2]	2.5-log treatment[2]	As determined by State[2]
Bin 4	2.5-log treatment[2]	3-log treatment[2]	As determined by State[2]

[1]Public water systems (PWSs) may use any technology or combination of technologies from microbial toolbox
[2]PWSs must achieve at least 1-log of required treatment using ozone, chlorine dioxide, UV, membranes, bag filtration, cartridge filtration, or bank filtration

In addition to stipulating the overall pathogen treatment requirements, these rules require a multi-barrier treatment approach to ensure effective microbial treatment. The specific treatment credit awarded for pathogen *removal* depends on the filtration technology applied, and the credit awarded for pathogen *inactivation* depends on the disinfectant type, dose and contact time. As such, regardless of the removal credit attained, at least 0.5-log Giardia inactivation and 2-log virus inactivation must be provided.

Although DDW and Federal SWTR regulations require treatment for only 3-log *Giardia* removal/inactivation and 4-log virus removal/inactivation, DDW independently developed a guidance document (Appendix B, DDW SWTR Guidance) at the time the Federal SWTR was being developed, which provides guidance on additional treatment for dirtier waters based on source water total coliform concentrations. This guidance document suggests that more than 3-log *Giardia* treatment and 4-log virus treatment may be needed when the source water mean monthly total coliform concentration is greater than 1,000/100 mL or *E. coli* concentration is greater than 200/100 mL. (A criterion of 1,000 total coliform/100 mL is considered equivalent to 200 fecal coliform/100 mL, which is considered equivalent to 200 *E. coli*/100 mL (NRC, 2004)). DDW has suggested it may follow these guidelines when permitting the new SRWA's WTP.

5.3 Enhanced Coagulation for DBP Control

The Stage 1 Disinfectants and Disinfection Byproducts Rule (D/DBPR), promulgated in 1998, was legislated to minimize the public's exposure through drinking water to potentially carcinogenic disinfection byproducts (DBPs). In addition to setting MCLs for total trihalomethanes (TTHMs), haloacetic acids (HAA5), bromate and chlorite, the D/DBPR set a treatment technique for TOC removal—referred to as "enhanced coagulation"—to reduce DBP formation during disinfection. The amount of TOC removal required by the D/DBP Rule is a function of the source water TOC concentration and alkalinity, as summarized in Table 8. The D/DBP Rule also provides "alternative compliance criteria" which systems have the option of meeting for compliance in lieu of the TOC removal requirement.

Table 8. TOC Removal Required Under the Stage 1 D/DBPR

Source Water TOC (mg/L)	Source Water Alkalinity (mg/L as $CaCO_3$)		
	0-60	>60-120	>120
>2.0 – 4.0	35%	25%	15%
>4.0 – 8.0	45%	35%	25%
>8.0	50%	40%	30%

6 - PROPOSED WATER QUALITY MONITORING PLAN

All samples will be collected at the same location in the Tuolumne River, near the site of the Infiltration Gallery. The goal is to collect samples as close to the infiltration gallery location as practical. The proposed sampling site, shown in Figure 9, is at the Infiltration Gallery location. The exact location may move slightly depending on site accessibility and field crew safety. Once identified though, the same location will be used throughout the sampling program.

Figure 9. Candidate Sampling Location

6.1 Sampling Collection Methodology

Most samples will be collected from shore with Kemmerer water sampler attached to a pole (Figure 10a). Some constituents in the sampling plan will be sampled quarterly, some monthly, and a select few will be sampled twice monthly. During the bi-monthly sampling trips when only a small volume of water is needed (< 1L), the water will be collected from the shore using some type simple pole/bottle sampling apparatus (Figure 10b). All samples will be collected in the flowing segment of the river, below the surface but off the bottom so as to not pull bottom sediments into the sample that would skew water quality characterization.

(a) Kemmerer Sampler

(b) Pole/Bottle

Figure 10. Water Sampler Alternatives

6.2 Monitored Constituents and Sampling Frequency

Several categories of constituents will be monitored during the first year of sampling. These categories include:

- General water quality parameters needed to assess treatability
- Regulated contaminants with a DDW pMCL or sMCL
- Select unregulated contaminants that are of interest because of potential contamination sources in the watershed
- Select unregulated pesticides and other SOCs with a high usage rate in the watershed
- Select unregulated pesticides and other SOCs that have been detected previously in this reach of the Tuolumne River.

Most constituents will be monitored quarterly for four consecutive quarters (one year), with sampling beginning in Summer or Fall 2016. Quarterly monitoring includes general water quality parameters, all regulated contaminants with a pMCL or sMCL (i.e., inorganic and organic chemicals, radionuclides, and DBPs) and the select group of unregulated pesticides and other SOCs applied to agricultural areas within the watershed or measured in the River during prior monitoring programs.

A few parameters will require monthly sampling. To satisfy the LT2ESWTR requirements, *E. Coli*, *Cryptosporidium* oocysts, and turbidity will be monitored monthly over a period of 24 months. Total coliform and *Giardia* cysts will also be monitored concurrently to characterize microbial contaminating activities in this reach of the Tuolumne River. TOC also will be sampled monthly—concurrent with the LT2ESWTR samples—to assess variation in TOC levels and enhanced coagulation requirements of this source water. Because DDW has expressed that more frequent monitoring may be needed for total coliform and *E. coli*, these parameters will also be sampled every other week (i.e., in between the LT2 sample collection events).

The nitrogen compounds associated with wastewater—ammonia, nitrite and nitrate—will also be sampled monthly. The purpose for monthly rather than quarterly sampling is to assess the impact of the upstream cattle feedlots and poultry facilities, and the upstream Waterford WWTP percolation ponds.

The monitoring frequency for this sampling program is summarized in Table 9 below. The sampling frequency shown in Table 9 is for the first year only (i.e., Phase 1 – Intensive Monitoring), except for the LT2ESWTR parameters, which require 24 months of sampling. Phase 2 of the monitoring program—after the first year of sampling—will be scaled-back and redesigned to accommodate monitoring of any changes in water quality prior to construction and startup of the treatment plant.

Table 9. Summary of Sampling Frequency for each Category of Constituents[1]

Category	Sampling Frequency	Estimated Total Number of Samples
General Water Characteristics (Physical and Chemical)	Quarterly	4
Select Field and Other General Parameters (pH, Temperature, Dissolved Oxygen, Alkalinity, Bromide, Conductivity, Iron, Manganese, TOC, DOC)	Monthly	12
Turbidity[2]	Twice per month	48
Inorganic chemicals with DDW MCLs	Quarterly	4
Organic chemicals with DDW MCLs	Quarterly	4
Radionuclides with DDW MCLs	Quarterly	4

Category	Sampling Frequency	Estimated Total Number of Samples
Microbial Parameters:		
Cryptosporidium[2], Giardia[3]	Monthly	24
Total Coliform[3], E. coli[2]	Twice per month	48
Nitrogen Compounds (NH_3, NO_2, NO_3)	Monthly	12
Select Unregulated Pesticides and SOCs	Quarterly	4

[1] First year of monitoring, except as noted for LT2ESWTR required parameters
[2] Parameters will be sampled monthly for 24 consecutive months, per LT2ESWTR requirements
[3] Not a required parameter for LT2ESWTR, so sampling frequency may be reduced the second year.

The category "Select Unregulated Pesticides and SOCs" includes all pesticides applied to crops within the Lower Tuolumne River watershed, plus constituents measured during prior sampling events, provided that an appropriate analytical method is available. (Regulated pesticides are included in the category of constituents with DDW MCLs). Pesticides applied in the watershed are divided into two categories: (a) high usage based on mass applied per year and acreage covered, and (b) those on one of the candidate future regulatory lists—Unregulated Contaminant Monitoring Rule (UCMR), Candidate Contaminant List (CCL), Notification Level (NL), or archived Notification Level (aNL)—or with a USEPA health advisory (HA) level. Pesticides considered to be high-use were applied at a rate of 5,000 lbs/yr or greater or applied to an area of 10,000 acres or greater.

In addition, the category "Select Unregulated Pesticides and SOCs" includes all pesticides and other SOCs measured in water samples collected within the study area (i.e., between the La Grange dam and the Infiltration Gallery location) since 1995, provided that appropriate analytical methods are available. The amount of data for these constituents is very limited, which is the reason for looking back as far as 1995. Contaminants detected in the River are discussed in more detail in the Water Quality Assessment TM (In preparation by Trussell Technologies, 2016).

After the first year of sampling, the monitoring program will be scaled back to fewer constituents, being limited to those needed for establishing design criteria and those needed to document long-term changes in source water quality. This reduced monitoring program will be submitted to DDW for review and approval, along with a Technical Memorandum summarizing the first year monitoring results.

6.3 Laboratory and Analytical Methods

A detailed list of the constituents to be monitored under each category of this proposed sampling program is shown in Table 10. The corresponding analytical method, regulatory list (where applicable), MCL or Notification Level (NL), Detection Limit for Reporting (DLR), and sampling frequency are also provided for each constituent. A State of California certified laboratory will be used for all analyses.

Table 10. Detailed list of Constituents to be Monitored

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
General Water Characteristics (Physical and Chemical)						
Alkalinity, total	--	SM 2320B	mg/L	--		m
Ammonia	--	EPA 350.1	mg/L	--		m
Bromide	--	EPA 300.0	mg/L	--		m
Calcium	--	EPA 200.7	mg/L	--		q
Chloride	sMCL	EPA 300.0	mg/L	250		q
Color	sMCL	SM 2120B	units	15		q
Dissolved Oxygen (Field Measurement)	--	--	mg/L	--		m
Foaming Agents (MBAS)	sMCL	SM 5540C	mg/L	0.5		q
Iron (total and dissolved)	sMCL	EPA 200.8	mg/L	0.3		m
Magnesium	--	EPA 200.7	mg/L	--		q
Manganese (total and dissolved)	sMCL/NL	EPA 200.8	mg/L	0.05/0.5		m
Nitrate (as N)	pMCL	EPA 300.0	mg/L	10		m
Nitrate + Nitrite (as N)	pMCL	addition	mg-N/L	10	--	m
Nitrite (as N)	pMCL	EPA 300.0	mg-N/L	1	0.4	m
Odor-Threshold	sMCL	SM 6040E	units	3		q
Organic Carbon, Total (TOC)	--	SM5310C	mg/L	TT	0.3	m
Organic Carbon, Dissolved (DOC)		SM5310C	mg/L	--		m
pH	--	SM 4500-H+ B	--	--		m
pH (Field Measurement)						m
Phosphorus (total as P)	--	SM 4500-PE/ EPA 365.1	mg/L	--		q
Potassium	--	EPA 200.7	mg/L	--		q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Sodium	--	EPA 200.7	mg/L	--		q
Specific Conductance (field measurement)	sMCL	SM 2510B	µS/cm	900		m
Sulfate	sMCL	EPA 300.0	mg/L	250		q
Temperature	--	--	°C	--		m
Total Dissolved Solids (TDS)	sMCL	SM2540C	mg/L	500		q
Total Suspended Solids (TSS)	--	SM2510D	mg/L	--		q
Turbidity	pMCL/sMCL	EPA 180.1	NTU	TT/5		2x/m
Turbidity (field measurement)	pMCL/sMCL	EPA 180.1	NTU	TT/5		m
UV-254	--	SM 5910	cm^{-1}	--		m
Inorganic Contaminants with a primary (p) or secondary (s) MCL (not included in general water characteristics)						
Aluminum	pMCL/sMCL	EPA 200.8	mg/L	1/0.2	0.05	q
Antimony	pMCL	EPA 200.8	mg/L	0.006	0.006	q
Arsenic	pMCL	EPA 200.8	mg/L	0.010	0.002	q
Asbestos	pMCL	EPA 100.2	MFL*	7	0.2	q
Barium	pMCL	EPA 200.8	mg/L	1	0.1	q
Beryllium	pMCL	EPA 200.8	mg/L	0.004	0.001	q
Cadmium	pMCL	EPA 200.8	mg/L	0.005	0.001	q
Chromium (Total)	pMCL	EPA 200.8	mg/L	0.05	0.01	q
Chromium-6 (Hexavalent)	pMCL	EPA 218.6	mg/L	0.010	0.001	q
Copper	pMCL/sMCL	EPA 200.8	mg/L	1.3/1.0	0.05	q
Cyanide	pMCL	SM4500CN-F	mg/L	0.15	0.1	q
Fluoride	pMCL	SM4500F-C	mg/L	2.0	0.1	q
Lead	pMCL	EPA 200.8	mg/L	0.015	0.005	q
Mercury (inorganic)	pMCL	EPA 245.1	mg/L	0.002	0.001	q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Nickel	pMCL	EPA 200.8	mg/L	0.1	0.01	q
Perchlorate	pMCL	EPA 314.0	mg/L	0.006	0.004	q
Selenium	pMCL	EPA 200.8	mg/L	0.05	0.005	q
Silver	sMCL	EPA 200.8	mg/L	0.1	0.01	q
Thallium	pMCL	EPA 200.8	mg/L	0.002	0.001	q
Zinc	sMCL	EPA 200.8	mg/L	5	0.05	q
* MFL = million fibers per liter; MCL for fibers exceeding 10 µm in length						
Organic Contaminants with a primary or secondary MCL (excludes DBPs)						
1,1,1-Trichloroethane (1,1,1-TCA)	pMCL	EPA 524.2	mg/L	0.200	0.0005	q
1,1,2,2-Tetrachloroethane	pMCL	EPA 524.2	mg/L	0.001	0.0005	q
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	pMCL	EPA 524.2	mg/L	1.2	0.01	q
1,1,2-Trichloroethane (1,1,2-TCA)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
1,1-Dichloroethane (1,1-DCA)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
1,1-Dichloroethylene (1,1-DCE)	pMCL	EPA 524.2	mg/L	0.006	0.0005	q
1,2,4-Trichlorobenzene	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
1,2-Dichlorobenzene	pMCL	EPA 524.2	mg/L	0.6	0.0005	q
1,2-Dichloroethane (1,2-DCA)	pMCL	EPA 524.2	mg/L	0.0005	0.0005	q
1,2-Dichloropropane	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
1,3-Dichloropropene [1]	pMCL	EPA 524.2	mg/L	0.0005	0.0005	q
1,4-Dichlorobenzene (p-DCB)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
2,3,7,8-TCDD (Dioxin)	pMCL	EPA 1613	mg/L	3.E-08	5. E-09	q
2,4,5-TP (Silvex)	pMCL	EPA 515.4	mg/L	0.05	0.001	q
2,4-Dichlorophenoxyacetic acid (2,4-D) [1]	pMCL	EPA 515.4	mg/L	0.07	0.01	q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Alachlor	pMCL	EPA 505	mg/L	0.002	0.001	q
Atrazine	pMCL	EPA 525.2	mg/L	0.001	0.0005	q
Bentazon	pMCL	EPA 515.4	mg/L	0.018	0.002	q
Benzene	pMCL	EPA 524.2	mg/L	0.001	0.0005	q
Benzo(a)pyrene	pMCL	EPA 525.2	mg/L	0.0002	0.0001	q
Carbofuran	pMCL	EPA 531.2	mg/L	0.018	0.005	q
Carbon Tetrachloride	pMCL	EPA 524.2	mg/L	0.0005	0.0005	q
Chlordane	pMCL	EPA 505	mg/L	0.0001	0.0001	q
cis-1,2-Dichloroethylene	pMCL	EPA 524.2	mg/L	0.006	0.0005	q
Dalapon	pMCL	EPA 515.4	mg/L	0.2	0.01	q
Di(2-ethylhexyl)adipate	pMCL	EPA 525.2	mg/L	0.4	0.005	q
Di(2-ethylhexyl)phthalate (same as Bis (2-ethylhexyl)phthalate [2])	pMCL	EPA 525.2	mg/L	0.004	0.003	q
Dibromochloropropane (DBCP)	pMCL	EPA 551.1	mg/L	0.0002	0.00001	q
Dichloromethane (Methylene chloride)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
Dinoseb	pMCL	EPA 515.4	mg/L	0.007	0.002	q
Diquat	pMCL	EPA 549.2	mg/L	0.02	0.004	q
Endothall	pMCL	EPA548.1	mg/L	0.1	0.045	q
Endrin	pMCL	EPA 508	mg/L	0.002	0.0001	q
Ethylbenzene	pMCL	EPA 524.2	mg/L	0.3	0.0005	q
Ethylene Dibromide (EDB)	pMCL	EPA 551.1	mg/L	0.00005	0.00002	q
Glyphosate [1]	pMCL	EPA 547	mg/L	0.7	0.025	q
Heptachlor	pMCL	EPA 505	mg/L	0.00001	0.00001	q
Heptachlor Epoxide	pMCL	EPA 505	mg/L	0.00001	0.00001	q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Hexachlorobenzene	pMCL	EPA 505	mg/L	0.001	0.0005	q
Hexachlorocyclopentadiene	pMCL	EPA 505	mg/L	0.05	0.001	q
Lindane	pMCL	EPA 505	mg/L	0.0002	0.0002	q
Methoxychlor	pMCL	EPA 505	mg/L	0.03	0.01	q
Methyl tert butyl ether (MTBE)	pMCL/sMCL	EPA 524.2	mg/L	0.013/0.005	0.003	q
Molinate	pMCL	EPA 525.2	mg/L	0.02	0.002	q
Monochlorobenzene	pMCL	EPA 524.2	mg/L	0.07	0.0005	q
Oxamyl	pMCL	EPA 531.2	mg/L	0.05	0.02	q
Pentachlorophenol	pMCL	EPA 515.4	mg/L	0.001	0.0002	q
Picloram	pMCL	EPA 515.4	mg/L	0.5	0.001	q
Polychlorinated Biphenyls (PCBs)	pMCL	EPA 505	mg/L	0.0005	0.0005	q
Simazine [2]	pMCL	EPA 525.2	mg/L	0.004	0.001	q
Styrene	pMCL	EPA 524.2	mg/L	0.1	0.0005	q
Tetrachloroethylene (PCE)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
Thiobencarb	pMCL/sMCL	EPA 525.2	mg/L	0.07/0.001	0.001	q
Toluene	pMCL	EPA 524.2	mg/L	0.15	0.0005	q
Total Xylenes	pMCL	EPA 524.2	mg/L	1.750	0.0005	q
Toxaphene	pMCL	EPA 505	mg/L	0.003	0.001	q
trans-1,2-Dichloroethylene	pMCL	EPA 524.2	mg/L	0.01	0.0005	q
Trichloroethylene (TCE)	pMCL	EPA 524.2	mg/L	0.005	0.0005	q
Trichlorofluoromethane (Freon 11)	pMCL	EPA 524.2	mg/L	0.15	0.005	q
Vinyl Chloride	pMCL	EPA 524.2	mg/L	0.0005	0.0005	q
Disinfection By-Products						

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Haloacetic acids (HAA5)	pMCL	SM 6251B	mg/L	0.060	--	q
Total Trihalomethanes (TTHMs)	pMCL	EPA 551.1	mg/L	0.080	--	q
Bromate	pMCL	EPA 317.0	mg/L	0.010	0.0010	q
Chlorite	pMCL	EPA 300.0	mg/L	1.0	0.020	q
Radionuclides with an MCL						
Gross Alpha Particle (excluding radon and uranium)	pMCL	EPA 900	pCi/L	15	3	q
Gross Beta Particle	pMCL	EPA 900	mrem/yr	4	4	q
Radium-228 and -226 (combined)	pMCL	GA Method	pCi/L	5	1 for each	q
Strontium-90	pMCL	EPA 905	pCi/L	8	2	q
Tritium	pMCL	EPA 906	pCi/L	20,000	1,000	q
Uranium	pMCL	EPA 200.8	pCi/L	20	1	q
Microbiological						
Cryptosporidium	pMCL	EPA 1623	oocysts/L	TT	--	m
E. coli	pMCL	SM 9223F	MPN/100mL	TT	--	2x/m
Giardia	pMCL	EPA 1623	cysts/L	TT	--	m
Total Coliform	pMCL	SM 9223B	MPN/100mL	TT	--	2x/m
Applied in Watershed - Unregulated, High-Use Pesticides (>5,000 lbs/yr)						
Chloropicrin	aNL	551.1	mg/L	0.05	--	q
Chlorothalonil	HA (1-day)	525.2	mg/L	0.2	--	q
Methyl Bromide	CCL3, CCL4	524.2	--	--	--	q
Oxyfluorfen	CCL3, CCL4	EPA 525.2	--	--	--	q
Paraquat Dichloride	HA (1-day)	549.2	mg/L	0.1	--	q
Pendimethalin	none	525.2	mg/L			q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Additional Unregulated Pesticides Applied in the Watershed, with a Health Advisory Level or Considered for Future Regulation						
Acephate	CCL3, CCL4	LCMS-MS		--	--	q
Carbaryl	aNL	531.2	mg/L	0.7	--	q
Dimethoate	aNL	525.2	mg/L	0.001	--	q
Diuron	HA (1-day); CCL4	EPA 532	mg/L	1	--	q
Hexazinone	HA (1-day)	EPA 525.2	mg/L	3	--	q
Methomyl	HA (1-day)	531.2	mg/L	0.3	--	q
Metolachlor [2]	UCMR2; HA (1-day)	525.2	mg/L	2	--	q
Permethrin	CCL3, CCL4	525.2		--	--	q
Tebuconazole	CCL3, CCL4	LCMS-MS		--	--	q
Thiamethoxam	UCMR3	LCMS-MS		--	--	q
Thiophanate-Methyl	CCL4	LCMS-MS		--	--	q
Ziram	CCL4	630.1		--	--	q
Additional SOCs Reported in Historical Data						
Diazinon	aNL; HA	EPA 525.2	mg/L	0.0012	--	q
Tertiary butyl alcohol (TBA)	NL	EPA 524.2	mg/L	0.012	--	q
Chlorpyrifos (Dursban)	UCMR4; HA	525.2	mg/L	0.03	--	q
EPTC	UCMR1	525.2		--	--	q
Malathion	aNL; HA	525.2	mg/L	0.16	--	q
Trifluralin	HA (1-day)	525.2	mg/L	0.08	--	q
Select Additional Unregulated Constituents of Interest						
1,2,3-Trichloropropane (1,2,3-TCP)	Forthcoming pMCL, NL	EPA 524.2	mg/L	5.00E-06	5.00E-06	q

Parameter	List	Method	Units	DDW MCL/NL	DDW DLR	Collection Frequency[3]
Footnotes: [1] Also a high-use pesticide in this watershed. [2] Also measured during prior water sampling. [3] m=monthly; q-quarterly, 2x/m=twice per month TT = Treatment Technique pMCL = Primary Maximum Contaminant Level sMCL = Secondary Maximum Contaminant Level NL = DDW Notification Level aNL = DDW Archived Notification Level UCMR = Unregulated Contaminant Monitoring Rule CCL = EPA's Contaminant Candidate List HA = EPA Health Advisory Level Note: Yellow highlighted methods in this final version of the Source Water Sampling Plan are different from the Draft version based on information provided by Eurofins Eaton Analytical Laboratory.						

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