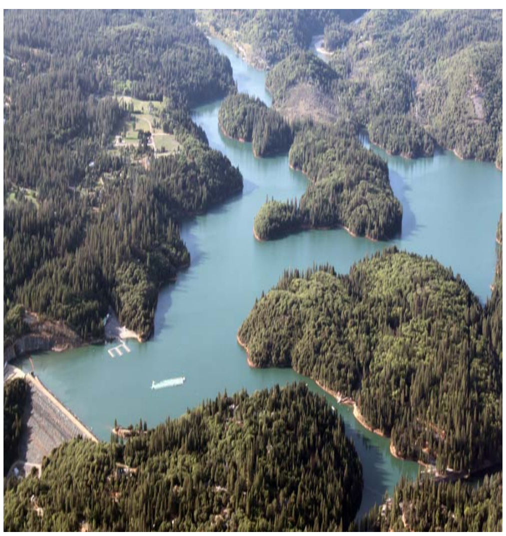
YUBA/BEAR RIVER WATERSHED SANITARY SURVEY 2017 UPDATE

January 2017

Prepared For

PCWA water • energy • stewardship

NID



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LIST OF ABBREVIATIONS

1996 Survey – Yuba/Bear River Watershed Sanitary Survey, 1996
2002 Update – Yuba/Bear River Watershed Sanitary Survey, 2002 Update
2012 Update – Yuba/Bear River Watershed Sanitary Survey, 2012 Update

ACL – Administration Civil Liability

BMP – Best Management Practice
BOD – Biochemical Oxygen Demand

CABY – Cosumnes, American, Bear and Yuba Rivers
CALFIRE – California Department of Forestry and Fire Protection
CalOES – California Office of Emergency Services
Caltrans – California Department of Transportation
CAO – Cleanup and Abatement Order
CAP – *Cryptosporidium* Action Plan
CCR – Consumer Confidence Report
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CEQA – California Environmental Quality Act
CFE – combined filter effluent
cfs – cubic feet per second
CIWQS – California Integrated Water Quality System
CRRIC – California Rangeland Research and Information Center
CRWC – California Rangeland Watershed Laboratory
CT – Disinfection Contact Time
CUPA – Certified Unified Program Agency
CWA – Clean Water Act

D/DBPR – Disinfectants/Disinfection By-Products Rule
DBP – disinfection by-product
DDW – California Division of Drinking Water
DFW – California Department of Fish and Wildlife
DOC – California Department of Conservation
DT – detention time
DWR – California Department of Water Resources

E. coli – Escherichia coli

FERC – Federal Energy Regulatory Commission
FIFRA – Federal Insecticide, Fungicide, and Rodenticide Act
FSA – Farm Service Agency

Gal - gallon
gpm – gallons per minute

gpm/sf – gallons per minute per square foot
GRAP – Grazing Regulatory Action Project

HAA5 – haloacetic acids
hr – hour
HSC – Health and Safety Code

IESWTR – Interim Enhanced Surface Water Treatment Rule
IFE – individual filter effluent
IOC – inorganic constituent
IRWMP – Integrated Regional Water Master Plan

Lbs – pounds
LRAA – locational running annual average
LT1ESWTR – Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR – Long Term 2 Enhanced Surface Water Treatment Rule

MBBR – moving bed bioreactors
MCL – maximum contaminant level
MEP – maximum extent practicable
mg – million gallon
mgd – million gallons per day
mg/L – milligrams per liter
MHP – Mobile Home Park
min - minute
MMRSA - Medical Marijuana Regulation and Safety Act
MPN/100 mL – most probable number per 100 milliliters
MRP – Monitoring and Reporting Program Plan
MS4 – municipal separate storm sewer system

ND – non-detect
NEPA – National Environmental Protection Act
NID – Nevada Irrigation District
NIMS – National Incident Management System
NIP – nonionic polymer
NOI – Notice of Intent
NPDES – National Pollution Discharge Elimination System
NPS – non-point source
NRCS – Natural Resources Conservation Service
NTMP – Non-Industrial Timber Management Plan
NTO – Notice of Timber Operations
NTU – nephelometric turbidity unit

OES – California Office of Emergency Services
OHV – Off-Highway Vehicle
oocyst/L – oocysts per liter

OSV – over-snow vehicle
OU – operable unit

PAC – powdered activated carbon
PACL – polyaluminum chlorohydrate
PCWA – Placer County Water Agency
PEIR – Programmatic Environmental Impact Report
PHG – Public Health Goal
PG&E – Pacific Gas and Electric

RAA – running annual average
Regional Board – Central Valley Regional Water Quality Control Board
RIMS – Response Information Management System
RMAC – Rangeland Management Advisory Committee
ROD – Record of Decision
RPF – Registered Professional Forester
RWQMP – Rangeland Water Quality Management Program

SCADA – Systems Control and Data Acquisition
Second Update – Yuba/Bear River Watershed Sanitary Survey, Second Update
SEMS – Standardized Emergency Management System
SFM – State Fire Marshall
SMARA – Surface Mining and Reclamation Act of 1975
SMARTS - Storm Water Multiple Application and Report Tracking System
SOC – synthetic organic compound
SSMP – sewer system management plans
SSO – sanitary sewer overflow
State Board – State Water Resources Control Board
SVWQC – Sacramento Valley Water Quality Coalition
SWPPP – storm water pollution prevention plan
SWTR – Surface Water Treatment Rule

TC – Technical Committee
THC - tetrahydrocannabinol
THP – Timber Harvest Plan
TMDL – total maximum daily load
TOC – total organic carbon
TSO – time schedule order
TSS – total suspended solids
TPH – total petroleum hydrocarbons
TTHM – total trihalomethanes

UCCE – University of California Cooperative Extension
UCMR 3 – Unregulated Contaminant Monitoring Rule 3
UFRV – Unit Filter Run Volume
ug/L – micrograms per liter

UPRR – Union Pacific Rail Road
USBLM – United States Bureau of Land Management
USDA – United States Department of Agriculture
USEPA – US Environmental Protection Agency
USFS – United States Forest Service
UV – ultraviolet light

VOC – volatile organic compound

WDR – Waste Discharge Requirements
WER – Watershed Evaluation Report
WFMP – Working Forest Management Plan
WQMH – Water Quality Management Handbook
WQMP – Water Quality Management Plan
WTP – water treatment plant
WWTP – wastewater treatment plant

This report presents the findings of the 2017 Update to the Yuba/Bear River Watershed Sanitary Survey (2017 Update). This study covers the period January 2011 through December 2015. The initial watershed sanitary survey was completed in 1996 (1996 Survey), the first update was completed in 2002 (2002 Update), the second update was completed in 2007 (Second Update), and the third update was completed in 2012 (2012 Update) in accordance with the California Surface Water Treatment Rule (SWTR).

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

PARTICIPATING WATER AGENCIES

Placer County Water Agency (PCWA) and Nevada Irrigation District (NID) jointly conducted the 1996 Survey, the 2002 Update, the Second Update, and the 2012 Update. This 2017 Update has been conducted by these agencies as well. Together these two are herein referred to as the participating water agencies.

2017 UPDATE OBJECTIVES

The overall objective of this 2017 Update is to assess the source water quality of the Yuba/Bear River to ensure the ability of the existing water treatment plants for the participating water agencies to continue to provide their customers with drinking water that meets all drinking water standards.

This 2017 Update is intended to accomplish the following objectives:

- Fulfillment of the California SWTR and the Interim Enhanced Surface Water Treatment Rule (IESWTR) requirements that surface water agencies conduct a sanitary survey of the source watershed once every five years. Any significant changes within the last five years that affect source water quality are to be identified in each update. In addition, it is required to comment on the appropriate level of treatment for pathogens, specifically for *Giardia*, viruses, and *Cryptosporidium*.

- Review and evaluate selected constituents of interest to identify potential water quality or treatment issues at each water treatment plant. Assess the ability of the water treatment plants to meet standards based on current and future regulatory framework. Develop recommendations for treatment plant actions to address water quality or treatment issues and/or address planning needs to meet expected future regulations.

- Review and evaluate selected potential contaminating activities to identify impacts on source water quality. Determine whether it may be useful to conduct additional monitoring to further assess contaminant levels in the source water or contaminants from a particular watershed source.

- Identify appropriate watershed management actions to protect and possibly improve source water quality. Develop recommendations for watershed management actions that are economically feasible and within the authority of the participating water agencies to implement. Of importance is to target contaminant activities that are most likely to affect source water quality, such as activities located near the water treatment plants or activities that are predominant in the watershed.

SIGNIFICANT CHANGES SINCE THE 2012 UPDATE

During the past five years, new information has been generated that was used to evaluate source water quality, treatment capabilities, and potential contaminating activities. This new information, which is summarized below, was obtained and evaluated for this 2017 Update.

- Many of the water treatment plants underwent upgrades and minor modifications, some key changes included:
    - Filter upgrades at the Alta Water Treatment Plant (WTP).
    - Conversion to sodium hypochlorite at the Bowman WTP.
    - Conversion to sodium hypochlorite at the Foothill 1/2 WTPs.
    - Replacement of filter media and underdrain at the Foothill 2 WTP.
    - Replacement of filter media at the Sunset WTP.
    - Completion of the Banner Cascade Pipeline to serve the Cascade Shores, Elizabeth George, and Loma Rica WTPs.
    - Conversion to sodium hypochlorite at the Loma Rica WTP.
    - Replacement of filter media on filters 3 and 4 at the Lake Wildwood WTP.
    - Partial completion of Magnolia III canal encasement to serve the Lake of the Pines WTP.
    - Conversion to sodium hypochlorite at the Lake of the Pines WTP.
    - Conversion to sodium hypochlorite and improvements to the upflow clarifier at the North Auburn WTP.

- There was one ambient monitoring program collecting data in the watershed during the study period. Additional monitoring data along Squirrel Creek continues to show elevated levels of *Escherichia coli* (*E. coli*) and indicates that there are sources of fecal contamination upstream of Penn Valley that may be contributing.

- Generally during the study period, 2011 through 2015, the source water turbidity levels remained similar or slightly lower than in the last study period. The same peaking trend during storm events was evident. Nevada Irrigation District (NID) has a more vigilant operating procedure to avoid diverting water during peak storm turbidities.

- *E. coli* monthly medians remained at similar levels seen previously, with only the Smartville WTP having consistently elevated source water levels. The raw water data for the Smartville WTP continue to indicate that there appears to be a source of fecal contamination between Deer Creek and the plant, which warrants further consideration.

- Many of the WTPs total organic carbon (TOC) levels appear to be increasing in the raw and treated water. There is no clear cause of this, but it could be related to drought effects and algae proliferation.

- Several distribution systems saw increasing trends in disinfection by-product (DBP) levels during the study period. An evaluation of source water temperatures indicates that temperatures were higher at NID WTPs and could be contributing to increased total trihalomethane (TTHM) levels. Other factors, such as pH, TOC, and water age could also be contributing to the increase in DBP levels.

- Both Placer County Water Agency (PCWA) and NID continue to implement National Pollutant Discharge Elimination System (NPDES) permits for canal aquatic herbicide application activities and implement actions to protect the water treatment plant diversions. The most commonly used herbicides in the canal are copper-based products.

- Donner Summit and Cascade Shores Wastewater Treatment Plants (WWTPs) both indicate that they will significantly reduce, or eliminate, waste discharge over the next five years.

- Outdoor cannabis cultivation has grown exponentially in the watershed during the study period. Each county has independent ordinances and regulations to manage the potential impacts from outdoor cultivation. Statewide regulations related to medical and recreational marijuana use are currently in development, so more changes are expected in the next five year period.

KEY FINDINGS AND CONCLUSIONS

The key findings and conclusions for this report are organized as they pertain to source water quality, treatment and regulatory compliance, and watershed contaminant sources. Highlights of these findings and conclusions are presented below.

Raw Water Quality for the Yuba/Bear River

Overall, the Yuba/Bear River provides excellent quality water. The raw water can be treated to meet all drinking water standards using conventional treatment processes. No persistently present constituents that require additional treatment processes have been identified in the raw water. Key findings for the constituents of interest are presented below.

Turbidity

- The median raw water turbidity ranges from 1.2 nephelometric turbidity units (NTU) at the Cascade Shores WTP to 8.4 NTU at the North Auburn WTP.

- Generally, the raw water turbidity for the Alta, Monte Vista, Cascade Shores, Loma Rica, Elizabeth George, and Sunset WTPs stays below 10 NTU. During the reporting period, the remainder of the WTPs occasionally frequented above 10 NTU. North Auburn WTP had the most months where raw water monthly averages were above 10 NTU, for 22 months out of 60 months, likely caused by conditions in the local watershed and reservoir.

- Completion of the Banner Cascade Pipeline by NID in June 2013 improved raw water turbidities for the Elizabeth George WTP.

- Rollins Reservoir can fill with turbid waters during the wet season. This results in higher turbidities at WTPs located downstream of Rollins Reservoir, when turbid waters are released from Rollins Reservoir during the winter and spring.

Microbiological Constituents

- The median *E. coli* values range from 2 most probable number per 100 milliliters (MPN/100mL) at Cascade Shores WTP to 52 MPN/100mL at the Smartville WTP.

- *E. coli* levels for the Banner Cascade Pipeline WTPs have been reduced since completion of the pipeline. There is a slight increase at the downstream WTPs.

- *E. coli* levels increase downstream for the Boardman Canal WTPs and the Deer Creek WTPs. There is no clear trend in the data for the WTPs downstream of Rollins Reservoir. These trends are similar to the Second and 2012 Updates.

- All of the WTPs, except for Smartville, can continue with their current level of treatment of 3/4-log reduction for *Giardia* and viruses under the SWTR. The Smartville WTP is currently operated to achieve 4/5-log reduction for *Giardia* and viruses, and should continue.

- Since the Sunset WTP had more than six *E. coli* monthly medians greater than 200 MPN/100mL, a closer examination of its monthly medians was conducted. The majority of months with higher median levels the Sunset WTP was not in operation. Peak levels can be associated with precipitation, but there are periods when they are not so there are likely other sources contributing *E. coli*.

- Higher *E. coli* levels at the Lake of the Pines WTP are often related to precipitation events and also ranch land along Magnolia III canal where cattle have been observed. Partial encasement of the Magnolia III canal has resulted in a reduction in the frequency and magnitude of peak *E. coli* levels at the Alexis Drive monitoring site.

- The data supports the possible Bin 1 classification of *Cryptosporidium* (2-log reduction) under the Long Term 2 Enhanced SWTR (LT2ESWTR) for the Auburn, Bowman, Foothill, and Sunset WTPs.

Disinfection By-Product Precursors

- Average TOC levels for all WTPs range from 1.2 milligrams per liter (mg/L) at Lake Wildwood and Foothill 1 WTPs to 2.4 mg/L at Smartville WTP.

- TOC levels did not increase consistently downstream for similar groupings of WTPs.

- Smartville WTP has the highest TOC levels, likely due to exposure to a natural watercourse (Squirrel Creek).

- TOC levels are seasonally variable, with the peak levels typically occurring during the wet season (late fall to early spring).

- NID WTPs showed a stronger increasing trend in temperature through the reporting period.

- Temperature plays a role in DBP formation; however it is evident that other factors are also impacting formation (water age, pH, and TOC).

- TTHM formation seems more related to temperature in NID systems compared to PCWA. This could be due to better preservation of colder temperatures in winter at NID WTPs, compared to PCWA WTPs.

- Overall, haloacetic acid (HAA5) formation is less correlated to temperature than TTHM formation.

Individual Intake Evaluations

All of the water treatment plants are currently in compliance with all existing drinking water regulations. PCWA and NID implement various types of treatment processes, depending on facility size and source water quality, and meet all current drinking water standards, including maximum contaminant levels (MCLs) and treatment technology requirements. Below is a summary of the selected treatment and regulatory compliance issues.

Turbidity

All treated water turbidity standards were met at all of the water treatment plants. The average raw water turbidity at the water treatment plants varies from 1.5 NTU at Cascade Shores WTP to 10.8 NTU at North Auburn WTP; while the average treated water turbidity varies from 0.02 NTU at Bowman and Sunset WTPs to 0.06 NTU at Colfax WTP. Overall, each of the water treatment plants achieves large amounts of solids removal with overall reductions varying from 97.9 to 99.6 percent removal.

Microbiological Constituents

All treated water coliform standards were met in each of the distribution systems, with the exception of September 2015 at the North Auburn system. There were a few occasions of total coliform positive results, but no others resulted in fecal coliform detects or violations of the Total Coliform Rule.

Disinfection By-Products

All of the water treatment plants, except the Smartville WTP, met the alternative compliance criterion for enhanced coagulation by having raw or treated water TOC levels less than 2 mg/L. Smartville WTP is required to calculate TOC removal and has met the reduction requirements through the study period.

The treated water Stage 1 Disinfectants/Disinfection By-Product Rule (D/DBPR) standards were met in each of the distribution systems. All of the water treatment plants have DBP running annual average (RAA) levels below the primary MCLs, 80 and 60 ug/L, for TTHMs and HAA5 respectively. There is also seasonality in the levels of DBPs, but it is variable at each water treatment plant depending on source water quality, treatment, and distribution system operations.

The treated water Stage 2 D/DBPR standards were also met in each of the distribution systems. All of the water treatment plants have DBP locational RAA (LRAA) levels below the primary MCLs, 80 and 60 ug/L, for TTHMs and HAA5 respectively. PCWA was required to conduct Operational Evaluations under the Stage 2 D/DBPR for the Applegate and Bowman distribution systems based on triggers in 2014 and 2015, respectively.

Of note were the increasing levels of TTHMs for many of the water treatment plants during the study period, some of the individual samples exceeded the MCL of 80 μg/L. PCWA and NID addressed the problem by altering disinfection practices at the water treatment plants, installing tank mixers, and optimizing distribution system operations.

Other Detectable Title 22 Constituents of Interest

There were minor detections of lead and copper in the distribution system for several of the systems, but none of the 90th percentile values exceeded the respective Action Levels. Bowman WTP had detectable levels of manganese and Lake of the Pines WTP had detectable levels of aluminum. The Alta and Colfax WTPs have had low level detections, well below the MCL, of total xylenes in the treated water due to clearwell tank coatings.

Other Detectable Unregulated Constituents

PCWA sampled four of its WTPs (Bowman, Auburn, Foothill 1/Foothill 2, and Sunset) and NID sampled two of its WTPs (Elizabeth George and Loma Rica) for unregulated constituents under the Unregulated Contaminant Monitoring Rule. Most constituents were non-detectable. There were low level detects, well below human health advisory levels, of hexavalent chromium, vanadium, strontium, and chlorate.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the total and fecal coliform data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus appears to continue to be appropriate reduction requirements for all of the water treatment plants, except the Smartville WTP. Smartville WTP has historically provided 4/5-log reduction and should continue to do so based on source water quality and the potential influence of upstream contaminating activities.

Based on the bin classification process for the LT2ESWTR all the water treatment plants were classified as Bin 1, requiring 2-log reduction of *Cryptosporidium*, except Bowman and Lake Wildwood WTPs. They were classified as Bin 2 and are each required to implement an additional 1-log action.

The water treatment plants implement either conventional or direct filtration to receive reduction credit for *Giardia*, viruses, and *Cryptosporidium* for physical removal. Disinfection with free chlorine provides the remaining credit for *Giardia* and viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and either the Interim Enhanced SWTR (IESWTR) or the Long Term 1 ESWTR.

Watershed Contaminant Sources

There are numerous types of potential contaminating activities in the watershed. Seven activities were selected for evaluation in this report based on constituents of interest and predominance in the watershed. Selected findings for each of these activities are provided below.

Canal Aquatic Herbicide Use

Although there is limited pesticide application in the Yuba/Bear River watershed, it has the potential to be significant in terms of source water quality due to the regulation of most pesticides in drinking water and its proximity of use to the water treatment plants. This evaluation focused on the seasonal algae control programs implemented by PCWA and NID.

Many of the conveyance canals, as well as Rock Creek Reservoir, are owned and operated by Pacific Gas and Electric (PG&E). PG&E does not conduct any chemical treatment of algae or aquatic plants; they use manual methods such as drawdown and pressure washing.

PCWA and NID apply herbicides as needed, typically sometime between April and October, which are based on chemical control using herbicides. During the study period PCWA used Cutrine-Plus and Cutrine-Ultra (copper ethanolamine herbicide), Algimycin-PWF (copper chelated based algaecide/cyanobacteriocide), Phycomycin (sodium carbonate peroxyhydrate algaecide), Round Up Custom (glyphosate herbicide), and Reward (diquat herbicide). During the study period NID used Cutrine–Ultra and Cutrine Plus (copper ethanolamine herbicide), Aquamaster (glyphosate herbicide), Round Up Custom (glyphosate herbicide), Nautique (copper carbonate herbicide), Cascade (dipotassium salt of endothall herbicide), Green Clean Pro (sodium carbonate peroxyhydrate algaecide), Captain (copper ethylenediamine complex chelated copper herbicide), and Phycomycin (sodium carbonate peroxyhydrate algaecide). Both agencies have coverage under a General NPDES Permit from the State Water Resources Control Board (State Board) and are in strict accordance with the permit terms. Each has submitted an Aquatic Pesticide Application Plan (APAP). The agencies are careful not to apply the copper-based chemicals near the water treatment plant intakes and water treated with glyphosate or endothall is not diverted to the intakes.

A review of water quality from the PCWA and NID water treatment plants shows that there have been no detects of organics in the source water. Also, copper levels in the treated water are either non-detectable or well below the action level of 1.3 mg/L.

Livestock Grazing

Livestock in the Yuba/Bear River watershed primarily includes cattle and sheep and is a relatively small livestock population in the watershed, especially rangeland grazing cattle. Cattle are the livestock of more concern because they are a known host for *Cryptosporidium parvum*. Also, there are several areas in close proximity to the water treatment plants where the cattle grazing could be more significant, such as near the Auburn, Lake of the Pines, Lake Wildwood, and Smartville WTPs.

The total livestock population documented by the United States Department of Agriculture for Nevada County, including both rangeland and dairy cows, was just under 4,800 in 2012. This is an approximate 15 percent decrease over the five-year period from 2007 to 2012. There is only one active United States Forest Service (USFS) grazing allotment in the upper watershed. This is the Canyon Creek Allotment. The allotment covers land in the Canyon Creek and Texas/Fall Creek sub basins. The permit currently covers 65 head of cattle grazing during the summer, between July 16 and September 20, and is expected to be increased to 100. The USFS has plans to reopen another allotment in the watershed, the English Mountain allotment upstream of Jackson Meadows Reservoir. In addition, NID manages a grazing lease along the Bear River below Rollins Reservoir, the Luster Lease. Three areas of particular interest are private ownership in the Squirrel Creek watershed, along Magnolia III canal, and along the Ragsdale Random in Meadow Vista.

Rangeland research published during the study strongly supports the effectiveness of best management practices related to vegetated buffers and grazing intensity to reduce the impact on source water quality. The State Board plans to include grazing as part of its Statewide Federal Lands order.

A review of available *Cryptosporidium* data for the water treatment plants indicates that there are relatively low levels throughout the watershed and no consistent relationship on seasonal or geospatial trends. The impacts are expected to be highly localized.

Forest Activities

This study identified timber harvesting and wildfires as activities of significant interest. The USFS and the State Board agree that the most important source of pollution in the forests is the timber harvesting road system.

Timber harvesting can occur on both public and private lands and is regulated separately. Timber harvesting on federal lands is regulated by the USFS and by the California Department of Forestry and Fire Protection (CALFIRE) on state and private lands. There continues to be more timber harvest harvesting on state and private lands, compared with federal lands.

A review of the Nevada County Agricultural Commissioner's annual crop report shows that harvesting operations were quite variable during the study period. This could be explained by the fact that most of the timber harvesting in the Yuba/Bear River watershed is by commercial growers, such as Sierra Pacific Industries, who have plans for rotational harvesting cycles and also implement salvage harvesting after wildfires.

Wildfires cause the loss of ground cover, the chemical transformation of soil, and the reduction in soil infiltration rates which all increase the likelihood of erosion and hydrophobic soils, contributing to increased solids in the receiving water and an increase in the turbidity of the raw water at the water treatment plants. There were only three fires greater than 20 acres in the upper watershed, all in the Bear River sub basin. The most significant was the Lowell Fire in 2015, but no water quality data was available to identify potential impacts.

A specific review of the turbidity and TOC data show that there are distinct seasonal peaks in both constituents during the wet winter months. It is possible that erosion from burned areas is contributing to those peaks.

Both NID and PCWA participate in the Cosumnes, American, Bear, Yuba Regional Integrated Water Master Planning effort. This includes applying for grant funding of a variety of projects, including source water protection efforts to reduce fuels and improve forest health.

Recreation

There is a large amount of recreation that occurs in the Yuba/Bear River watershed. Recreation occurs in each of the sub basins, at varying levels. Recreation includes body and non-body contact activities. Body contact recreation includes swimming, wading, and rafting and is allowed on all major reservoirs and river reaches in all sub basins. Non-body contact recreation includes camping, boating, off-highway vehicle (OHV) use, fishing, hiking, biking and winter activities such as snow play, skiing and snowmobiling.

Camping occurs in both formal campgrounds, nearly 50, and dispersed in the Tahoe National Forest. A review of user statistics for NID and PG&E shows that the annual use of their recreational facilities is also quite large and is likely to have associated impacts.

Some of the key day-use activities that occur in the watershed include hiking, OHV use, boating, fishing, cross-country skiing, and snowmobiling. The USFS completed the Travel Management Program to designate OHV roads and trails. Motorized Vehicle Use Maps have been developed for the forest. The USFS is now completing a similar process to designate roads and trails for over-snow vehicles (OSV) in the Forest.

PG&E allows access to most of its facilities for day-use including parts of the water supply system such as Deer Creek Forebay, Drum Forebay and Afterbay, Alta Forebay, Halsey Forebay and Afterbay, Rock Creek Reservoir, and Wise Forebay. Most of these are limited to on-shore fishing with limited parking available.

Day-use for the lower Bear River and Squirrel Creek does have significant use during the warm weather months of July, August, and September. Access to the Bear River is used at the Highway 174 and Dog Bar Road crossings and in the area of the Bear River Campground, as well as the adjacent landowners. There are sanitation facilities near the Bear River Campground, but not at any other of these areas. Squirrel Creek recreation is centered on the Western Gateway Regional Park in Penn Valley. There are sanitation facilities provided.

Recreation analysis by USFS, NID, and PG&E all indicate that activities will be expanded in the future and each agency is planning to upgrade or expand current recreational facilities.

Studies conducted by the Central Valley Regional Water Quality Control Board (Regional Board) support that there are distinct impacts on Squirrel Creek that may be attributed to by recreationalists. None of the water treatment plants show a peak in coliform levels during the peak recreational use period of June through August.

Source Water Spills

A hazardous material spill or leak into the river system could occur as a result of a vehicular traffic accident, railroad accident, pipeline leak or spill, wastewater treatment plant spill, or other incident. In the event of a leak or spill, timely notification is critical to ensure that the water treatment plant operators are provided with sufficient time and information to best respond to potential treatment concerns.

A review of the California Office of Emergency Services (Cal OES) Hazardous Materials Spill Reports revealed 28 incidents in the watershed. Most were small volume sewage or petroleum spills. In addition, there were two Category I Sanitary Sewer Overflows.

Both PCWA and NID have developed spill notification programs to ensure timely notification in the event that a spill threatens the source water quality for a water treatment plant. Both agencies are provided direct notification from their respective County OES in the event that a canal or receiving water is impacted. Both agencies also coordinate closely with PG&E regarding source water quality. NID receives direct notification from the City of Nevada City in the event of a wastewater spill from the wastewater treatment plant. Also, PCWA now has enhanced coordination with the California Highway Patrol and the California Department of Transportation due to spill event on Interstate 80 in December 2015.

Wastewater

There are three permitted NPDES wastewater treatment plants in the Yuba/Bear Watershed; Donner Summit Public Utilities District, Cascade Shores, and City of Nevada City. These are shown on the Watershed Map, **Figure 2-1**. Each of these facilities has a collection system associated with them that are also located within the watershed. In addition, parts of the City of Grass Valley and Nevada County Sanitation District collection systems are also located in the watershed.

The Donner Summit PUD facility is located in the upper watershed and provides full nitrification and denitrification. The Cascade Shores Wastewater Treatment Plant discharges to Gas Canyon Creek, which is a tributary to Greenhorn Creek and eventually discharges to Rollins Reservoir. The City of Nevada City Wastewater Treatment Plant discharges to Deer Creek, just west of Nevada City. Each of these facilities had minor violations during the study period, but generally discharge in compliance with their NPDES permits.

In addition, although there are numerous land discharge systems and individual on-site septic systems located in the watershed there is only one land discharge facility of interest due to its proximity to Squirrel Creek. This is the Creekside Village Mobile Home Park (MHP). The Creekside Village MHP uses their evaporative percolation ponds located on the north side of Squirrel Creek. The current WDR is outdated and needs to be replaced by a new General Order from the State Board. There is no receiving water monitoring required under the permit from the Regional Board. It is possible that the pond system could be impacting the source water quality of Squirrel Creek. Data for the Smartville WTP show that the peak *E. coli* levels occur in the spring months, when the water table would be at its highest from winter rain recharge.

Urban Runoff

There is limited urbanization of the watershed upstream of the WTPs. Small cities and urban areas are regulated under the Phase II Stormwater Program. Under the Phase II Stormwater Program, Stormwater Management Plans (SWMP) were implemented with specific best management practices (BMPs) to minimize pollution, including implementation of treatment BMPs in new development. Monitoring was not required for any Phase II permittees in the Yuba/Bear River watershed.

There is one NPDES Stormwater Phase I permit; the Statewide California Department of Transportation (Caltrans). There are three Phase II permits; the cities of Grass Valley and Auburn and Placer County/North Auburn. An inventory of the Construction Stormwater Program resulted in identification of 10 sites. An inventory was conducted to identify the Industrial Stormwater Permittees in the watershed, resulting in eight permits. There was limited ambient monitoring data conducted by these programs.

Mining

Mining has occurred in the Yuba/Bear River watershed for over 150 years. The intensity of use has decreased remarkably over that time, so that mining is now a relatively minimal activity. There have been no detections at levels of concern for constituents specific to mining at the WTPs. Mining occurs on both public and private lands for both metallic and non-metallic ores. Currently, there are four active surface mines, which quarry for sand, rock and stone.

A review of the US Bureau of Land Management (USBLM) LR2000 Database was conducted to identify mining patents and mining claims. There are no authorized mineral patents in the watershed, however there are several pending applications for gold (but there has been no activity on these in over 20 years). There are no active or pending mining claims either in the watershed counties. One gold claim was patented in Nevada County in 1992, but it was not authorized to mine. There is one approved millsite, the Hansen Bros. surface mine in Nevada County. The Lava Cap Mine is an active Superfund Site where management continues. The mine has been capped and discharge will be treated by 2019.

Cannabis Cultivation

Outdoor cannabis cultivation has grown exponentially in the watershed during the study period. Only personal medical cultivation is legal on private property, however there are significant illegal grow operations throughout the watershed. Outdoor cultivation has the potential to impact source water quality since the grow sites typically result in erosion, use of fertilizers and pesticides, and collection of trash. The outdoor cultivation period is typically April through October.

Cannabis cultivation is regulated differently in the three watershed counties, but all three ban commercial grow activities. The counties and cities are in the midst of developing ordinances and regulations and appear to be moving toward more restrictive cultivation requirements.

RECOMMENDATIONS

Table ES-1 presents the recommendations developed for this 2017 Update, listed by subject area and not by priority. Development of recommendations for watershed management actions that are economically feasible and within the authority of the participating water agencies is critical. Recommendations will be implemented by the participating water agencies as they have resources available.

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TABLE ES-1
2017 Update Recommendations

Water Quality and Treatment

Recommendation	Agency Impacted	Basis for Recommendation
Continue to optimize treatment during times of potentially reduced source water quality – i.e. adjust coagulant dose, optimize polymers, reduce flow if possible to increase hydraulic detention times and reduce filtration loading rates, ensure optimized disinfection practices and contact time (CT).	PCWA and NID	Based on historical treatment challenges posed by source water quality, optimization is most likely to be important during storm events or during other high turbidity periods.
Continue to optimize disinfection treatment during higher temperature periods to minimize DBP formation. Consider effects of water age on DBP formation. Consider assessing distribution system management practices which may affect detention time and optimize to prevent formation of DBPs. This could include; installation of tank mixers, increased flushing at dead ends, correlating water production more closely during transitional demand periods (i.e. fall), and optimize storage volume in the tanks seasonally.	PCWA and NID	DBP levels in the distribution system have the potential to increase to levels of regulatory concern so preventing further development is critical. Disinfection optimization during times of high temperature source water is important. Minimizing water age at all times is another important strategy to keep DBP levels low.
Request laboratories notify agency when source water *E. coli* in plant influent result is greater than 200 MPN/100mL. Evaluate the need to resample next day and documentation of potential causes of high result (if any evident).	PCWA and NID	The microbial data collected through the study period supports 3/4-log reduction of *Giardia* and viruses at all the WTPs, except Smartville. However, there were some unusual data results which should be assessed if they are repeated. These response procedures could enhance understanding of the source water quality.

TABLE ES-1 Cont'd
2017 Update Recommendations

Recommendation	Agency Impacted	Basis for Recommendation
Continue to meet enhanced treated water turbidity limits to achieve 1-log action credit at the Bowman and Lake Wildwood WTPs in accordance with Round 1 bin classifications of the LT2ESWTR.	PCWA and NID	This regulatory requirement is met by superior treated water quality turbidity.
Conduct and complete Round 2 of LT2ESWTR source water monitoring and update bin classifications and treatment requirements based on results.	PCWA and NID	This regulatory requirement will provide key information on source water quality related to protozoa. Use of EPA Method 1623 will provide quantification of *Giardia* as well. This information will verify the appropriate level of treatment currently based on surrogate data. Detailed lab results will assist in interpreting the data.
Confirm levels and investigate potential sources of *E. coli* at Sunset WTP.	PCWA	During the study period there was an increased frequency of *E. coli* seen at the influent of the Sunset WTP, during various times of the year. PCWA expanded its monitoring in December 2016 to confirm levels and identify areas of potential contaminant sources.
Continue canal protections for Magnolia III canal to Robles Drive to protect source water quality.	NID	The voluntary encasement of a portion of the Magnolia III canal resulted in reduced peaks and frequency of high coliform results and continuation of encasement is expected to result in more protection of source water quality at the Lake of the Pines WTP.
Continue canal protections upstream of Smartville WTP to protect source water quality.	NID	The voluntary encasement of the Cascade and Magnolia III canals shows improvement in source water quality at the downstream water treatment plants. Canal protections upstream of Smartville WTP are likely to result in source water quality improvement.

TABLE ES-1 Cont'd
2017 Update Recommendations

Watershed Contaminant Sources

Recommendation	Agency Impacted	Basis for Recommendation
Consider conducting an assessment of algae conditions at Rock Creek Reservoir to evaluate potential impacts on source water quality (i.e. organic carbon, coliform, blue-green algae presence).	PCWA and NID	During the study period there were increased occurrence of algae associated water quality impacts at North Auburn, Foothill, and Sunset WTPs. Increased presence, and future drinking water regulation, of blue-green algae in Northern California leads to potential concern for the reservoir.
Consider enhancing coordination and communication with PG&E to include results of algae assessment results and investigate the need for an algae assessment and management plan at Rock Creek Reservoir.	PCWA and NID	PG&E does not implement a comprehensive algae management plan for Rock Creek Reservoir. If assessments identify impacts to drinking water quality, consider working with PG&E to minimize risks to public health.
Continue to use the Cosumnes, American, Bear, and Yuba Rivers Integrated Regional Water Management Plan as a vehicle for grant funding of projects related to water quality. Consider submitting application for grant funding of source water protection projects such as public education along the canals, pet waste management stations along the canals, and canal fencing through vulnerable areas.	PCWA and NID	The impact of local activities is apparent in the source water quality. Implementing source water protection projects along the canals in close proximity to the water treatment plants will be more likely to impact source water quality.
Consider submitting a letter to watershed counties and USFS to identify source water quality impact concern over outdoor cannabis cultivation (i.e. clear cutting, grading, fertilizer and pesticide use, illegal dumping).	PCWA and NID	Outdoor cannabis cultivation, both personal and commercial, often results in conditions that may deteriorate source water quality. As counties are developing regulations related to cultivation it would be timely to provide input on the potential concerns related to drinking water impacts.

TABLE ES-1 Cont'd
2017 Update Recommendations

Recommendation	Agency Impacted	Basis for Recommendation
Consider outreach to the Regional Board to encourage update of the Waste Discharge Requirements for the Creekside Mobile Home Park Waste Ponds to prevent water quality impacts to Squirrel Creek, upstream of the Smartville WTP. Also, consider coordinating with the Regional Board to confirm the use of Squirrel Creek as existing conveyance for MUN supply and applicable beneficial use protections.	NID	Sampling by NID and other ambient programs has confirmed that there is degradation in the microbial quality of the source water for the Smartville WTP through the Penn Valley area. There are numerous sources that are potentially contributing (grazing, recreation, wastewater) so assessment and protection strategies would need to be multi-pronged. Coordination with Regional Board will ensure that they are protecting the source water.
Consider annual outreach to City of Grass Valley and Nevada County Sanitation District regarding notification of significant sanitary sewer overflows to the water supply system (Deer Creek, Squirrel Creek).	NID	Early notification in the event of a sewage or other hazardous material spill will ensure protection of public health. Some agencies may not be aware of which water conveyances are used for drinking water supply.

This report presents the findings of the 2017 Update to the Yuba/Bear River Watershed Sanitary Survey (2017 Update). This study covers the period January 2011 through December 2015. The initial watershed sanitary survey was completed in 1996 (1996 Survey), the first update was completed in 2002 (2002 Update), the second update was completed in 2007 (Second Update), and the third update was completed in 2012 (2012 Update) in accordance with the California Surface Water Treatment Rule (SWTR).

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

PARTICIPATING WATER AGENCIES

Placer County Water Agency (PCWA) and Nevada Irrigation District (NID) jointly conducted the 1996 Survey, the 2002 Update, the Second Update, and the 2012 Update. This 2017 Update has been conducted by these agencies as well. Together these two are herein referred to as the participating water agencies.

2017 UPDATE OBJECTIVES

The overall objective of this 2017 Update is to assess the source water quality of the Yuba/Bear River to ensure the ability of the existing water treatment plants for the participating water agencies to continue to provide their customers with drinking water that meets all drinking water standards.

A watershed sanitary survey focuses on the first barrier to contamination of the drinking water supply; source water protection. Evaluating source water quality and watershed contaminant sources provides key information to aid in understanding how to maintain and possibly improve the first barrier. In order to fully assess the ability of the participating water agencies to treat the Yuba/Bear River source water, some evaluation of treatment plant capabilities and treated water quality is also necessary. Therefore certain aspects of the second barrier (water treatment) are also evaluated in relationship to water quality.

This 2017 Update is intended to accomplish the following objectives:

- Fulfillment of the California SWTR and the Interim Enhanced Surface Water Treatment Rule (IESWTR) requirements that surface water agencies conduct a sanitary survey of the source watershed once every five years. Any significant changes within the last five years that affect source water quality are to be identified in each update. In addition, it is required to comment on the appropriate level of treatment for pathogens, specifically for *Giardia*, viruses, and *Cryptosporidium*.

- Review and evaluate selected constituents of interest to identify potential water quality or treatment issues at each water treatment plant. Assess the ability of the water treatment plants to meet standards based on current and future regulatory framework. Develop recommendations for treatment plant actions to address water quality or treatment issues and/or address planning needs to meet expected future regulations.

- Review and evaluate selected potential contaminating activities to identify impacts on source water quality. Determine whether it may be useful to conduct additional monitoring to further assess contaminant levels in the source water or contaminants from a particular watershed source.

- Identify appropriate watershed management actions to protect and possibly improve source water quality. Develop recommendations for watershed management actions that are economically feasible and within the authority of the participating water agencies to implement. Of importance is to target contaminant activities that are most likely to affect source water quality, such as activities located near the water treatment plants or activities that are predominant in the watershed.

CONSTITUENTS AND TOPICS COVERED IN THE 2017 UPDATE

Several water quality constituents were selected for evaluation as part of the 2017 Update. **Table 1-1** presents a summary of the water quality constituents selected and the reason for selection.

Nine potential contaminating activities were selected for review as part of the 2017 Update:

- Canal aquatic herbicide use,
- Livestock grazing,
- Forest activities, including timber harvesting and wildfires,
- Recreation,
- Source water spills,
- Wastewater,
- Urban runoff,
- Mining, including both active and historic, and
- Cannabis cultivation.

Each of these activities can contribute at least one of the constituents identified in **Table 1-1** to the source water.

Table 1-1
Water Quality Constituents Selected for Evaluation as Part of the 2017 Update

Constituent	Reason for Inclusion in 2017 Update
Turbidity	Turbidity is a measurement of suspended solids in water. Treated water turbidity levels are regulated in the SWTR and the IESWTR.
Escherichia coli (*E. coli*)	USEPA believes that source water *E. coli* may be the best surrogate to determine treatment requirements in lieu of actual pathogen and virus data.
Giardia	*Giardia lamblia* is infectious to humans. Source water levels of *Giardia* are used to determine treatment requirements under the SWTR.
Cryptosporidium	*Cryptosporidium parvum* is infectious to humans. Source water levels of *Cryptosporidium* are used to determine treatment requirements under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).
Total Organic Carbon	Total organic carbon (TOC) is a surrogate measure of disinfection by-products (DBP) precursor material in water. TOC levels in either source or treated water are used to determine treatment requirements under the Stage 1 Disinfectant/Disinfection By-Product Rule (D/DBPR).
Temperature	Temperature is a water characteristic that affects the source water quality, treatability, and treated water quality of drinking water. The study period included a significant drought that impacted source water temperature so evaluation was conducted to see if impacts were related on DBP formation.
Total Trihalomethanes	Total trihalomethanes (TTHMs) are disinfection by-products formed in treated water. Treated water levels are regulated under the Stage 1 D/DBPR and the Stage 2 D/DBPR.
Haloacetic Acids	Haloacetic acids (HAA5) are disinfection by-products formed in treated water. Treated water levels are regulated under the Stage 1 D/DBPR and the Stage 2 D/DBPR.

DESCRIPTION OF HOW THE 2017 UPDATE WAS CONDUCTED

The project team consisted of a Technical Committee (TC) comprised of representatives from both participating water agencies and the consultant team of Starr Consulting and Palencia Consulting Engineers. The TC reviewed data evaluation and identification and development of key findings and recommendations.

The consultant team obtained information from all water treatment plants through an agency survey that addressed each treatment plant's processes, including a discussion of treatment challenges and changes since the 2012 Update. The participating water agencies provided raw and treated water data as well as information on their actions relevant to recommendations from the 2012 Update.

The consultant team collected information on contaminant sources in the watershed through literature reviews, Internet searches, and discussions with various agencies' staff. A list of references is provided in **Appendix A**.

REPORT ORGANIZATION

Section 1 - Introduction

This section identifies the participating water agencies that funded the study, describes the objectives of the 2017 Update, lists the main topics and constituents covered in the 2017 Update, describes how the 2017 Update was conducted, and includes a description of the basic report organization.

Section 2 - The Watershed and Water Supply Systems

This section is largely descriptive and provides (1) a brief overview of the physical, hydrologic, and land use characteristics of the watershed, and (2) a description of each of the existing water supply systems. There have been very few significant changes in the watershed and water supply systems; therefore the reader is referred to the 1996 Survey and the 2002 Update for more detailed descriptive information on watershed characteristics.

Section 3 – Yuba/Bear River Water Quality Review

This section contains two parts. The first part provides an overall review of the available source, or raw, water quality data in the watershed, including third party ambient monitoring programs. The second part provides a review of the constituents of interest, including an explanation for their selection and a summary of the data obtained for the period of study, for each constituent. **Appendix B** contains summaries of the water treatment plants' data used for this review. **Appendix C** provides the regulatory framework used for the compliance evaluations.

Section 4 - Watershed Contaminant Sources Review

This section describes pertinent characteristics of each of the nine potential contaminating activities that were reviewed as part of this study.

Section 5 - Individual Intake Evaluations

This section contains an evaluation of all of the water treatment plant's treated water quality, as well as an evaluation of each water treatment plant's ability to meet the SWTRs and other existing regulations. **Appendix B** contains summaries of the water treatment plants' data used for this review. **Appendix C** provides the regulatory framework used for the compliance evaluations.

Section 6 - Findings and Recommendations

This section consists of key findings and a list of recommendations. Significant changes since the 2012 Update are summarized at the beginning of this section.

This section provides an overview description of the watershed, which summarizes physical, hydrologic, and land use characteristics. Major watershed characteristics have changed little since the original 1996 Survey. For a more detailed account of this information, the reader is referred to the 1996 Survey and the 2002 Update. This section provides a description of the overall watershed including the ten sub basins, the canal water supply systems, and water treatment facilities, including a summary of significant changes since the 2012 Update. This work does not include evaluation of distribution system physical facilities.

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

THE WATERSHED

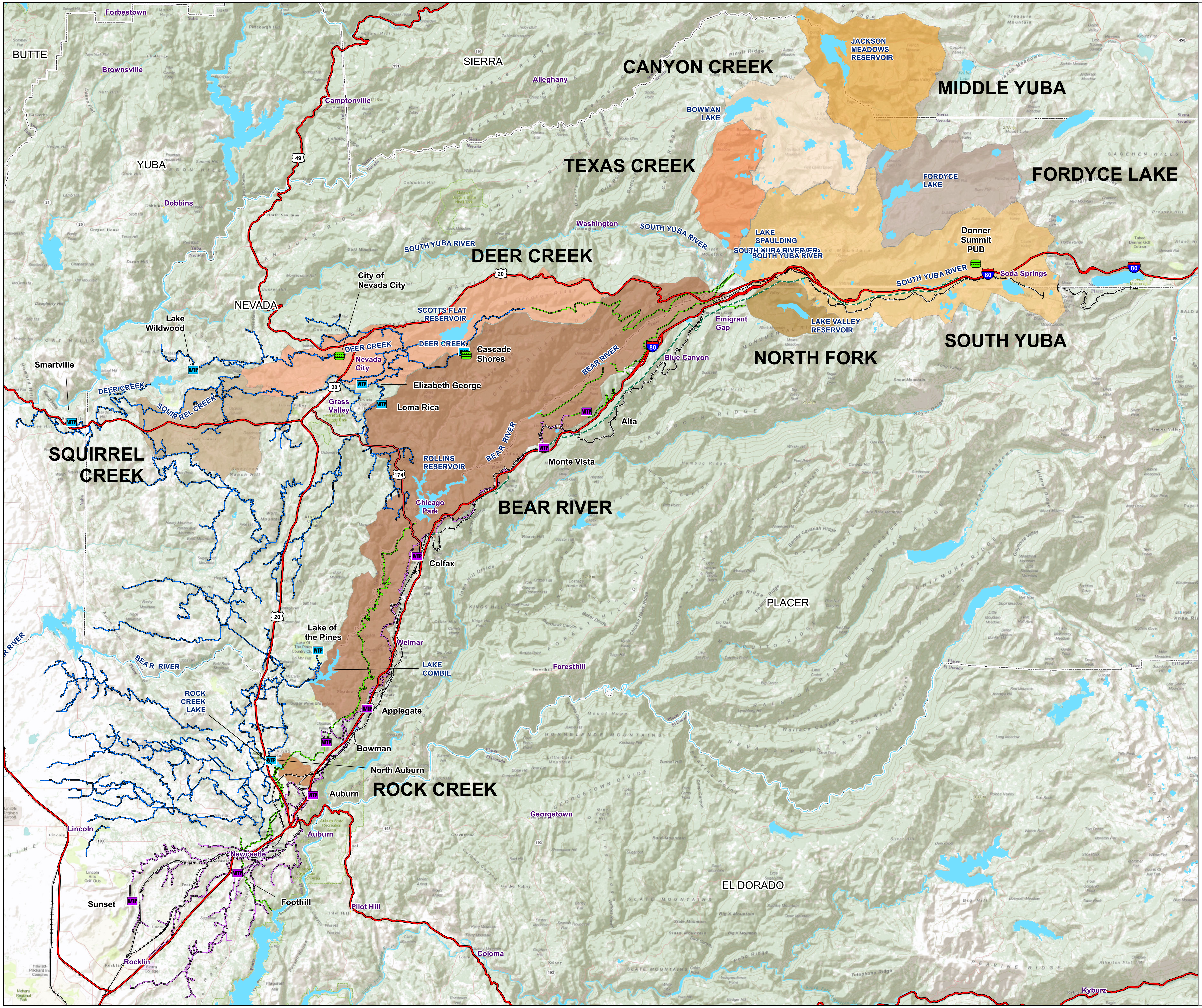
Placer County Water Agency (PCWA) and Nevada Irrigation District (NID) both utilize water from the Yuba and Bear Rivers. The watersheds are located on the western slope of the Sierra Nevada in Sierra, Nevada and Placer counties. The watershed map is provided as **Figure 2-1**. There have been minimal changes since the 2012 Update. Water is collected and transported in a variety of creeks, rivers, reservoirs, canals, and pipes. The water is eventually distributed to the fifteen water treatment plants for the participating water agencies.

The watershed includes several large lakes (Jackson Meadows, Bowman, Meadow, Fordyce, Spaulding, Lake Valley, Scotts Flat, Rollins, Combie), numerous small lakes (Milton, French, Jackson, Faucherie, Sawmill, Rucker, Feeley, Carr, Culbertson), and several key creeks and rivers (Fordyce, Middle and South Yuba, Deer, Bear, Squirrel). In addition to drinking water supply, these are used for other purposes including agricultural supply, power generation, and recreation. It should be noted that the canals that transport water below the watershed sub basins are mostly open ditches which have the potential to capture a small amount of local runoff and these contributions have not been included in this evaluation.

Provided below is a brief description of each of the ten sub basins in the watershed.

Middle Yuba River above Milton Reservoir

The Middle Yuba River above Milton Reservoir has a watershed that is 39.3 square miles, or just over 25,000 acres, with elevations ranging from 5,700 to 8,200 feet and is largely covered by mixed coniferous forest. It is located in Sierra and Nevada counties. The sub basin ownership is approximately 50 percent Tahoe National Forest and 50 percent private. The principal uses in the sub basin are timber harvesting and year-round recreation. The principal water bodies are Jackson Meadows Reservoir (fed by Middle Yuba River and Pass Creek) and Milton Reservoir.



Legend

- PCWA WTP (source: PCWA's GE001r3.DWG)
- NID WTP (source: Carmen Holman, 8/31/2006)
- WWTP Discharge Point (source: Regional Board)

WATERSHED

- BEAR RIVER
- CANYON CREEK
- DEER CREEK
- FORDYCE LAKE
- MIDDLE YUBA
- NORTH FORK
- ROCK CREEK
- SOUTH YUBA
- SQUIRREL CREEK
- TEXAS CREEK

- NID Canal (source: Carmen Holman, 8/31/2006)
- PG&E Canal (sources: GE001r3.DWG and GE032.DWG)
- PCWA Canal (source: PCWA's GE032.DWG)
- Highway
- Railroad (source: GE001r3.DWG)
- Approximate alignment of Morgan Kinder Petroleum Pipeline (source: route map Roseville to Reno, Southern Pacific Pipe Lines, Los Angeles, CA; 4/28/86, R-11-1)

2.5 1.25 0 2.5 Miles

Revision Date: 2/7/2012

NID and PCWA
YUBA/BEAR RIVER WATERSHED MAP
2017 UPDATE

Watershed Boundary
Figure 2-1

Canyon Creek and Jackson Creek above Bowman Reservoir

The watershed above Bowman Reservoir is 30.4 square miles, or nearly 20,000 acres, with elevations ranging from 5,564 to 8,400 feet. It is largely covered by mixed coniferous forest. It is located in Nevada County. The sub basin ownership is approximately 60 percent Tahoe National Forest and 40 percent private. The principal uses in the sub basin are timber harvesting, seasonal recreation (spring to fall), and grazing. Bowman Reservoir is fed by Jackson Lake, via Jackson Creek, and French, Faucherie, and Sawmill lakes, via Canyon Creek.

Texas/Fall Creek System

Texas and Fall creeks have a watershed that is 17.2 square miles, or almost 11,000 acres, with elevations ranging from 5,400 to 7,700 feet and is largely covered by mixed coniferous forest. It is located in Nevada County. The sub basin ownership is approximately 50 percent Tahoe National Forest and 50 percent private. The principal uses in the sub basin are timber harvesting and year-round recreation. Water is stored in numerous small lakes, including; Upper Rock, Lower Rock, Culbertson, Upper Lindsey, Middle Lindsey, Lower Lindsey, Upper Feely, Lower Feely, Blue, Rucker, and Fuller. Water is then released to Rucker, Fall, Clear and Texas creeks where it is re-regulated into the Bowman-Spaulding Canal.

Fordyce Creek above Spaulding Reservoir

The Fordyce Creek watershed is 30.5 square miles, or nearly 20,000 acres, with elevations ranging from 6,400 to 9,000 feet and is largely covered by mixed coniferous forest. It is located in Nevada County. The sub basin ownership is approximately 50 percent Tahoe National Forest and 50 percent private. The principal uses in the sub basin are timber harvesting and year-round recreation. The principal reservoirs in the sub basin are Meadow and Fordyce, which release flows to Fordyce Creek and thence to Spaulding Reservoir.

South Yuba River above Spaulding Reservoir

The South Yuba River watershed is 86 square miles, just over 55,000 acres, with elevations ranging from 5,000 to 9,000 feet and is largely covered by mixed coniferous forest. It is located in Nevada and Placer counties. The sub basin ownership is approximately 35 percent Tahoe National Forest and 65 percent private. The principal uses in the sub basin are timber harvesting and year-round recreation, as well as some grazing. Interstate 80, the Union Pacific Rail Road, and the Kinder Morgan Petroleum Pipeline parallel the South Yuba River. The principal water bodies include Lake Van Norden and Kidd Lake, as well as the South Yuba River which flows to Spaulding Reservoir.

North Fork of the North Fork of the American River above Lake Valley Reservoir

The Lake Valley Reservoir watershed is 9.1 square miles, or nearly 6,000 acres, with elevations ranging from 5,475 to 6,824 feet and is largely covered by mixed coniferous forest. It is located in Placer and Nevada counties. The sub basin ownership is approximately 70 percent Tahoe National Forest and 30 percent private. The principal uses in the sub basin are timber harvesting and year-round recreation. Lake Valley Reservoir and Lake Valley Canal are the principal water bodies in the sub basin.

Bear River above Combie Reservoir

The watershed for the Bear River above Combie Reservoir is 134.9 square miles, over 86,000 acres, with elevations ranging from 1,600 to 5,200 feet and is largely covered with evergreen and mixed forest. It is located in Nevada and Placer counties. The sub basin ownership is approximately 20 percent Tahoe National Forest and 80 percent private. This sub basin contains nearly 20 rural community areas, such as; Alta, Dutch Flat, Peardale, Chicago Park, Colfax, Weimar, and Meadow Vista. The other principal uses in the watershed include timber harvesting, seasonal recreation (primarily Memorial to Labor days), and agriculture. Interstate 80, the Union Pacific Rail Road, and the Kinder Morgan Petroleum Pipeline travel along the southern boundary of the watershed. The principal water bodies are Rollins Reservoir, which is fed by imported water, the Bear River, and Greenhorn and Steephollow creeks, and Combie Reservoir, fed by the Bear River.

Deer Creek above the Tunnel Canal Diversion

The watershed for Deer Creek above the Tunnel Canal Diversion is 44.7 square miles, or almost 29,000 acres, with elevations ranging from 1,900 to 5,000 feet and is largely covered with evergreen and mixed forest. It is located in Nevada County. The sub basin ownership is approximately 25 percent Tahoe National Forest and 75 percent private. This sub basin contains portions of both Nevada City and Grass Valley, as well as several other rural community areas. Other uses in the watershed include timber harvesting and recreation. Highway 20 travels along the northern boundary of the watershed. The principal water body is Scotts Flat Reservoir, which Deer Creek flows through.

Squirrel Creek above China Union Canal Diversion

Water from Deer Creek is diverted through the Tunnel Canal into Squirrel Creek near Rough and Ready. The water is conveyed via Squirrel Creek to the China Union Canal below Lake Wildwood. The watershed for Squirrel Creek above China Union Canal is 26 square miles, or almost 17,000 acres, with elevations ranging from 1,070 to 2,570 feet. The sub basin is located in Nevada County and is largely privately owned. The sub basin contains portions of Grass Valley, Rough and Ready, and Penn Valley. The landscape is still primarily oak-studded grasslands. Other uses in the watershed include recreation, grazing, and farming. The principal contributing water bodies are Tunnel Canal and Squirrel, Grub, and Clear creeks.

Rock Creek Reservoir

The local watershed for Rock Creek Reservoir is 2.3 square miles, nearly 1,500 acres, with elevations ranging from 1,440 to 1,692 feet. The sub basin ownership is totally private and wholly located within Placer County. The sub basin contains a portion of North Auburn. The watershed includes native oak-studded grasslands, but has significant urban development and associated landscaping. The principal contributing water bodies are Wise Canal, Rock Creek, and local drainage.

THE WATER SUPPLY SYSTEMS

In the upper watershed above Spaulding Reservoir, water is collected from the Middle Fork of the Yuba River at Milton Reservoir and then conveyed down to Bowman Reservoir in the Milton-Bowman Tunnel. Bowman Reservoir also receives water from Canyon and Jackson creeks, water is then diverted and conveyed to Spaulding Reservoir in the Bowman-Spaulding Conduit. Along the way, water from Texas and Fall creeks is also collected. Spaulding Reservoir also receives water from Fordyce Creek and the South Yuba River. Below Spaulding Reservoir water is also received from Lake Valley Reservoir via the Lake Valley Canal.

The water from Spaulding Reservoir and Lake Valley Reservoir is channeled into the South Yuba Canal for NID's water treatment plants and into the Drum Canal for PCWA and NID's water treatment plants. Provided below is a description of the typical water supply systems for the participating water agencies below Spaulding Reservoir. These have been organized into five groups of similar water supply. It should be noted that these are typical operations and that most water treatment plants have alternative supplies that can be used during emergencies or outages.

Banner Cascade Pipeline System

The South Yuba Canal feeds Deer Creek 300 feet above the Cascade Canal diversion, which then provides water supply to the Cascade Shores Water Treatment Plant (WTP), Elizabeth George WTP, and Loma Rica WTP. All of these WTPs are owned and operated by NID. During the study period the Banner Cascade Pipeline was completed to replace the Cascade Canal as the main conveyance from the Deer Creek diversion to the Loma Rica Reservoir to protect source water quality. All of the downstream WTPs have the ability to take water directly from this pipeline now.

Deer Creek System

Deer Creek then passes through Scotts Flat Reservoir and Nevada City. Water is diverted from Deer Creek into the Newtown Canal (upstream of the Nevada City Wastewater Treatment Plant) to feed the Lake Wildwood WTP. Further downstream, water is diverted from Deer Creek into the Tunnel Canal down to Squirrel Creek, then to China Union Canal. This then feeds the Meade Canal to the Smartville WTP. Water can be sent to the Union

Reservoir for later use via the Union Canal. Both of these WTPs are owned and operated by NID.

Upper Boardman Canal System

The Drum Canal feeds the Drum Forebay which then spills into Canyon Creek and into the Towle Canal, which then feeds the Alta Forebay. The Alta WTP uses the Alta Forebay for water supply. The Alta Forebay also feeds Cedar Creek Canal, which is the water supply for the Monte Vista WTP. The Cedar Creek Canal later feeds the Boardman Canal. The Boardman Canal is the water supply for the Colfax and Applegate WTPs. All of these WTPs are owned and operated by PCWA.

Bear River Canal and Lower Boardman Canal Systems

Water is diverted from Rollins Lake on the Bear River into the Bear River Canal. Water from the Bear River Canal is used three ways; diverted into the Lower Boardman Canal via the Ragsdale Random just below Lake Theodore in Applegate, diverted upstream of the Halsey Forebay to the Bowman Canal to feed the Bowman WTP, and sent to the Halsey Forebay.

The Lower Boardman Canal is used to feed the Auburn WTP. From the Halsey Forebay the Wise Canal transports water into Rock Creek Reservoir. The North Auburn WTP is fed directly from Rock Creek Reservoir. The Wise Canal leaves the Rock Creek Reservoir, passes through the Wise Forebay, and into the South Canal. The South Canal is the water supply for the Foothill WTP (which can also get water from the Lower Boardman Canal and the American River Pump Station). The South Canal also feeds the Dutch Ravine Canal, which feeds the Caperton Canal, which feeds Whitney Reservoir, the water supply for Sunset WTP. The North Auburn WTP is owned and operated by NID, while the other WTPs are owned and operated by PCWA.

Bear River System

Water released from Rollins Lake into the Bear River then enters Combie Lake. Water is diverted from Combie Lake into the Magnolia III Canal to supply the Lake of the Pines WTP. Lake of the Pines WTP is owned and operated by NID. During the study period the Magnolia III Canal has been partially enclosed in a pipeline to protect source water quality.

THE WATER TREATMENT FACILITIES

Placer County Water Agency

PCWA owns and operates eight WTPs that utilize Yuba/Bear River water supply. These are presented below. Two of the WTPs, Bowman and Foothill, have two parallel treatment trains with different processes. The Alta, Monte Vista, Colfax, and Applegate WTPs provide water to individual distribution systems, which are separate public water systems. The Bowman and Auburn WTPs both feed water into the Auburn/Bowman distribution system, which is one combined public water system. The Foothill and Sunset WTP both feed water into the Foothill distribution system, which is one combined public water system.

Alta Water Treatment Plant

The Alta WTP is located along Interstate 80 in Placer County about 30 miles northeast of Auburn. Alta has been classified as a direct filtration plant by the California Division of Drinking Water (DDW), and consists of pre-chlorination, adsorption clarification, pressure filtration, and post chlorination. The plant design flow is 360 gallons per minute (gpm), with average flows at 217 gpm. During the study period facility improvements were made to prevent off-site discharges, improve disinfection contact time (CT) monitoring, replace/upgrade instrumentation, replace filters, and upgrade filter air scour.

Monte Vista Water Treatment Plant

The Monte Vista WTP is located off the Cedar Creek Canal approximately 2.4 miles downstream from Lake Alta. Monte Vista has been classified as a direct filtration plant by DDW, and consists of pre-chlorination, adsorption clarification, pressure filtration, and post chlorination. The plant design flow is 86 gpm, with average flows at 35 to 40 gpm. During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring.

Colfax Water Treatment Plant

The Colfax WTP is located in Colfax off the Boardman Canal approximately 14.2 miles downstream from Lake Alta. Colfax is a conventional water treatment plant, and consists of pre-chlorination, coagulation/flocculation, sedimentation, pressure filtration, and post-chlorination. The plant design flow is 1.58 million gallons per day (mgd), with average flows at 0.57 mgd. During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring.

Applegate Water Treatment Plant

The Applegate WTP is located in Applegate off the Boardman Canal downstream of Pine Crest Road. Applegate is a microfiltration membrane plant, with no pretreatment and only post-chlorination. The plant design flow is 87 gpm, with average flows at 7 gpm. During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring.

Bowman Water Treatment Plant

The Bowman WTP is located along Interstate 80 on the east side of Auburn, off the Bowman Canal. Water is diverted from the Bear River Canal into an inverted siphon to Bowman Canal and passes through a PG&E staging area, above Halsey Forebay. The Bowman WTP has two separate treatment trains. The Bowman WTP is a conventional water treatment plant, consisting of pre-chlorination, coagulation/flocculation, sedimentation, gravity filtration, and post-chlorination. The plant design flow is 5.0 mgd, with average flows at 3.6 mgd. The Bowman Package WTP has been designated as a conventional filtration plant by DDW, and consists of a CPC Microfloc package unit (adsorption clarification and gravity filtration) followed by post-chlorination. The plant design flow is 2.0 mgd and the average flow is 2.0 mgd. The Bowman Package WTP typically operates from April through October. During the study period a new backwash sludge processing system was installed and the disinfectant was converted from chlorine gas to sodium hypochlorite.

Auburn Water Treatment Plant

The Auburn WTP is located along Interstate 80 in Auburn, off the Bear River Canal whose source of supply is Rollins Lake. During PG&E outage, the plant receives water from the Upper Boardman Canal. The Auburn WTP consists of pre-screening, pre-chlorination, Actiflo pretreatment, gravity filtration, post-chlorination, and a centrifuge for sludge thickening. The plant design flow is 8.0 mgd, with average flows at 2.16 mgd. The plant typically operates from April through October. There were no changes in the facility during the study period.

Foothill 1 Water Treatment Plant

The raw water intake location for the Foothill 1 WTP is located off PG&E's South Canal. The plant can also be fed from the Lower Boardman Canal at station 903+00, or off the American River during South Canal maintenance. Foothill 1 WTP is a ballasted clarification water treatment plant. The plant design flow is 40 mgd, with average flows at about 25.9 mgd. The plant includes trash rack, grit removal, fine screening, Actiflo pretreatment, high rate filtration, post-chlorination, and a solids management system. During the study period there was a third screening unit installed at the grit structure to improve solids and algae removal, the disinfectant was converted from chlorine gas to sodium hypochlorite, and instrumentation was replaced/upgraded to prevent off-site discharges and improve CT monitoring.

Foothill 2 Water Treatment Plant

The Foothill 2 WTP is located in Newcastle off PG&E's South Canal. The plant can also be fed from the Lower Boardman Canal at station 903+00, or off the American River during South Canal maintenance. Foothill 2 is a conventional water treatment plant, consisting of pre-chlorination, coagulation/flocculation, sedimentation, gravity filtration, and post-chlorination. It is also permitted to run in direct filtration mode. The plant design flow is 15.0 mgd as a conventional filtration plant and 18.26 mgd as a direct filtration plant, with average flows at 15.1 mgd. During the study period there was a third screening unit installed at the grit structure to improve solids and algae removal, the disinfectant was converted from chlorine gas to sodium hypochlorite, instrumentation was replaced/upgraded to prevent off-site discharges and improve CT monitoring, and the filter underdrain and media was replaced.

Sunset Water Treatment Plant

The Sunset WTP is located in Rocklin and takes water from the Whitney Reservoir. The source of supply is the Caperton Canal. Sunset is a conventional water treatment plant, consisting of pre-chlorination, coagulation/flocculation, sedimentation, gravity filtration, and post-chlorination. The plant design flow is 8.0 mgd, with average flows at 4.32 mgd. During the study period all the filter media was replaced and the filter air scour system was replaced.

Nevada Irrigation District

NID owns and operates seven WTPs that utilize Yuba/Bear River water supply. These are presented below. Each provides water to a distinct distribution system and is a separate public water system.

Cascade Shores Water Treatment Plant

The Cascade Shores WTP is located adjacent to Scotts Flat Reservoir and uses water diverted off of Deer Creek. The source of supply is the Banner Cascade Pipeline. Cascade Shores WTP is a direct filtration water treatment plant, utilizing pre-chlorination, coagulation/flocculation, pressure filtration, and post-chlorination. The primary disinfectant is sodium hypochlorite. The plant design flow is 0.34 mgd, with average flows at 0.11 mgd. During the study period a new System Control and Data Acquisition (SCADA) system was installed at the WTP.

Elizabeth George Water Treatment Plant

The Elizabeth George WTP is located in Nevada City, 2,000 feet east of Banner Reservoir. The source of supply includes the Banner Cascade Pipeline or the Loma Rica Reservoir. The Elizabeth George WTP is a conventional filtration plant and has a capacity of 18 mgd, with an average flow of 4 mgd. The facility includes pre-chlorination, sedimentation basins, dual media gravity filters, a filter backwash wastewater handling system, post-chlorination, and upgraded solids handling. The primary disinfectant is sodium hypochlorite. During the study period no changes were made to the WTP, but new treated water storage tanks were added to the distribution system and upgrades were made to existing storage tanks. As mentioned previously, NID completed the Banner Cascade Pipeline that now provides the source water supply to the WTP.

Loma Rica Water Treatment Plant

The Loma Rica WTP is located in Grass Valley and diverts water from Loma Rica Reservoir, which is the terminus of the Cascade Pipeline and Canal, at mile marker 19.01. Loma Rica WTP is a conventional water treatment plant, consisting of pre-chlorination, coagulation/flocculation, sedimentation, pressure filtration, and post-chlorination. The plant design flow is 8.3 mgd, with average flows at 3 mgd. During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite. As mentioned previously, NID completed the Banner Cascade Pipeline that now provides the majority of source water supply to the WTP.

Lake of the Pines Water Treatment Plant

The Lake of the Pines WTP is located south of Grass Valley on the Magnolia III Canal. The source of supply is pumped from Lake Combie. Lake of the Pines WTP is a conventional water treatment plant, consisting of pre-chlorination, upflow clarification, gravity filtration, and post-chlorination. The plant design flow is 5 mgd, with average flows at 1.3 mgd. During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite. As mentioned previously, NID enclosed a portion of the Magnolia III Canal that provides the source water supply to the WTP.

Due to the addition of a new subdivision, two new storage tanks of 1 million gallons and 0.4 million gallons were installed in 2005. Demand has still not kept pace and there is limited usage. The hydraulics have not functioned as planned so the Darkhorse tank remains empty during the winter months and the Serene Hill tank is only filled to half capacity year-round to minimize water age in the tanks.

Lake Wildwood Water Treatment Plant

The Lake Wildwood WTP is located in Penn Valley on the Newtown Canal, whose source of supply is Deer Creek. Lake Wildwood WTP is a conventional water treatment plant, consisting of pre-chlorination, coagulation, upflow clarification, gravity filtration, and post-chlorination. The primary disinfectant is sodium hypochlorite. The plant design flow is 4 mgd, with average flows at 1.5 mgd. During the study period the filter media was replaced in two of the filter cells.

North Auburn Water Treatment Plant

The North Auburn WTP is located in North Auburn on the Combie Ophir Canal, or Rock Creek Reservoir. North Auburn WTP is a conventional water treatment plant, consisting of pre-chlorination, coagulation, upflow clarification, gravity filtration, and post-chlorination. The plant design flow is 6 mgd, with average flows at 2.5 mgd. During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite and the mixers on the upflow clarifiers were changed from belt to direct drive for better control and optimization of clarifier operation.

Smartville Water Treatment Plant

The Smartville WTP is located in Smartville, and receives water from the Meade Canal. The Smartville WTP is a conventional water treatment plant, consisting of coagulation, flocculation, sedimentation, pressure filtration, and post-chlorination. The primary disinfectant is sodium hypochlorite. The plant design flow is 0.085 mgd, with average flows at 0.037 mgd. During the study period the effluent flow meter was replaced.

This section provides an overall review of the water quality data available within the focus area of this study. Primarily, this includes all of the source (raw) water data collected by the participating water agencies. In addition to those data sets, there was one outside ambient water quality monitoring program in the study area with relevant water quality data during the study period. This monitoring program was the Central Valley Regional Water Quality Control Board's (Regional Board) Safe to Swim Studies, which will be discussed separately from the data collected by Placer County Water Agency (PCWA) and Nevada Irrigation District (NID). **Appendix B** contains summaries of the water treatment plants' intake data used for this review. **Appendix C** provides the regulatory framework used for the compliance evaluations.

This section then provides a review of the constituents of interest, including an explanation for their selection and a summary of the data obtained for the study period, which is January 2011 through December 2015.

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

AMBIENT WATER QUALITY MONITORING

It should be noted that other ambient water quality monitoring programs were considered for report conclusion, however the data from these programs was either outside of the study period, or the sampling locations were not upstream of PCWA or NID's water treatment plants' intakes. For example, the Yuba Bear Development Project collected water quality data in their 2013 Water Quality Sampling Report, but the monitoring locations are not upstream of any of the WTP intakes. Similarly, the South Yuba Bear River Citizens League currently monitors for *Escherichia coli* (*E. coli)*, but sampling locations are not upstream of any of the WTP intakes. Neither the Drum-Spaulding Hydroelectric Project nor the Yuba Bear Hydroelectric Project has collected any new data since 2008.

Central Valley Regional Water Quality Control Board – Safe to Swim Studies

In 2007, the Regional Board identified a number of swimming holes in the Sacramento River and San Joaquin River basins for water quality sampling. The purpose of sampling the swimming holes was to determine if the standards for recreational beneficial use was being attained at these recreation sites. The initial sampling conducted in 2007 and 2008 was conducted prior to, during, and after Labor Day. Samples were collected for pH, electrical conductivity, total coliform and *E. coli.* In 2009, follow-up sampling was conducted for *E. coli O157:H7*, *Giardia*, and *Cryptosporidium* for sites with historic elevated *E. coli* levels. Samples in the Deer Creek watershed were collected primarily along Squirrel Creek near Western Gateway Park. More recent data from 2011 to 2013 were collected further upstream on Squirrel Creek, Clear Creek, and Deer Creek, as shown in **Figure 3-1. Table 3-1** shows range, mean and number of *E. coli* samples collected from 2008 to 2014.

Figure 3-1
Safe to Swim Studies Sampling Locations for Deer Creek Watershed

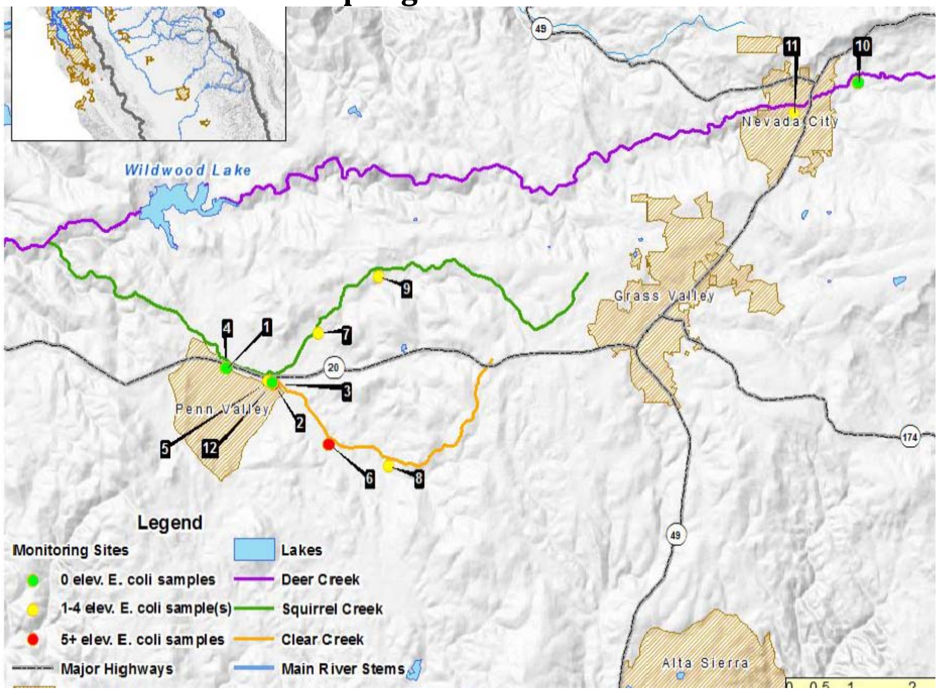


Table 3-1
***E. coli* Monitoring Results for Safe to Swim Studies, Deer Creek Watershed, 2008 to 2014**

Site	Range	Mean	Number of Samples
1 – Squirrel Creek in Western Gate way Park	54.6 – 579.4	189.4	39
2 – Clear Creek above confluence with Squirrel Creek	30.5 – 547.5	**257.8**	29
3 – Squirrel Creek above confluence with Clear Creek	45.2 – 1046.2	**207.9**	29
4 – Squirrel Creek downstream of swimming hole	148.3 – 167	157.7	2
5 – Squirrel Creek at Creekside Village Mobile Home Park	88 – 461.1	182.3	17
6 – Clear Creek at Lazy Valley Road	63.1 – 1046.2	**344.5**	16
7 – Squirrel Creek at Valley Drive	16 – 866.4	167.6	17
8 – Clear Creek at Long Valley Road	23.1 – 1413.6	**275.1**	17
9 – Squirrel Creek at Rough and Ready	36.4 – 365.4	147.9	8
10 – Deer Creek near Willow Valley Christmas Tree Farm	2 – 66.3	19.4	8
11 – Deer Creek below S Pine St.	37.3 – 2419.6	**595.4**	8
12 – Squirrel Creek below Clear Creek	248.1	248.1	1

Sites 2, 3, 6, 8 and 11 are of interest as the mean *E. coli* value at each site is greater than 200 most probable number per 100 milliliters (MPN/100mL), which is the trigger level at which additional log reduction is needed for *Giardia* and viruses, under the Surface Water Treatment Rule. Sites 2, 6, and 8 are along Clear Creek, where cattle presence is documented. Sites 2, 6, and 8 are upstream of the Smartville WTP, which currently operates with an additional log of *Giardia* and virus reduction. Site 11 is upstream of the Lake Wildwood WTP. The Technical Committee for this 2012 Update discussed that a possible source of contamination at site 11 is seasonal homeless camps. *Cryptosporidium* was detected at site 1 on four separate sampling dates, and once at sites 2 and 9.

Similarly, samples were collected for five sites along the South Yuba River from 2008 to 2014, as shown in **Figure 3-2**. For these locations, the *E. coli* medians are all low, less than 25 MPN/100mL. **Table 3-2** shows range, mean and number of *E. coli* samples collected from 2008 to 2014.

Figure 3-2
Safe to Swim Studies Sampling Locations for South Yuba River Watershed

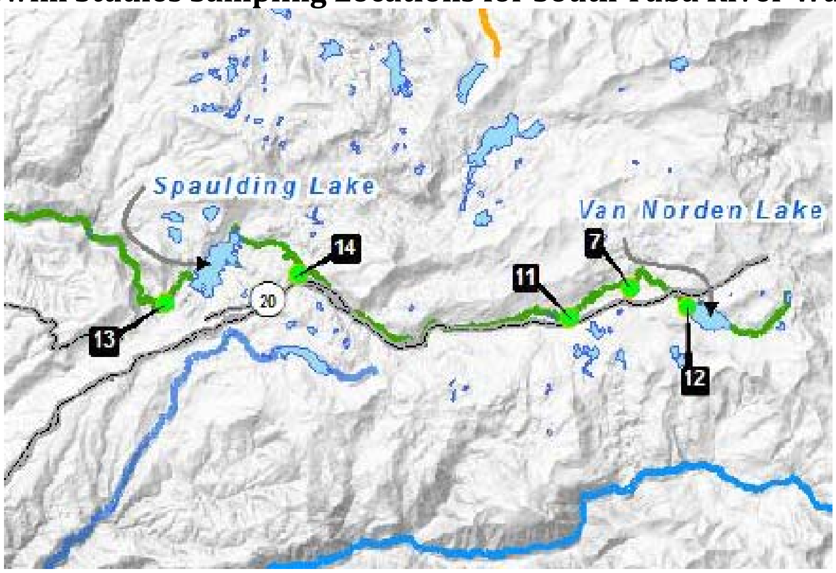


Table 3-2
***E. coli* Monitoring Results for Safe to Swim Studies, South Yuba River, 2008 to 2014**

Site	Range	Mean	Number of Samples
Site 7 – S. Yuba River Below Towle Mtn. Rd.	1.0 – 26.2	12.3	4
Site 11 – S. Yuba River at Plavada	2.0 – 12.1	6.1	3
Site 12 – S. Yuba River at Van Norden Dam	<1.0 – 63.1	22.4	3
Site 13 – S. Yuba River at Emerald Pools	< 1.0 – 57.3	5.6	18
Site 14 – S. Yuba River at Indian Springs Campground	< 1.0 – 166.4	20.5	9

OVERALL WATER QUALITY REVIEW

The review of overall water quality is largely based on comparison of the participating water agencies' intake water (also called raw water) to drinking water standards for the constituents currently regulated. This includes all constituents with primary and secondary MCLs and unregulated constituents that have Notification Levels. In general, it is assumed that if the raw water is below these limits, then the treated water (also called finished water) will be also. MCLs and Notification Levels are typically based on treated water sample results. **Appendix C** contains a summary of each of the contaminants currently regulated in drinking water by both the U.S. Environmental Protection Agency (USEPA) and the California Division of Drinking Water (DDW).

Overall, the Yuba and Bear Rivers provide excellent quality source water. The raw water can be treated to meet all drinking water standards using conventional filtration processes. There are no constituents present in the raw water that will require additional treatment processes based on data collected during this reporting period. The individual intake evaluations for treated water and regulatory compliance are presented in **Section 5**.

Selected data from the 15 existing intakes has been summarized and is included in the summary tables below. **Tables 3-3** through **3-5** show the statistics for each selected constituent.

Table 3-3
Raw Water Turbidity Summary Statistics for all PCWA and NID WTPs, NTU

WTP	Minimum	Maximum	Average	Median	95th %
Alta	1.9	9.5	3.8	3.6	5.8
Monte Vista	1.4	8.6	4.1	3.9	6.9
Colfax	1.7	17.9	6.9	6.8	12.5
Applegate	1.7	20.6	8.2	7.5	14.7
Bowman	0.79	22.8	4.8	2.6	21.0
Auburn	1.9	18.1	6.7	6.4	10.9
Foothill 1	0.89	39.5	4.8	2.5	12.2
Foothill 2	1.1	17.5	4.5	2.4	9.1
Sunset	1.2	2.3	1.6	1.7	2.0
Cascade Shores	0.7	6.2	1.5	1.2	2.6
Loma Rica	1.0	6.5	2.8	2.7	4.9
Elizabeth George	1.2	12.8	4.6	3.1	9.9
Lake of the Pines	1.7	19.5	5.6	4.5	15.7
Lake Wildwood	1.6	19.2	5.6	4.8	10.4
North Auburn	2.4	39.7	10.8	8.4	30.2
Smartville	1.4	16.1	5.4	5.2	9.9

Table 3-4
Raw Water *E. coli* Summary Statistics for all PCWA and NID WTPs, MPN/100mL

WTP	Minimum	Maximum	Average	Median	95th %
Alta	<2	130	15.4	4	80
Monte Vista	<2	1,600	36.8	6	31
Colfax	<2	300	28	13.5	82.5
Applegate	2	270	52.2	32.5	170
Bowman	<2	475	35	12.8	138.5
Auburn	5	855	80	41.2	177
Foothill	<2	500	39	23	111
Sunset	2	500	74	30	281
Cascade Shores	<2	111	7.0	2.0	28.6
Loma Rica	<2	108	12.7	6.3	43
Elizabeth George	<2	210	20.1	8.6	85
Lake of the Pines	1	2,419	116	34	470
Lake Wildwood	<2	816	48	23	165
North Auburn	1	190.4	22.9	13.5	64.8
Smartville (Meade Canal)	<2	1,850	152	52	694

Table 3-5
Raw Water Total Organic Carbon Summary Statistics for all PCWA and NID WTPs, mg/L

WTP	Minimum	Maximum	Average	Median	95th %
Alta	0.5	2.2	1.3	1.4	2.0
Monte Vista	0.5	2.0	1.3	1.4	1.8
Colfax	0.6	2.1	1.3	1.4	1.9
Applegate	0.9	2.5	1.5	1.4	2.1
Bowman	0.9	1.5	1.3	1.3	1.5
Auburn	0.9	3.0	1.4	1.3	2.0
Foothill 1	0.8	1.7	1.2	1.2	1.6
Foothill 2	0.8	2.7	1.4	1.3	2.6
Sunset	1.0	5.1	1.6	1.3	3.0
Cascade Shores	0.75	1.8	1.4	1.6	1.7
Loma Rica	0.8	2.3	1.5	1.5	1.9
Elizabeth George	0.75	1.8	1.4	1.5	1.8
Lake of the Pines	0.99	2.1	1.5	1.4	1.9
Lake Wildwood	0.83	1.9	1.2	1.2	1.9
North Auburn	0.88	2.4	1.5	1.5	2.1
Smartville	1.1	8.8	2.4	2.0	5.7

SELECTED CONSTITUENT REVIEW

This section contains a general discussion of selected water quality constituents and the reasons why they were selected for further evaluation. The constituents selected for further review in this section include turbidity, microbials including *E. coli, Giardia,* and *Cryptosporidium*, and disinfection by-product precursors including total organic carbon (TOC), and temperature. The constituents' general characteristics, seasonal and historical trends, and significance with respect to existing and potential future regulations are presented, along with data analysis and review. Additional evaluation of these constituents, with respect to treated water quality and regulatory compliance, is presented in **Section 5**. Inorganic chemicals, volatile organic chemicals, and synthetic organic chemicals will be discussed in **Section 5**, as they are monitored in treated water only.

In order to provide a spatial analysis, the data has been grouped into five categories: 1) Lake Spaulding via Boardman Canal, 2) Lake Spaulding via Banner Cascade Pipeline, 3) Deer Creek downstream Scotts Flat Reservoir, 4) Downstream Rollins Reservoir via Bear River Canal, and 5) Downstream Rollins Reservoir via Bear River. Within each category, the water treatment plants (WTPs) have been arranged from upstream to downstream.

The constituents selected for further review were selected based on several criteria including; existing or upcoming regulatory standards, critical operational evaluation parameters, and relevance to significant potential contaminating activities. These items are discussed in the background section for each constituent. **Table 3-6** shows the relationship between potential contaminating activities and water quality constituents.

Table 3-6
Relationship Between Potential Contaminating Activities and Water Quality

	Turbidity	Microbials	DBP Precursors
Canal Aquatic Herbicide Use	√		√
Livestock Grazing	√	√	√
Forest Activities	√		√
Recreation	√	√	√
Source Water Spills	√	√	√
Wastewater	√	√	√
Urban Runoff	√	√	√
Mining	√		√
Cannabis Cultivation	√		√

Turbidity

General Characteristics and Background

Turbidity is the measurement of light scatter in water and provides a measure of the degradation of clarity in water. Clarity is typically degraded by suspended colloids and fine suspended solids such as clay, organic particulates, and microorganisms such as *Giardia* and *Cryptosporidium*, if present. Turbidity is measured to evaluate the efficiency of the treatment process at removing these particles and also to comply with regulatory requirements.

Turbidity was selected for further evaluation since most utilities, including PCWA and NID, optimize pretreatment processes to maximum turbidity removal in order to reduce the potential for pathogens, such as *Giardia* and *Cryptosporidium*, in treated drinking water. Turbidity is monitored throughout each of the treatment plants to ensure that particles are removed. Turbidity has been assumed to be an indicator for the presence of *Giardia* and C*ryptosporidium*. However, turbidity alone may be a poor predictor of microbiological quality.

Current drinking water regulations require that the combined filtered effluent be less than 0.3 nephelometric turbidity units (NTU) in 95 percent of measurements and that the turbidity never exceed 1 NTU. Continuous turbidity monitoring for individual filters is required. Turbidity has also been indirectly regulated in drinking water as part of the Filter Backwash Rule. This rule requires that recycled waste streams return to the plant headworks upstream of all chemical feed systems and recommends return at a controlled, small percentage of total flow (less than 10 percent) to ensure that chemical feed is adjusted for blended water quality, including potential increases in turbidity caused by recycle streams.

High turbidity levels in surface water sources, such as rivers and lakes, are typically the result of erosion and sediment transport during precipitation and high flow events, and are undesirable because high turbidity can mask the presence of harmful particulates. The principal source of turbidity is general watershed runoff, and can also be contributed by other all of the potential contaminating activities. It is common for turbidities to vary seasonally as a result of precipitation and flow. It has also been found that the presence of suspended matter can interfere with disinfection of microorganisms.

Evaluation

Turbidity has been selected for evaluation not only because it is a regulated constituent, but also because it is commonly used as an indicator of general water quality and overall plant performance. Averages, medians, minimums, maximums, and 95th percentiles have been summarized for each plant in **Table 3-3**. Timeseries plots have been developed for raw water turbidity over the reporting period for each of the plants (**Figures 3-3** through **3-7**).

Figure 3-3 indicates that for the Boardman Canal WTPs, the turbidity increases downstream**.** Raw water turbidities for the Alta and Monte Vista WTPs stay generally below 10 NTU, while the Colfax WTP raw water turbidities can occasionally frequent above 10 NTU, and the Applegate WTP raw water turbidities frequent over 10 NTU more often than the Colfax WTP.

Figure 3-3
Raw Water Turbidity, Lake Spaulding via Boardman Canal WTPs, 2011-2015

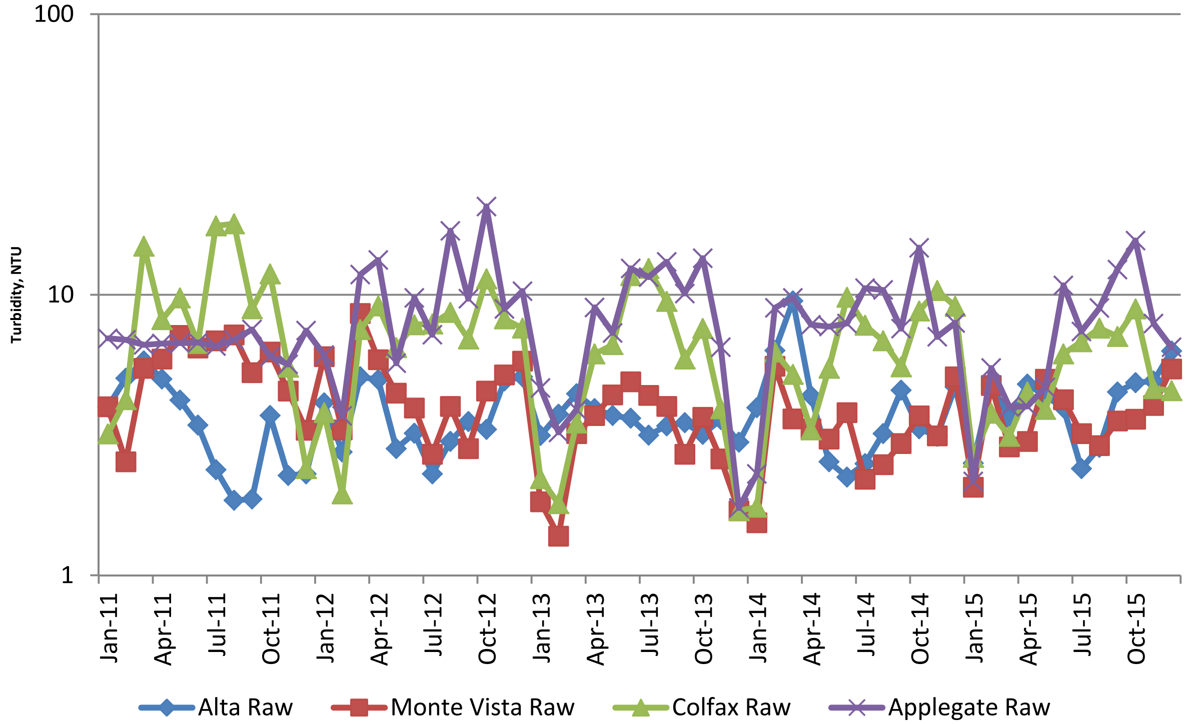


Figure 3-4 indicates that for the Banner Cascade Pipeline WTPs, turbidity increases downstream as turbidities are higher at Elizabeth George WTP compared to Cascade Shores WTP**.** However, once the Banner Cascade Pipeline Project was completed in June 2013, the raw water turbidities for the Elizabeth George WTP decreased dramatically. The Elizabeth George and the Loma Rica WTPs are now similar, as both WTPs generally receive water directly from the Banner Cascade Pipeline via the Loma Rica Reservoir. During the 2011 to 2015 time period, Cascade Shores and Loma Rica WTPs stayed generally below 10 NTU, while Elizabeth George WTP occasionally frequented above or close to 10 NTU before the Banner Cascade Pipeline was completed, but never was above or close to 10 NTU after the Banner Cascade Pipeline was completed.

Figure 3-4
Raw Water Turbidity, Lake Spaulding via Banner Cascade Pipeline WTPs, 2011-2015

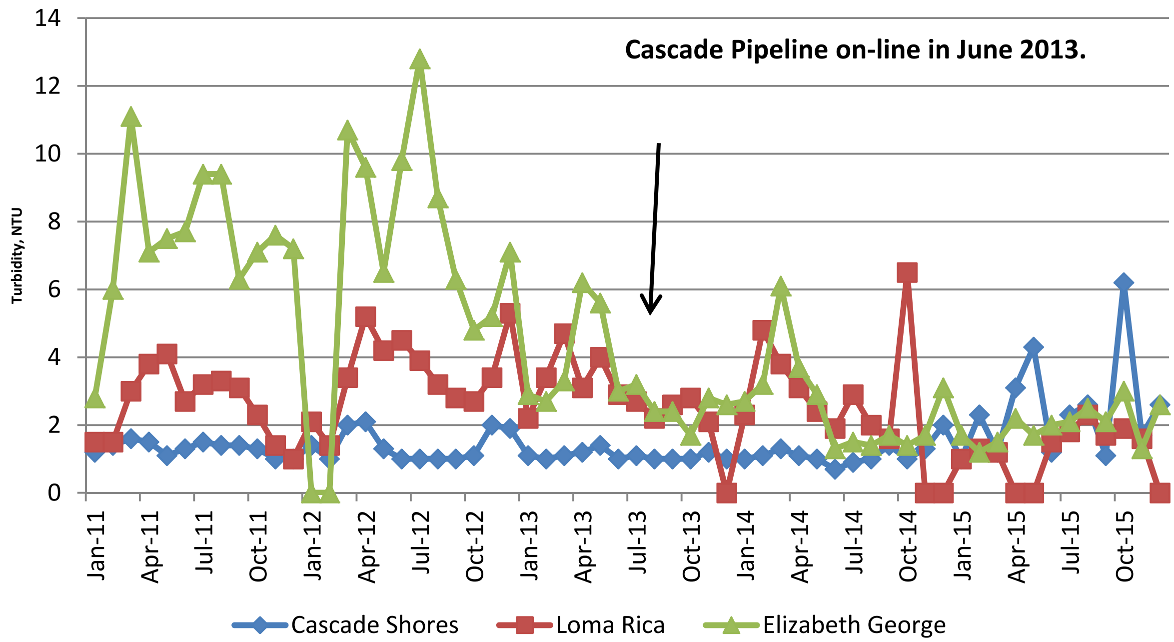


Figure 3-5 indicates that for the Deer Creek downstream of Scotts Flat Reservoir WTPs, turbidity is generally below 10 NTU, with the exception of a few peaks. NID has been able to reduce source water peaks due to an operating procedure implemented during the 2012 Update; NID stops diverting off the canals during a storm and does not begin diverting again until the storm has passed. This appears to be very effective in reducing source water turbidities at the water treatment plants.

As shown in **Figure 3-6**, the downstream Rollins Reservoir WTPs show seasonal variation, with peaks during the winter and spring and lower turbidities in the summer. This is due to turbid water filling up Rollins Reservoir after rain events, with subsequent release to the downstream WTPs throughout the winter and spring. The North Auburn WTP had the most months where the raw water turbidity monthly average was over 10 NTU. This occurred 22 out of 60 months. North Auburn WTP is fed from Rock Creek Reservoir, which is a small water body at low elevation that receives local drainage. PG&E operates this reservoir and does not implement any algae control measures so there are times of algae blooms which could be contributing to the increased turbidity levels.

Figure 3-5
Monthly Peak Raw Water Turbidity, Deer Creek Downstream Scotts Flat Reservoir WTPs, 2011-2015

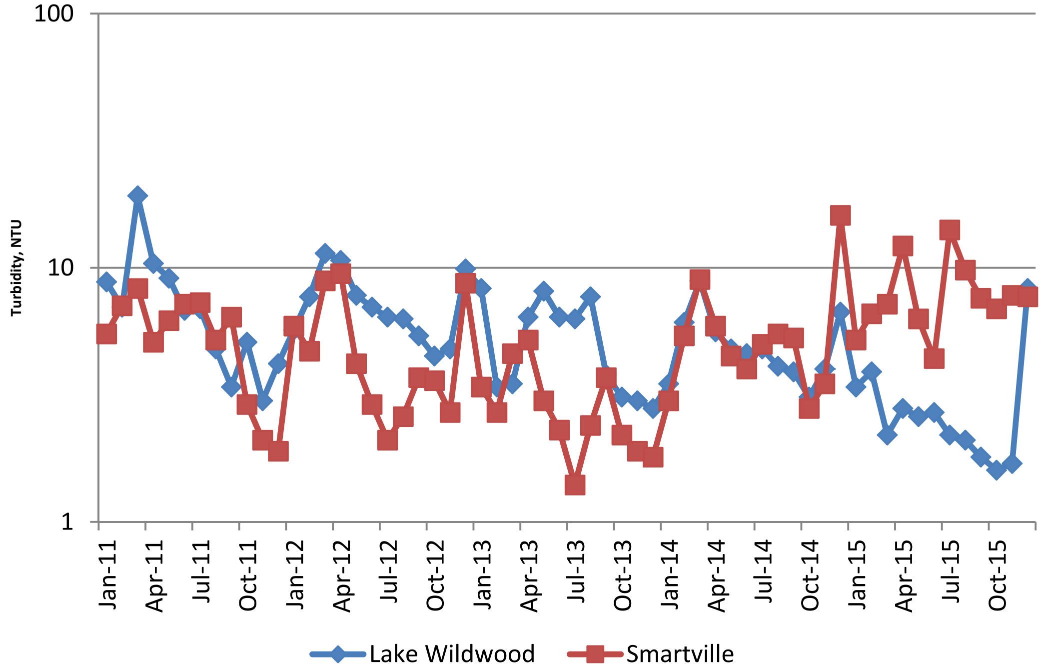
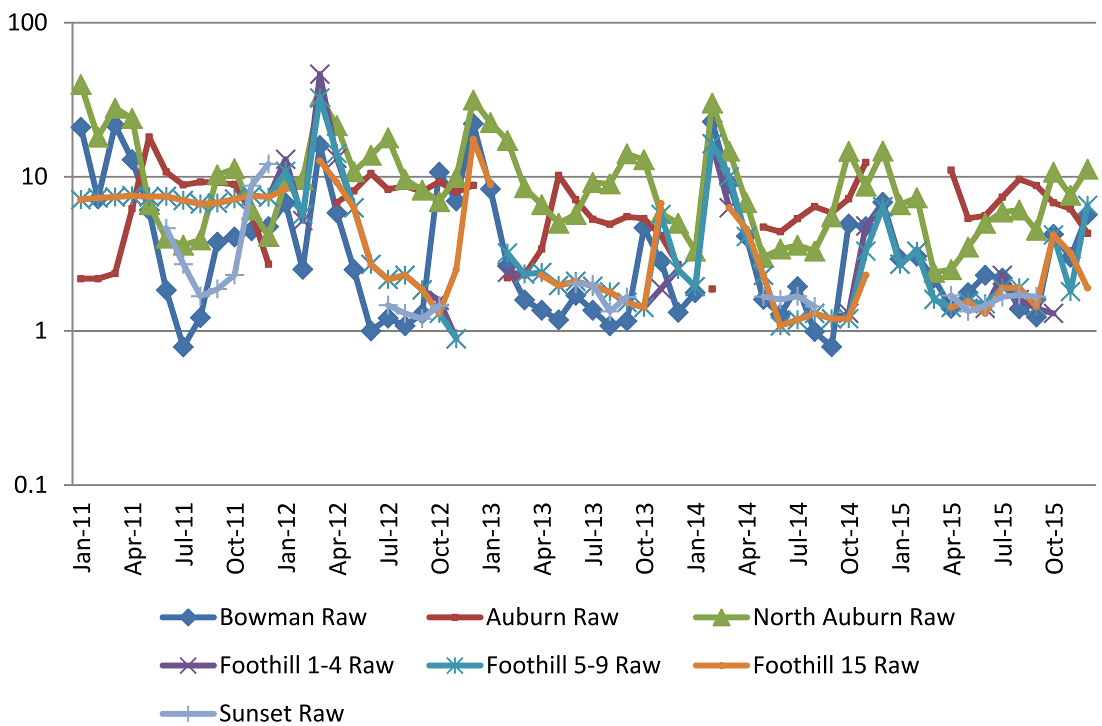


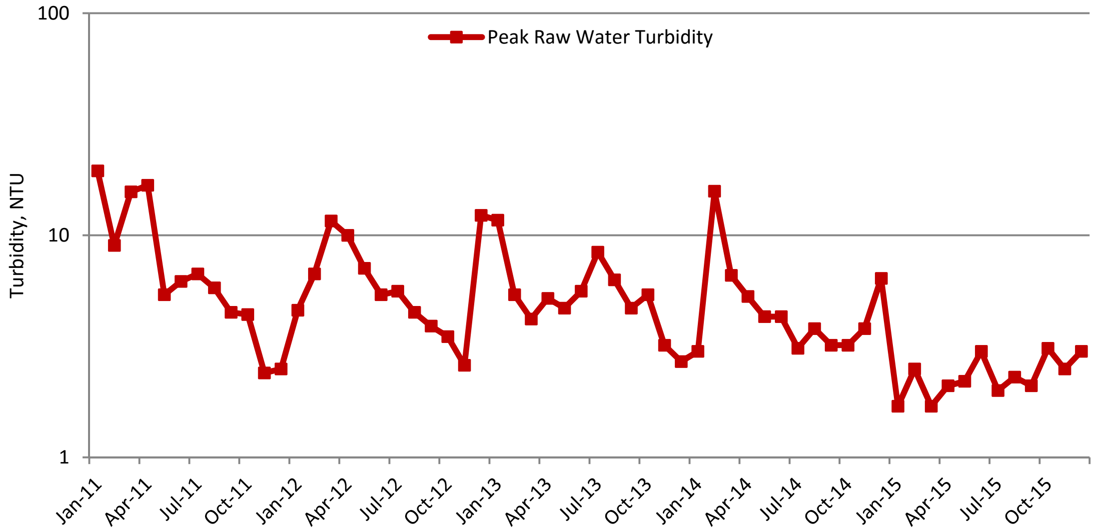
Figure 3-6
Raw Turbidity Data, Downstream Rollins Reservoir via Bear River Canal WTPs, 2011-2015



Lake of the Pines WTP is the only plant classified as downstream of Rollins Reservoir via the Bear River. Raw water turbidities for Lake of the Pines WTP show seasonal variation, with higher turbidities during the wet season. **Figure 3-7** indicates that the source water turbidities for the Lake of the Pines WTP are generally below 10 NTU.

NID staff indicates that the Lake of the Pines WTP can have degraded water quality that may be impacted by local activities along the Magnolia III canal, including grazing and runoff, between the Combie Lake diversion and the WTP.

Figure 3-7
Raw Turbidity Data, Downstream Rollins Reservoir via Bear River (Lake of the Pines WTP), 2011-2015



Summary of Results for Turbidity

- The median raw water turbidity ranges from 1.2 NTU at the Cascade Shores WTP to 8.4 NTU at the North Auburn WTP.

- Generally, the raw water turbidity for the Alta, Monte Vista, Cascade Shores, Loma Rica, Elizabeth George, and Sunset WTPs stays below 10 NTU. During the reporting period, the remainder of the WTPs occasionally frequented above 10 NTU. North Auburn WTP had the most months where raw water monthly averages were above 10 NTU, for 22 months out of 60 months, likely caused by conditions in the local watershed and reservoir.

- Completion of the Banner Cascade Pipeline by NID in June 2013 improved raw water turbidities for the Elizabeth George WTP.

- Rollins Reservoir can fill with turbid waters during the wet season. This results in higher turbidities at WTPs located downstream of Rollins Reservoir, when turbid waters are released from Rollins Reservoir during the winter and spring.

Microbiological Constituents

General Characteristics and Background

The major microbiological constituents of concern include total coliforms, *E. coli*, *Giardia lamblia*, and *Cryptosporidium parvum*. Generally speaking, pathogenic organisms carried by mammalian species may be infectious to humans although this depends on the species of microorganism. Pathogens infecting other types of animals, such as birds and reptiles, are usually not infectious to humans. However, some types of animals, such as birds, may be vectors for human pathogens. Each of these constituents was identified for further evaluation because they are currently regulated. The presence of the constituents in the raw water governs the overall treatment requirements for the water treatment plants.

Fecal coliform and *E. coli* have been used to indicate the potential presence of pathogenic microorganisms in source waters. Although coliform levels have not been shown to correlate well with pathogenic microorganisms, they continue to be used as indicators due to the lack of affordable and reliable direct analytical methods for detecting pathogens. Potential sources of coliform bacteria include general watershed runoff, grazing, recreation, wastewater, urban runoff, spills, and animal populations. Coliform levels in treated water are currently regulated directly through the Total Coliform Rule, to ensure the effectiveness of the disinfection process throughout the distribution system.

Giardia lamblia is a species of the protozoa genus *Giardia* that infects humans and can cause the gastrointestinal disease giardiasis. *Giardia* is found in the environment as a cyst from the feces of humans and animals; both wild and domestic animals may be hosts. Sources close to waterbodies have the most potential to introduce viable cysts to the source water. Cysts may be destroyed naturally in the environment by desiccation and/or heat. The cysts are effectively inactivated using chlorine disinfection. The detectability of *Giardia* has been greatly improved with USEPA Method 1623, which is better able to establish concentrations, but still does not determine viability. *Giardia* may be carried in urban runoff and wastewater sources or may be contributed directly as a result of body-contact recreation or animal defecation.

Giardia lamblia is currently regulated by the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR), and the Long Term 1 ESWTR (LT1ESWTR). Surface water supplies must provide for at least 3-log reduction of *Giardia* through physical removal and chemical inactivation. Additional reduction may be required for impaired water supplies. The USEPA provided guidance with the SWTR that indicated additional reduction would be appropriate if measured *Giardia* levels in the source water were greater than 0.01 cysts per liter. However, in the 1980's there was no practical means to measure *Giardia*, therefore the DDW prepared guidance under the SWTR that indicated that 3-log reduction would likely be appropriate when monthly median levels of total coliform in the raw water were less than 1,000 most probable number per 100 milliliter (MPN/100 mL). In recent years DDW has allowed for the substitution of fecal coliform or *E. coli* levels in raw water since they are more specific indicators. The DDW have set the guidance level for increased treatment at raw water monthly fecal or *E. coli* median levels greater than 200 MPN/100 mL, based on the historic ratio of five total coliform to one fecal coliform. *Cryptosporidium parvum* is a species of the protozoa genus *Cryptosporidium* that infects humans and can cause the gastrointestinal disease cryptosporidiosis. *Cryptosporidium* is found in the environment as an oocyst principally from the feces of domestic animals, although both wild and domestic animals are known to be hosts. Like *Giardia*, *Cryptosporidium* oocysts may be destroyed naturally in the environment by desiccation and/or heat. Once in the source water, however, viable oocysts are very resistant to traditional chemical inactivation using chlorine. Stronger disinfectants such as ozone or ultraviolet (UV) light are required to inactivate these pathogens. The detectability of *Cryptosporidium* has been greatly improved with USEPA Methods 1622 and 1623, which are able to establish truer concentrations, but still do not determine viability. *Cryptosporidium* may be carried in urban runoff and wastewater sources or may be contributed directly as a result of body-contact recreation or animal defecation.

Cryptosporidium is currently regulated through the IESWTR and the LT1ESWTR, which require 2-log reduction, and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), which potentially requires additional log action based on source water monitoring results for either *E. coli* or *Cryptosporidium*, depending on system size. Under the IESWTR and LT1ESWTR well-operated conventional and direct treatment plants are granted a 2-log removal credit for *Cryptosporidium* if they meet all treated water turbidity standards. The LT2ESWTR further regulates *Cryptosporidium* and requires additional action (treatment or protection) if the source water quality is determined to be impaired based on direct *E. coli* or *Cryptosporidium* monitoring of the source. Small systems with a population less than 10,000 are to first monitor for *E. coli* bi-weekly for one year. If the average annual value is greater than 10 MPN/100 mL for a lake source, or 100 MPN/100mL (as modified by USEPA) for a flowing stream source, then *Cryptosporidium* must be monitored monthly for two years. If not, then the source is classified as Bin 1 and no additional action or treatment is required. If any *Cryptosporidium* running annual average level is greater than 0.075 oocysts per liter (oocyst/L) then additional action must be achieved based on bin classification of the source.

The DDW also developed the *Cryptosporidium* Action Plan (CAP) in the mid-1990's to address *Cryptosporidium* while federal regulations were being formed. The CAP identified recommended turbidity limits for settled water, treated water and recycled water in lieu of treated water *Cryptosporidium* levels. The CAP was developed to help utilities optimize treatment processes to ensure maximum removal of *Cryptosporidium* oocysts and reduce the risk of waterborne illness. This plan was intended for utilities with over 1,000 service connections.

Evaluation for E. coli

PCWA monitors raw water for total coliform and *E. coli* on a monthly basis for each individual plant. NID was monitoring raw water for total coliform and *E. coli* on a monthly basis for each plant, but increased their monitoring frequency to twice a month beginning in January 2007.

Monthly medians for *E. coli* were examined, as DDW requires an additional log reduction for *Giardia* and viruses if the monthly median for *E. coli* is greater than 200 MPN/100mL.

Out of 60 months from the entire study period; the Alta, Cascade Shores, Loma Rica, Elizabeth George, and North Auburn WTPs had no monthly medians for *E. coli* greater than 200 MPN/100mL. The Monte Vista, Colfax, and the Applegate WTPs each only had one monthly median *E. coli* value higher than 200 MPN/100mL. The Lake Wildwood and Foothill WTPs each had two monthly median *E. coli* values above 200 MPN/100mL. The Bowman and Auburn WTPs each had three monthly median and the Lake of the Pines WTP had six monthly median *E. coli* values above 200 MPN/100mL. Meanwhile, the Sunset WTP had eight monthly medians and the Smartville WTP had 11 monthly medians greater than 200 MPN/100mL for *E. coli.*

For the Boardman Canal WTPs, **Figure 3-8** clearly demonstrates similar monthly median *E. coli* levels for the Alta, Monte Vista, and Colfax WTPs. It also shows that *E. coli* levels increase downstream, as the Applegate WTP has the highest *E. coli* levels. Particularly, *E. coli* levels increase at the Applegate WTP, indicating a source of fecal contamination between the Colfax and Applegate WTPs. This same trend was observed in the Second and 2012 Update. The current data also indicates that this contaminant source is more prevalent during the summer and early fall months.

Figure 3-8
Combined Monthly Medians for *E. coli*,
Lake Spaulding via Boardman Canal WTPs, 2011-2015

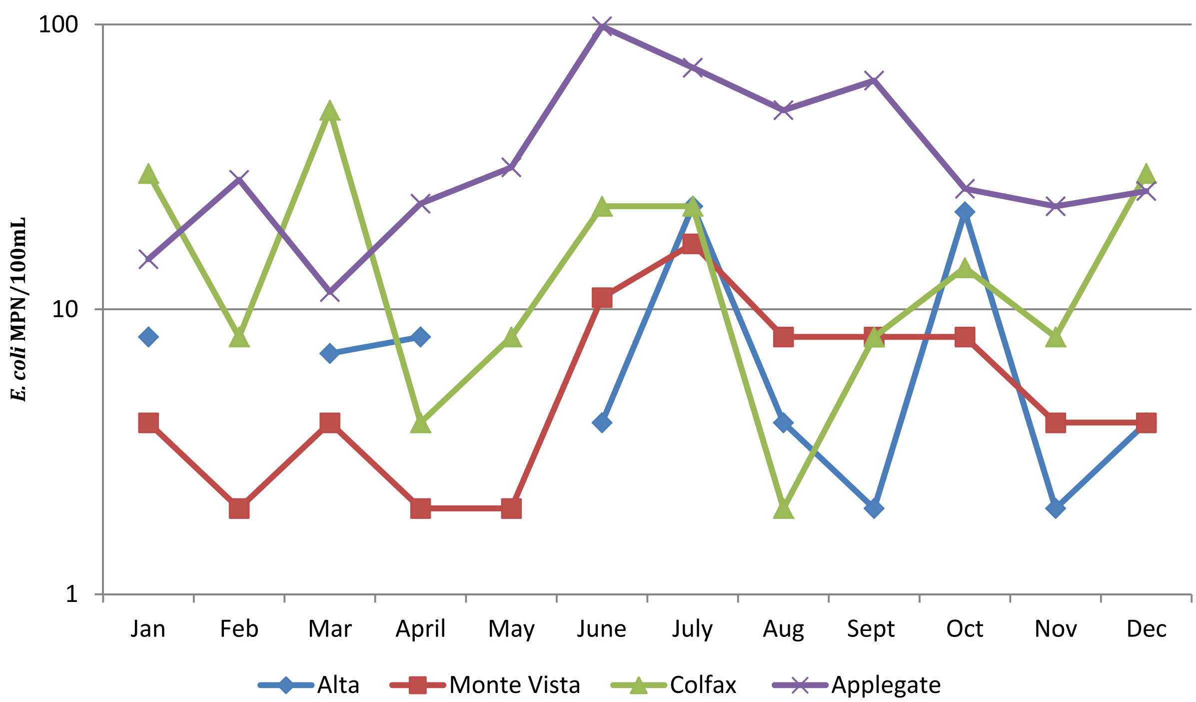


Figure 3-9 indicates that for the Banner Cascade Pipeline WTPs, *E. coli* increases downstream as *E. coli* is higher at Elizabeth George WTP and Loma Rica WTP, as compared to Cascade Shores WTP. However, once the Banner Cascade Pipeline Project was completed in June 2013, the raw water *E. coli* for the Elizabeth George WTP decreased. *E. coli* levels at the Elizabeth George and the Loma Rica WTPs are now similar, as both WTPs receive water from the Banner Cascade Pipeline via the Loma Rica Reservoir. **Figure 3-10** demonstrates that the monthly median *E. coli* levels for the Banner Cascade Pipeline WTPs are always below 200 MPN/100mL.

Figure 3-9
Raw Water *E. coli*, Lake Spaulding via Banner Cascade Pipeline WTPs, 2011-2015

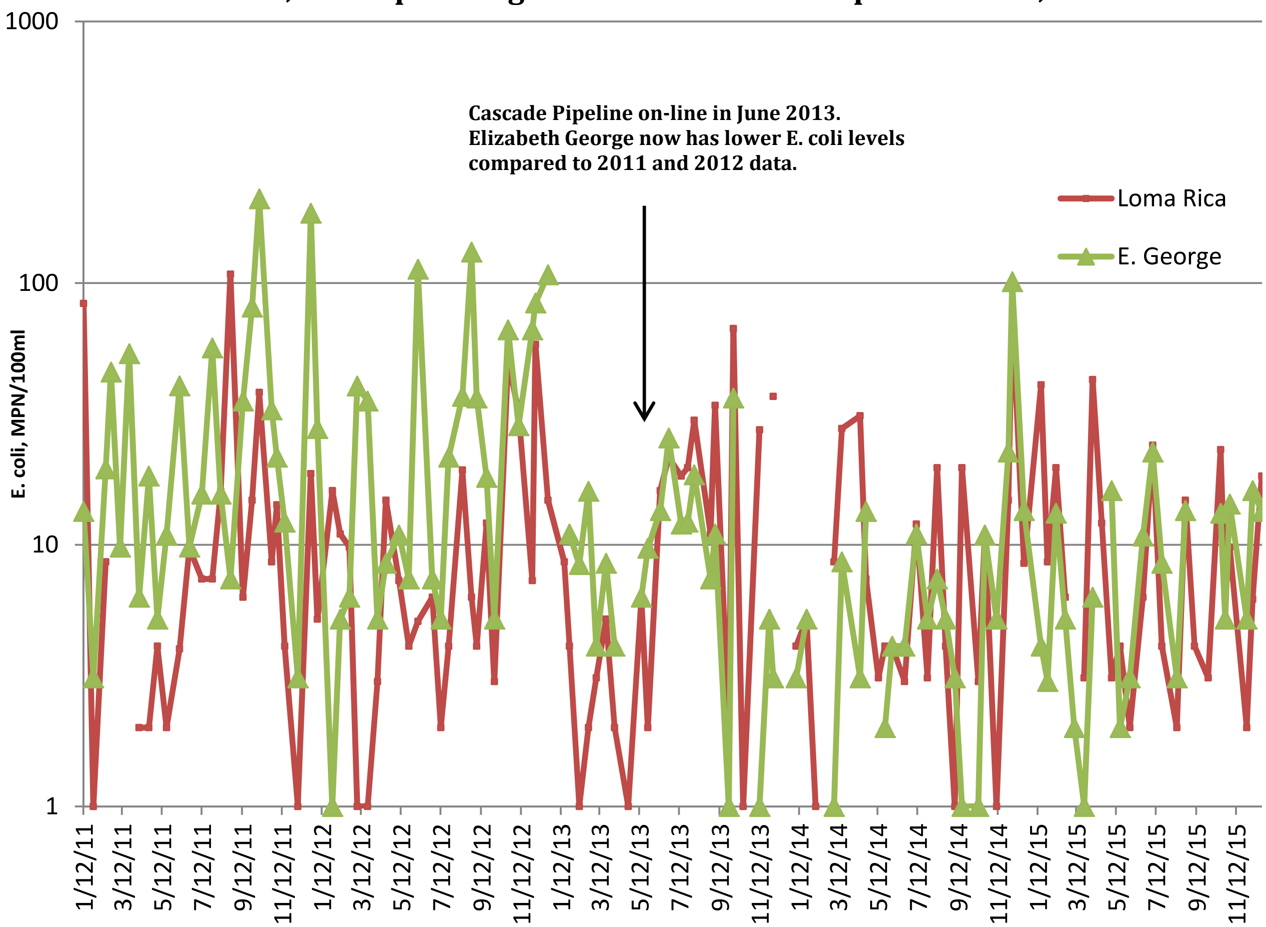
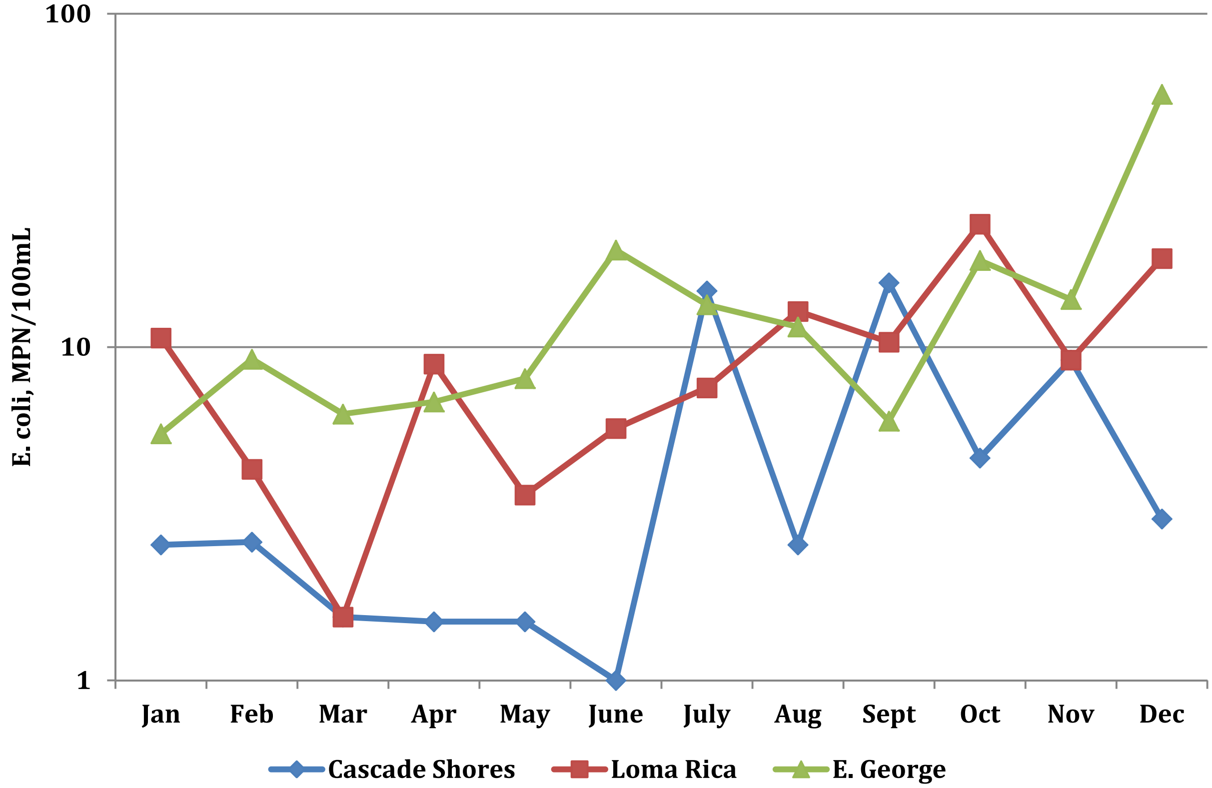


Figure 3-10
Combined Monthly Medians for *E. coli*,
Lake Spaulding via Banner Cascade Pipeline WTPs, 2011-2015



For the Deer Creek WTPs downstream of Scotts Flat Reservoir, **Figure 3-11** shows that the monthly median *E. coli* levels increase from Lake Wildwood WTP to Smartville WTP. This trend continues from the Second and 2012 Update. There are a number of potential sources of *E. coli* in the Squirrel Creek and Deer Creek watersheds, which include runoff from ranches, cattle walking in the creeks, treated wastewater effluent, wastewater ponds, and recreation in Western Gateway Park. *E. coli* peaks during the month of April for the Smartville WTP, which may be related to increased flows at the start of the irrigation season on April 1st of each year.

Figure 3-12 shows the *E. coli* monthly medians at the Smartville WTP, and although elevated *E. coli* can occur in April and May due to the start of the irrigation season, peaks also occur at other times of the year, suggesting multiple sources of *E. coli.*

Figure 3-11
Combined Monthly Medians for *E. coli*, Deer Creek Downstream Scotts Flat Reservoir WTPs, 2011-2015

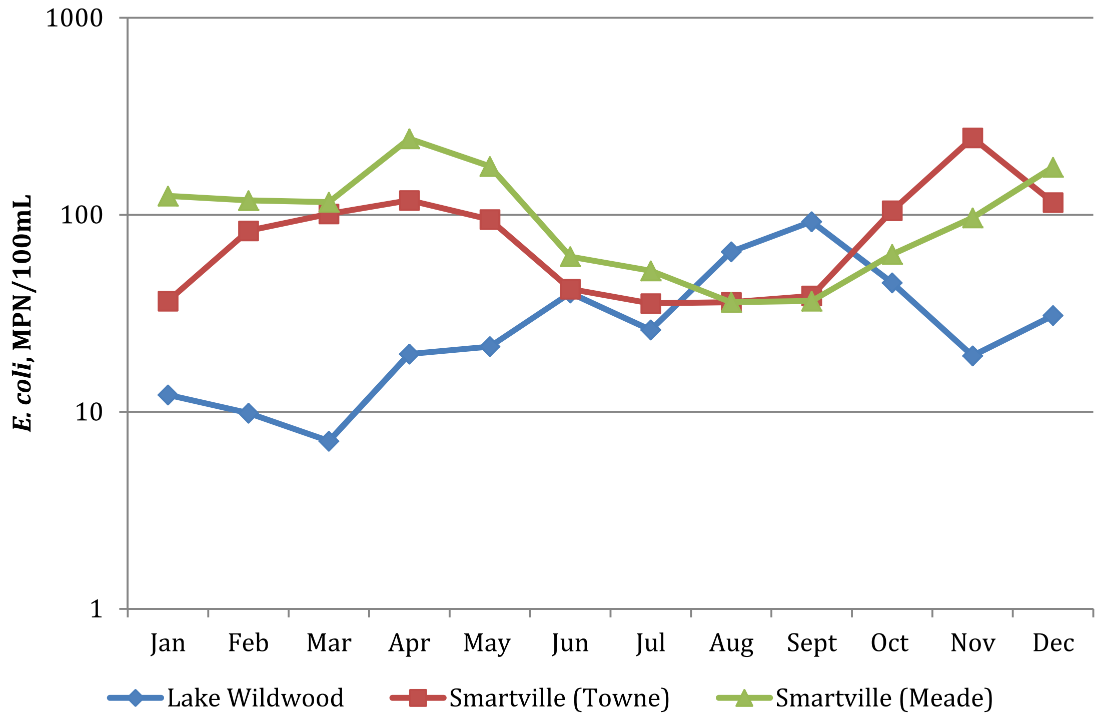
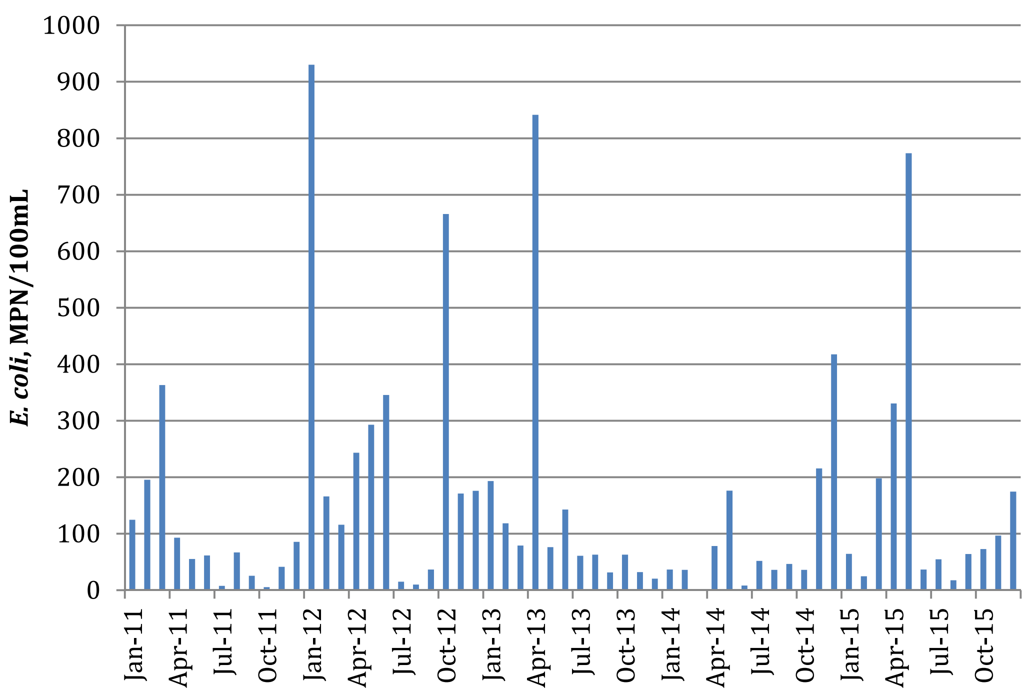
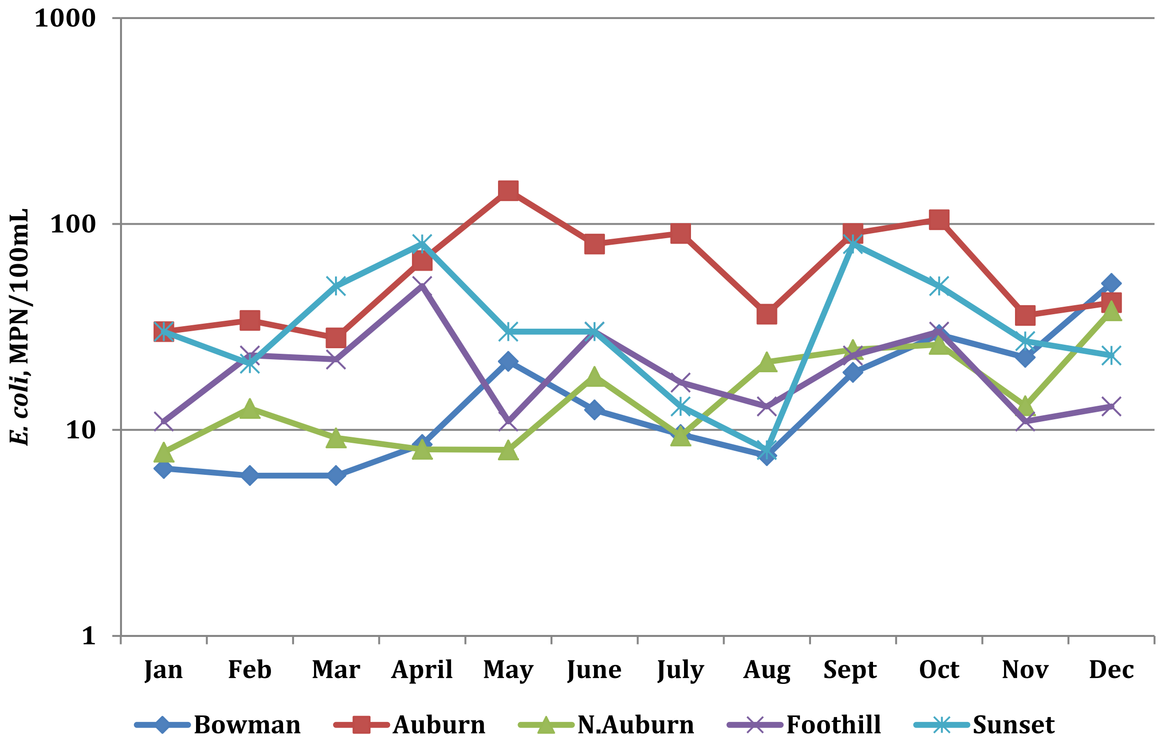


Figure 3-12
Monthly Medians for *E. coli* Smartville WTP, 2011-2015



For the Downstream Rollins Reservoir via Bear River Canal WTPs, **Figure 3-13** indicates no clear trend moving downstream. In fact, the Auburn WTP has the highest monthly medians for the majority of the year, and it is not the furthest downstream WTP. This trend continues from the Second and 2012 Updates. The North Auburn, Foothill, and Bowman WTPs show an increase in *E. coli* during September and October, which is when PG&E conducts their annual maintenance on the Bear River Canal. During Bear River Canal Outages, the North Auburn WTP reverts to a backup water supply from the Combie Ophir 1 Canal. This is an NID earthen canal that is supplied water from the base of the dam at Lake Combie. The Foothill and Bowman WTPs revert to the Lower Boardman Canal. These changes in source water supply are likely the cause of the increased monthly medians.

Figure 3-13
Combined Monthly Medians for *E. coli*, Downstream Rollins Reservoir via Bear River Canal WTPs, 2011-2015

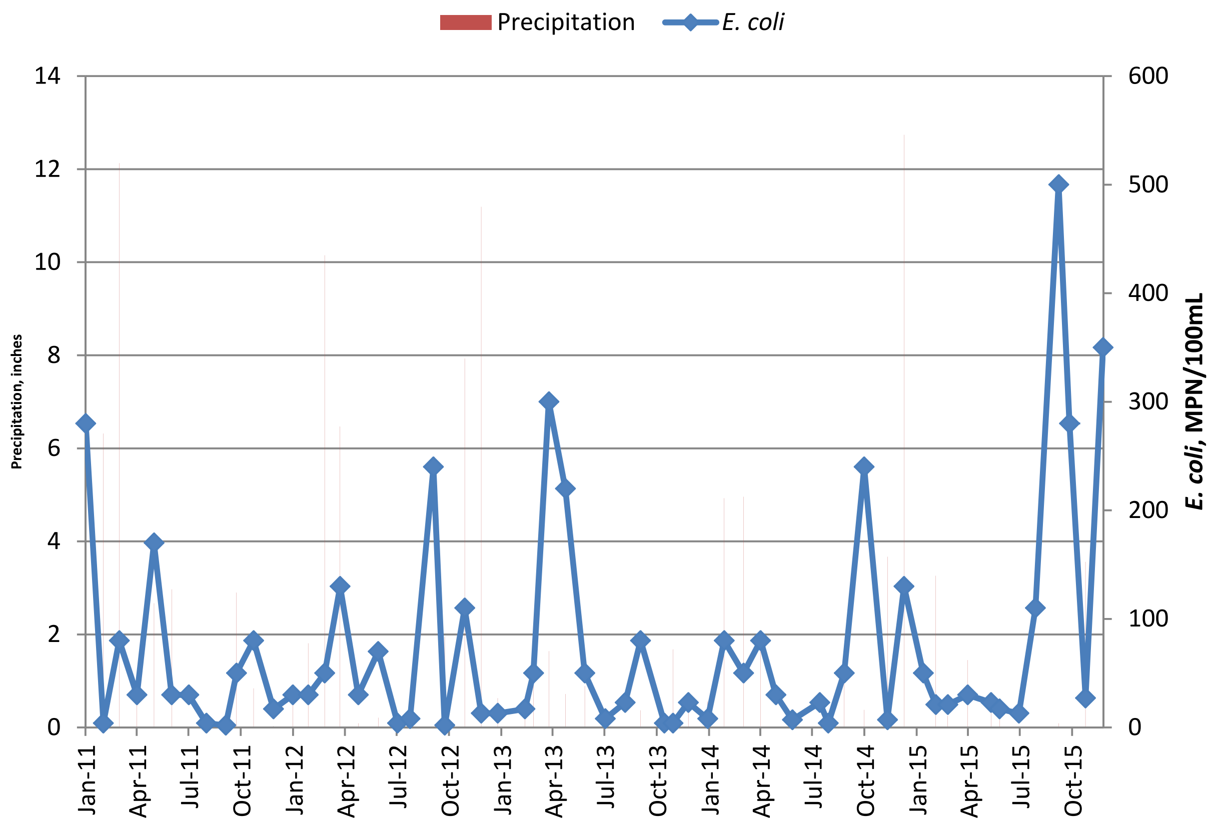


All of the WTPs with 10 percent or less of monthly medians (six or fewer during the study period) exceeding the 200 MPN/100 mL threshold were determined to need no further evaluation and should be operated to achieve 3/4-log reduction for *Giardia* and viruses. That includes all of the WTPs except Smartville and Sunset WTPs.

Although the Smartville WTP had 11 monthly medians greater than 200 MPN/100mL, it should be noted that the Smartville WTP is already classified as needing and operated to achieve 4/5-log reduction for *Giardia* and viruses. Therefore, the Smartville WTP should continue to be operated to achieve 4/5-log reduction for *Giardia* and viruses.

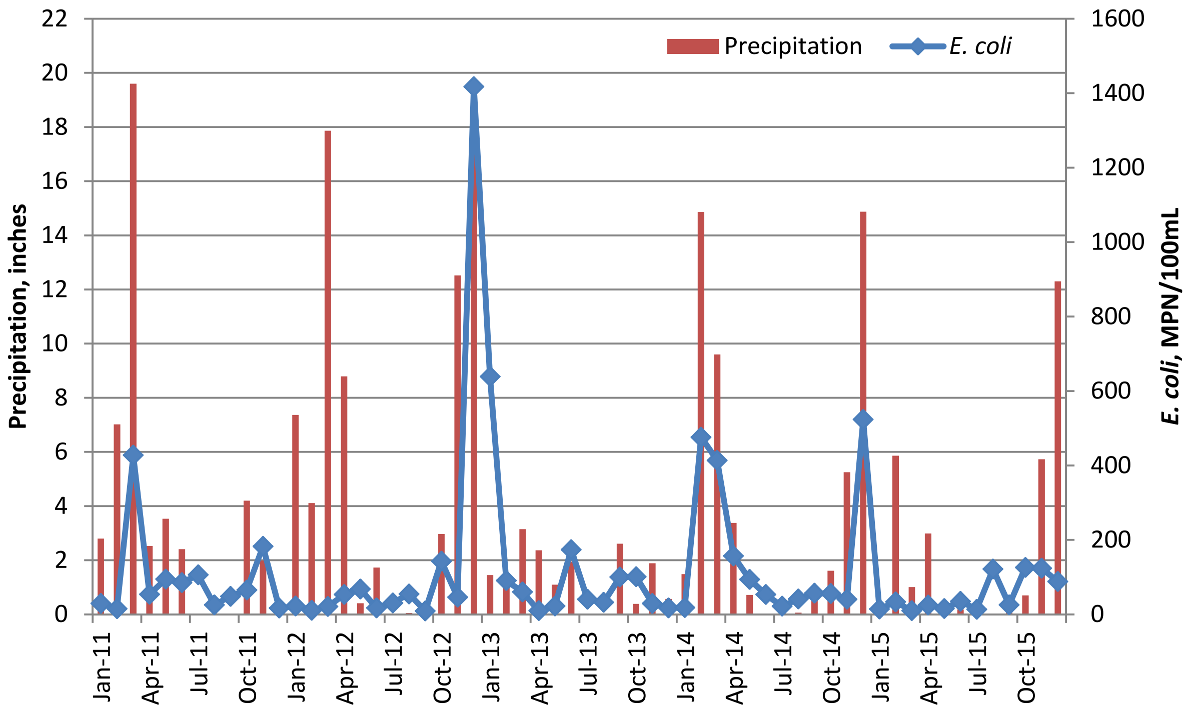
Since the Sunset WTP had eight *E. coli* monthly medians greater than 200 MPN/100mL, a closer examination of its monthly medians was completed. As shown in **Figure 3-14**, the months when the *E. coli* monthly median exceeded 200 MPN/100mL at the Sunset WTP were January 2011, September 2012, April 2013, May 2013, October 2014, September 2015, October 2015, and December 2015. However, it is important to note that the Sunset WTP was not operating in most of these time periods, only in September 2012 and September 2015. When only looking at the months of WTP operation, there were only two out of 22 monthly medians which exceeded 200 MPN/100 mL, or 9 percent. **Figure 3-14** also shows precipitation plotted with *E. coli* values. Since there are peaks in *E. coli* that are not associated with precipitation, it is clear that there are other factors contributing to *E. coli* values above 200 MPN/100mL besides precipitation. Overall, the DDW guidelines are met for the Sunset WTP, and the current 3/4-log reduction requirement for *Giardia* and viruses continues to be appropriate.

Figure 3-14
Monthly Median *E. coli* and Total Monthly Precipitation, Sunset WTP, 2011-2015



An additional evaluation of the *E. coli* levels at Lake of the Pines WTP was conducted to evaluate the impact of the partial enclosure of the Magnolia III canal. As shown in **Figure 3-15**, the months when the *E. coli* monthly median exceeded 200 MPN/100mL at the Lake of the Pines WTP were March 2011, December 2012, January 2013, February 2014, March 2014, and December 2014. **Figure 3-15** also shows that precipitation measured at the Grass Valley rain gauge occurred with every monthly median above 200 MPN/100mL at the Lake of the Pines WTP. Precipitation often, but not always, was associated with the higher *E. coli* monthly medians.

Figure 3-15
Monthly Median *E. coli* and Total Monthly Precipitation, Lake of the Pines WTP, 2011-2015



Note: Precipitation data from CDEC, Grass Valley (GSV) station

In order to investigate potential sources of *E. coli* at the Lake of the Pines WTP influent, NID has continued to sample for *E. coli* along the Magnolia III canal, which is the canal that transports water from the base of Lake Combie to the Lake of the Pines WTP. Magnolia III canal samples were collected at: 1) Magnolia III Reservoir, 2) Magnolia III Canal at Robles Drive, and 3) Magnolia III Canal at Alexis Drive. As **Figure 3-16** shows, *E. coli* levels rarely exceed the 200 MPN/100mL trigger at Magnolia III Reservoir and at Magnolia III Canal at Robles Drive. However, *E. coli* levels increase as measured at Magnolia III Canal at Alexis Drive, as shown in **Figure 3-17**. The suspected contamination source is ranch land that the open canal runs through. Although approximately half of the canal from Robles Drive to Alexis Drive was encased in November 2013, the remaining half through ranch land remains open and cattle have been observed near the canal in this area. There were more individual *E. coli* samples greater than 200 MPN/mL at Alexis Drive, compared to Lake of the Pines WTP influent. The frequency and magnitude of peak excursions at Alexis Drive has been reduced since the partial encasement.

Figure 3-16
***E. coli* at Magnolia III Reservoir and Magnolia III Canal at Robles Drive, 2011-2015**

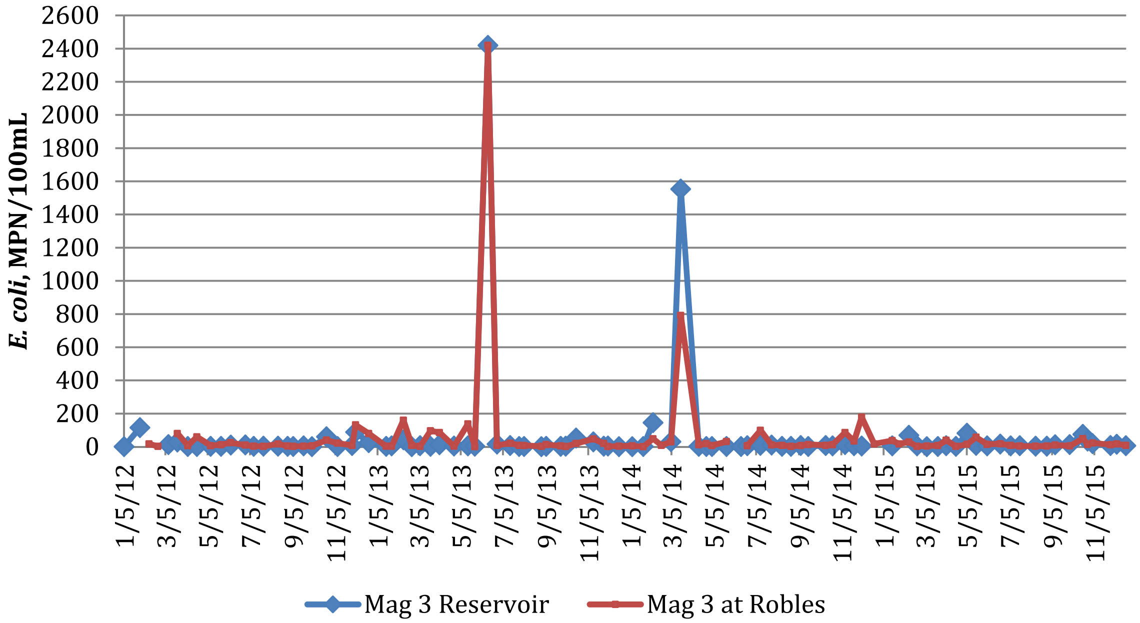
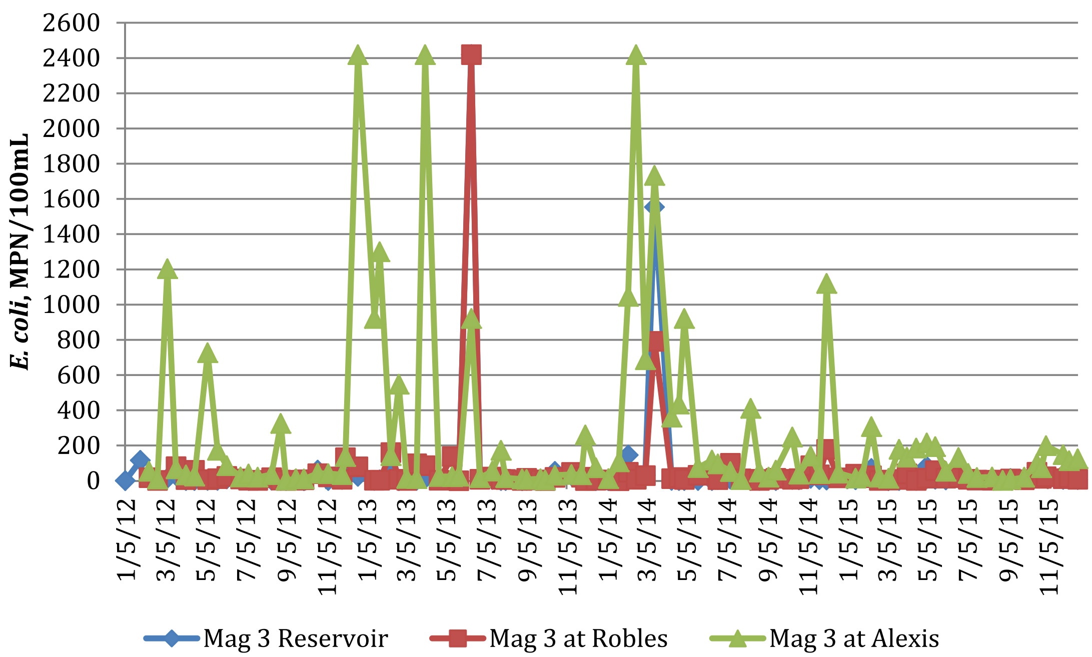


Figure 3-17
***E. coli* at Magnolia III Reservoir, Magnolia III Canal at Robles Drive, and Magnolia Canal III at Alexis Drive, 2011-2015**



Summary of Results for E. coli

- The median *E. coli* values ranges from 2 MPN/100mL at Cascade Shores WTP to 52 MPN/100mL at the Smartville WTP.

- *E. coli* levels for the Banner Cascade Pipeline WTPs have been reduced since completion of the pipeline. There is a slight increase at the downstream WTPs.

- *E. coli* levels increase downstream for the Boardman Canal WTPs and the Deer Creek WTPs. There is no clear trend in the data for the WTPs downstream of Rollins Reservoir. These trends are similar to the Second and 2012 Updates.

- All of the WTPs, except for Smartville, can continue with their current level of treatment of 3/4-log reduction for *Giardia* and viruses under the SWTR. The Smartville WTP is currently operated to achieve 4/5-log reduction for *Giardia* and viruses, and should continue.

- Since the Sunset WTP had more than six *E. coli* monthly medians greater than 200 MPN/100mL, a closer examination of its monthly medians was conducted. The majority of months with higher median levels the Sunset WTP was not in operation. Peak levels can be associated with precipitation, but there are periods when they are not so there are likely other sources contributing *E. coli*.

- Higher *E. coli* levels at the Lake of the Pines WTP are often related to precipitation events and also ranch land along Magnolia III canal where cattle have been observed. Partial encasement of the Magnolia III canal has resulted in a reduction in the frequency and magnitude of peak *E. coli* levels at Alexis Drive.

Evaluation for Giardia and Cryptosporidium

The second round of monitoring for LT2ESWTR began in October 2015 for PCWA's Auburn, Bowman, Foothill, and Sunset WTPs. NID's Elizabeth George and Loma Rica WTPs began the second round of monitoring in October 2016. The remainder of the WTPs are Schedule 4 systems, serving less than 10,000 population, and are not required to begin monitoring for *E. coli* until October 2017. The rule requires bi-weekly *E. coli* monitoring for one year for these smaller plants. If the annual mean of those samples is greater than 10 MPN/100 mL for a lake source or 100 MPN/100mL for a flowing stream source, then the system is considered to be potentially at risk for microbial contamination and must conduct source water monitoring for *Cryptosporidium*. Annual means below these triggers results in Bin 1 classification and no additional action or treatment required.

Using the 2011 to 2015 *E. coli* data, running annual averages (RAA) were calculated for all of the Schedule 4 WTPs, see **Table 3-7,** to provide a sense of whether or not

Cryptosporidium monitoring might be required in the second round of source water monitoring under the LT2ESWTR.

Table 3-7
***E. coli* Running Annual Averages for Schedule 4 System, 2011-2015**

WTP	Minimum RAA	Maximum RAA
Alta	7.9	23.8
Monte Vista	4.9	**144**
Colfax	11.7	52.4
Applegate	37.1	87.3
Cascade Shores	1.8	10.8
Lake of the Pines	41.1	**231.1**
Lake Wildwood	20.9	**102.5**
North Auburn	16.7	29.7
Smartville	46.6	**264**

With a trigger level of 100 MPN/100mL for *E. coli* (based on annual mean), it appears that Smartville and Lake of the Pines WTPs may need to conduct *Cryptosporidium* monitoring. It is also possible that Monte Vista and Lake Wildwood WTPs have the potential to have an annual mean greater than 100 MPN/100mL.

Table 3-8 provides the average of all *Giardia* and *Cryptosporidium* data collected to date at the PCWA Auburn, Bowman, Foothill and Sunset WTPs. The highest 12-month mean is the regulatory compliance point for *Cryptosporidium* under the LT2ESWTR. As the Bin 1 threshold is 0.075 oocysts per liter, currently all four WTPs would be classified as Bin 1 from the data collected to date.

Table 3-8
Summary of LT2ESWTR Round 2 Source Water Monitoring for
PCWA's Auburn, Bowman, Foothill, and Sunset WTPs
October 2015 to November 2016

WTP	***Cryptosporidium*** **Average (oocysts/L)**	***Giardia*** **Average (cysts/L)**
Bowman	0.014	0.013
Auburn	0.029	0.051
Foothill	0	0.007
Sunset	0.021	0

Summary of Results for Giardia and Cryptosporidium

- The data supports the 3/4-log reduction of *Giardia*/viruses under the SWTR and the possible Bin 1 classification of the water treatment plants (2-log reduction of *Cryptosporidium*) under the LT2ESWTR.

Disinfection By-Product Precursors

General Characteristics and Background

Disinfection By-Products (DBPs) are formed when disinfectants added to water react with naturally occurring organic matter or other constituents, such as bromide. Since the Yuba and Bear Rivers do not have detectable levels of bromide, total organic carbon (TOC) is the key precursor for DBPs. In addition, temperature significantly affects the rate of disinfection kinetics and can result in increased levels of DBPs. The most common DBPs are total trihalomethanes (TTHMs), which are suspected carcinogens. Other DBPs, including haloacetic acids (HAA5), are suspected mutagens and teratogens. Potential sources of these organic precursors are plant matter, animal matter, and soil, which can be contributed by general watershed runoff, urban runoff, agricultural runoff, recreation, grazing, and wastewater sources.

The Stage 1 Disinfectants/Disinfection Byproduct Rule (D/DBPR) requires varying levels of TOC removal if the source water TOC concentrations exceed 2 mg/L and a utility uses conventional filtration. TOC was a selected constituent for further evaluation due to its importance in the formation of DBPs and also as a general indicator of organic contamination in water.

Evaluation for TOC

Raw water TOC data was provided by PCWA and NID. **Tables 3-9** through **3-13** provide a summary of TOC data at each of the WTP intake locations. Timeseries graphs showing source water TOC over time are provided in **Section 5** for each WTP.

Table 3-9
Summary of 2011-2015 TOC Levels for
Lake Spaulding via Boardman Canal WTPs, mg/L

WTP	Average	Median
Alta	1.3	1.4
Monte Vista	1.3	1.4
Colfax	1.3	1.4
Applegate	1.5	1.4

Table 3-10
Summary of 2011 – 2015 TOC Levels for
Lake Spaulding via Banner Cascade Pipeline WTPs, mg/L

WTP	Average	Median
Cascade Shores	1.4	1.6
Elizabeth George	1.4	1.5
Loma Rica	1.5	1.5

Table 3-11
Summary of 2011 – 2015 TOC Levels for
Deer Creek Downstream Scotts Flat Reservoir WTPs, mg/L

WTP	Average	Median
Lake Wildwood	1.2	1.2
Smartville	2.4	2.0

Table 3-12
Summary of 2011 – 2015 TOC Levels for
Downstream Rollins Reservoir via Bear River Canal WTPs, mg/L

WTP	Average	Median
Bowman	1.3	1.3
Auburn	1.4	1.3
North Auburn	1.5	1.5
Foothill 1	1.2	1.2
Foothill 2	1.4	1.3
Sunset	1.6	1.3

Table 3-13
Summary of 2011 – 2015 TOC Levels for
Downstream Rollins Reservoir via Bear River, mg/L

WTP	Average	Median
Lake of the Pines WTP	1.5	1.4

Average TOC levels for all WTPs range from 1.2 to 2.4 mg/L. **Figure 3-18** shows that for the Lake Spaulding via Boardman Canal WTPs, TOC levels are similar for all of the WTPs, except during February when Applegate WTP was 1.8 mg/L.

Figure 3-18
Monthly Medians for TOC, Lake Spaulding via Boardman Canal WTPs

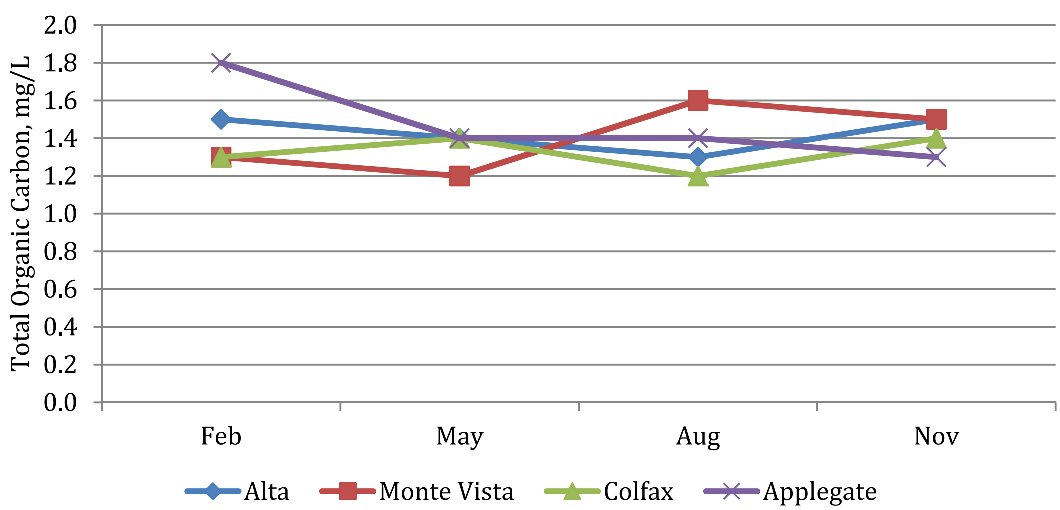


Figure 3-19 shows that for the Banner Cascade Pipeline WTPs, TOC levels are similar for all of the WTPs.

Figure 3-19
Monthly Medians for TOC, Lake Spaulding via Banner Cascade Pipeline WTPs

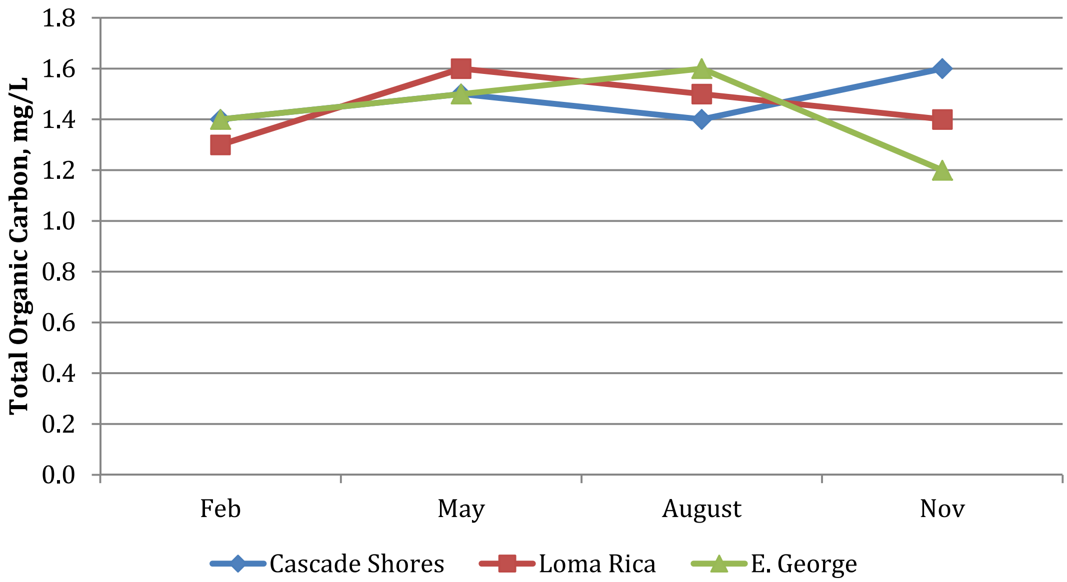
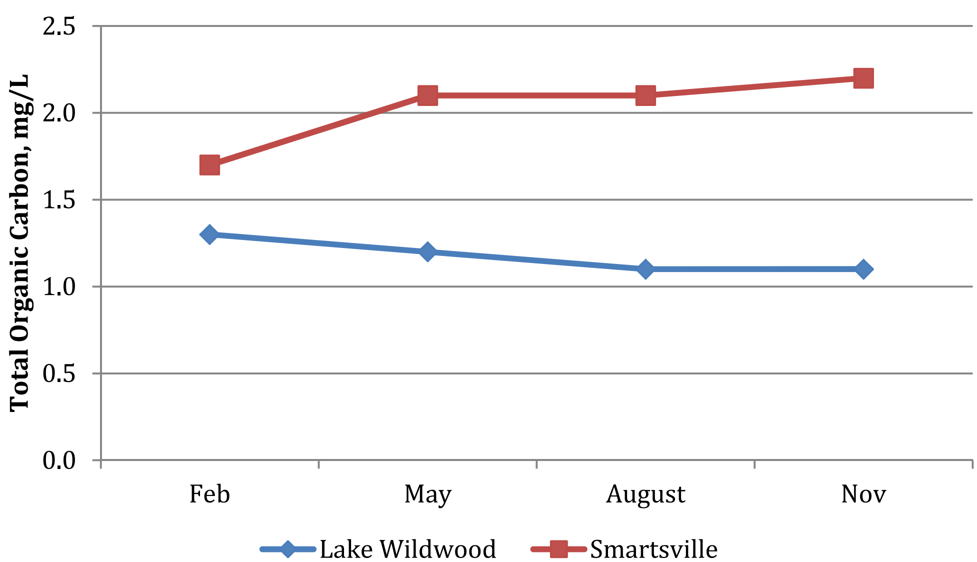


Figure 3-20 shows that TOC increases downstream for the WTPs using Deer Creek downstream of Scotts Flat Reservoir. It has been suggested that this is due to the water entering a natural watercourse, Squirrel Creek, before entering the Smartville WTP, as well as other localized potential contaminant sources, such as grazing.

Figure 3-20
Monthly Medians for TOC, Deer Creek Downstream Scotts Flat Reservoir WTPs



Figures 3-21 and **3-22** show that downstream Rollins Reservoir via Bear River Canal, TOC levels follow no clear pattern.

Figure 3-21
Monthly Medians for TOC, Downstream Rollins Reservoir via Bear River Canal WTPs

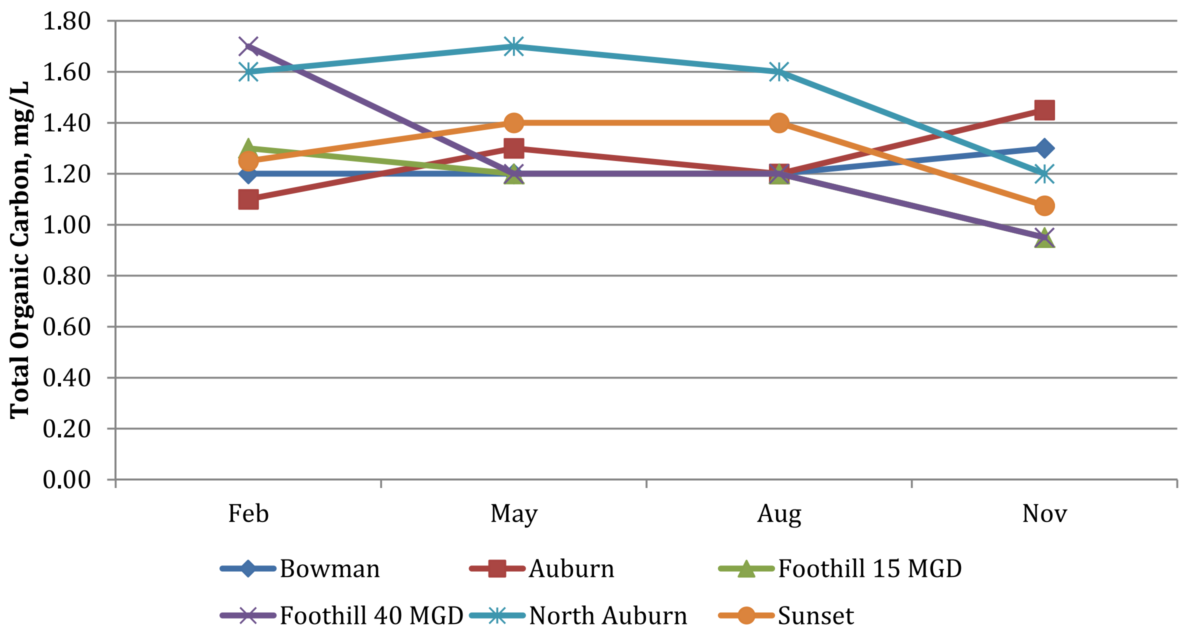
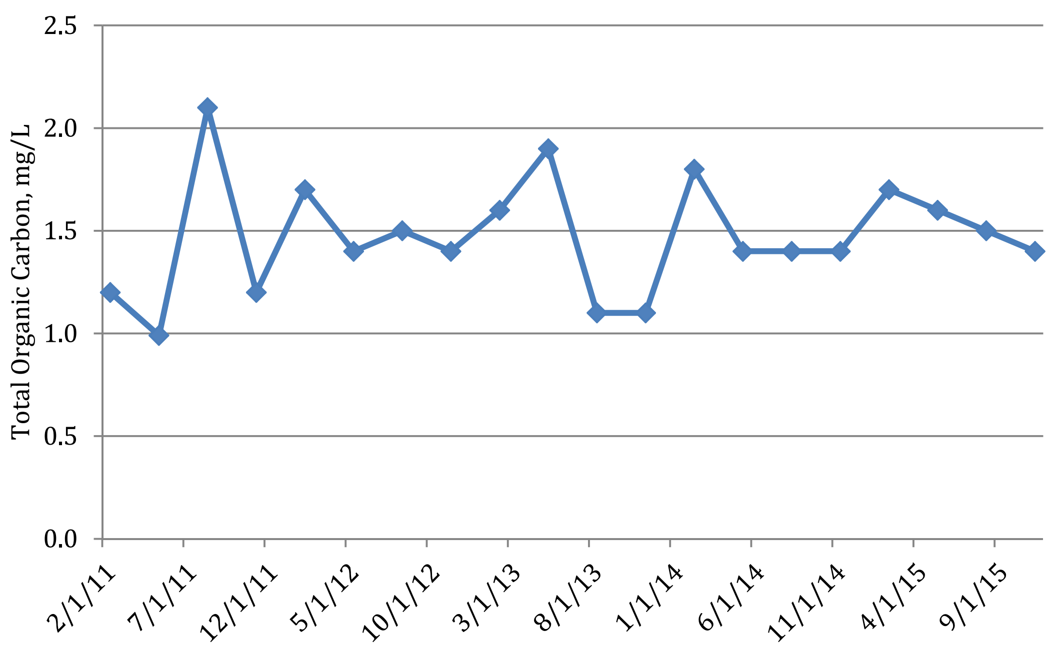


Figure 3-22
Monthly Medians for TOC, Downstream Rollins Reservoir via Bear River (Lake of the Pines WTP)



Summary of Results for TOC

- Average TOC levels for all WTPs range from 1.2 mg/L at Lake Wildwood and Foothill 1 WTPs to 2.4 mg/L at Smartville WTP.
- TOC levels did not increase consistently downstream for similar groupings of WTPs.
- Smartville WTP has the highest TOC levels, likely due to exposure to a natural watercourse (Squirrel Creek).
- TOC levels are seasonally variable, with the peak levels typically occurring during the wet season (late fall to early spring).

Source Water Temperature and DBP Formation Evaluation

Source water temperatures at selected WTPs were evaluated since there were extensive drought conditions over the reporting period. The temperature data was then compared to TTHMs and HAA5 to determine if any correlations could be identified. Applegate and Bowman WTPs were selected for PCWA and Loma Rica, Lake of the Pines and North Auburn WTPs were selected for NID.

As shown in **Tables 3-14** through **3-18**, some WTPs show a stronger increasing trend in temperature through the reporting period. For example, the median and average source water temperature at Lake of the Pines WTP shows a definite increasing trend from 2011 to 2015, about a 5 to 6 °C increase. Also, the Loma Rica WTP average and median source water temperatures show a 3 to 4 °C increase. On the other hand, the median and average source water temperatures for Applegate WTP are similar through the reporting period. This could be due to the PCWA supply system being more open to the atmosphere compared to the NID system, and also due to the lower elevation of PCWA's WTPs.

Table 3-14
Source Water Temperatures for Applegate WTP in °C, 2012-2015

	2012	2013	2014	2015
Minimum	6.3	1.8	5.5	3.6
Maximum	26.7	25.9	25.5	25.4
Average	14.8	14.1	14.7	14.7
Median	14.7	13.5	14.1	14.9

Table 3-15
Source Water Temperatures for Bowman WTP in °C, 2012-2015

	2012	2013	2014	2015
Minimum	4.9	3.6	2.3	5.5
Maximum	19	20.5	18.7	19
Average	11	10.9	12.3	11.1
Median	9.9	10.4	11.9	10.1

Table 3-16
Source Water Temperatures for Loma Rica WTP in °C, 2011-2015

	2011	2012	2013	2014	2015
Minimum	4.0	4.0	4.0	7.0	8.0
Maximum	19.0	23.0	24.0	21.0	25.0
Average	12.4	13.5	14.4	13.8	15.8
Median	13.0	14.0	15.0	13.5	17.0

Table 3-17
Source Water Temperatures for Lake of the Pines WTP in °C, 2011-2015

	2011	2012	2013	2014	2015
Minimum	5.0	5.0	6.0	7.0	6.0
Maximum	20.0	25.0	25.0	27.0	29.0
Average	12.7	15.3	15.8	16.6	17.5
Median	12.0	15.0	16.0	15.0	18.0

Table 3-18
Source Water Temperatures for North Auburn WTP in °C, 2011-2015

	2011	2012	2013	2014	2015
Minimum	6.0	7.0	6.0	7.0	7.0
Maximum	19.0	20.0	21.0	21.0	25.0
Average	12.0	13.1	13.0	13.8	14.8
Median	12.0	12.0	12.0	14.0	14.0

Graphs showing source water temperature with both TTHM and HAA5 were prepared for each selected WTP discussed above. It appears that TTHM formation correlated best at the Loma Rica and Lake of the Pines WTPs, which could be due to the fact that historically the source water temperatures maintained lower levels during the winter than the PCWA WTPs.

From **Figure 3-23** and **3-24**, temperature correlates closer to TTHM formation compared to HAA5 at the Applegate WTP. As the temperature rises and fall, the TTHMs generally follow the same pattern, except in February 2014, when TTHM was high, but temperature was low. This could be due to increased water age or organic carbon levels during the winter.

Figure 3-23
Individual TTHMs and Temperature at Applegate WTP, 2012-2015

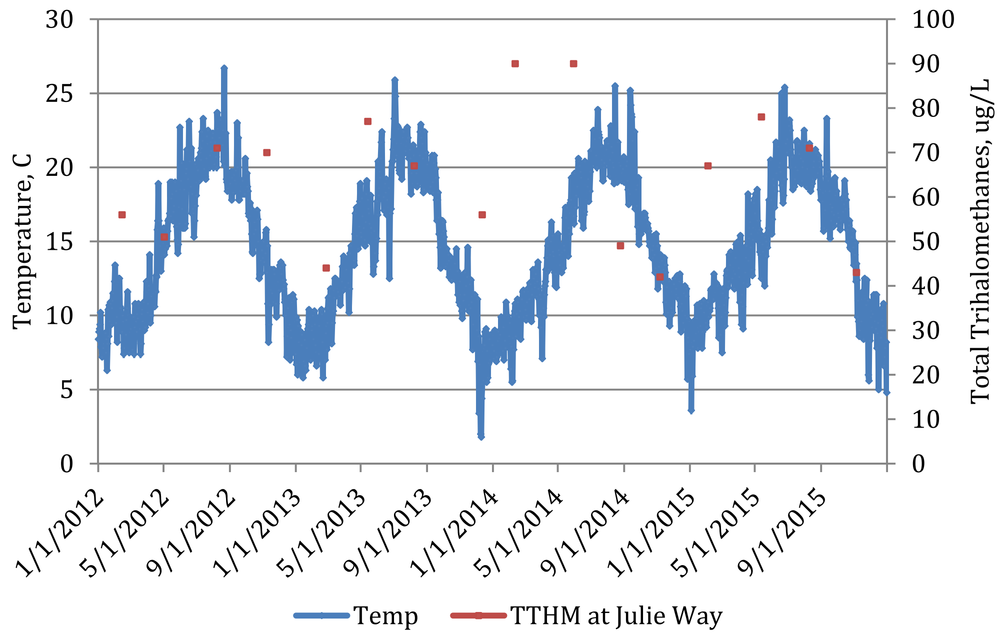


Figure 3-24
Individual HAA5s and Temperature at Applegate WTP, 2012-2015

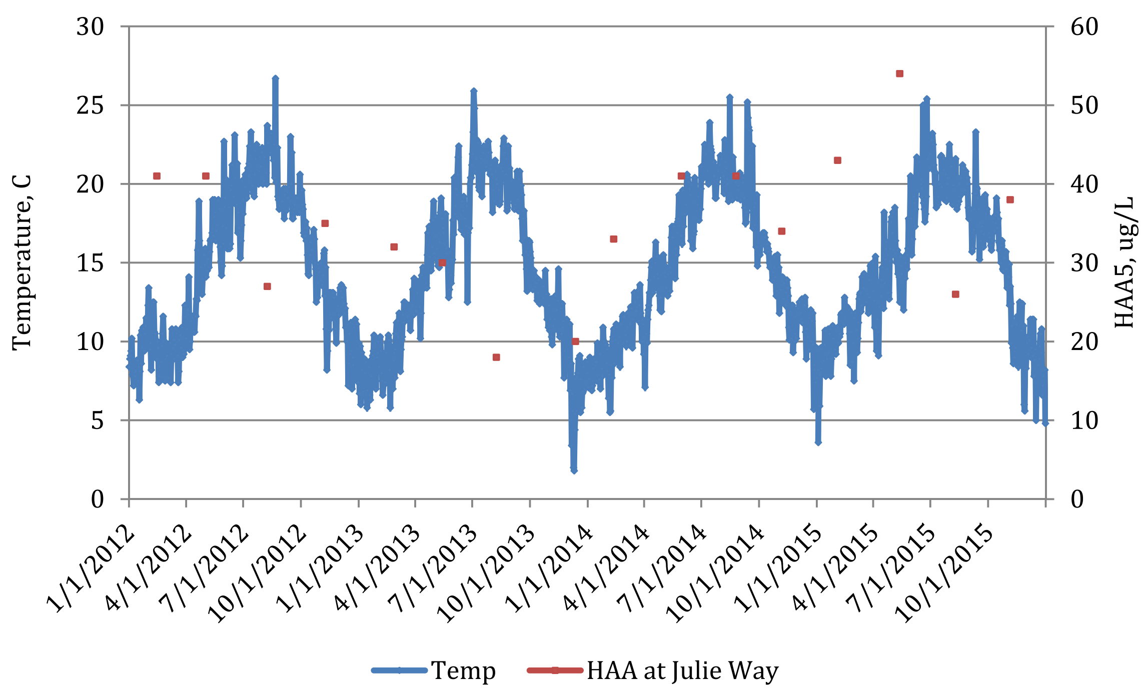


Figure 3-25 shows that TTHM concentration remained stable at the Westwood Dr. Site, despite changes in temperature at the Bowman WTP. The Landis Circle site had noticeably higher TTHM in 2015 compared to 2014, although the highest TTHM occurred in February 2015, when the water temperature was cold. **Figure 3-26** shows that HAA5 does not correlate with temperature at the Bowman WTP. As shown in the figure, HAA5s can be very low when temperatures are high in August and also can be high when temperatures are low, as shown in February 2013.

For the two PCWA WTPs, temperature plays a role in DBP formation but there are also other factors such as water age, pH, and TOC.

Figure 3-25
Individual TTHMs and Temperature at Bowman WTP, 2012-2015

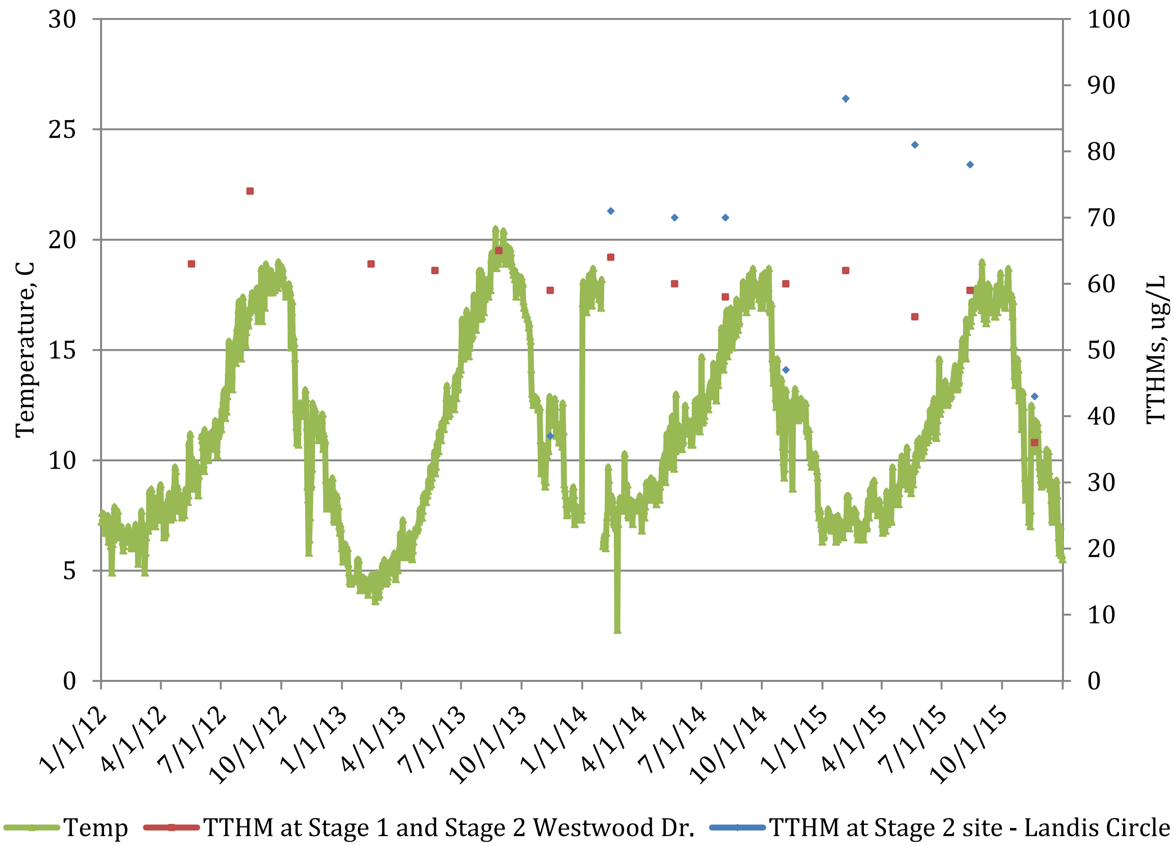
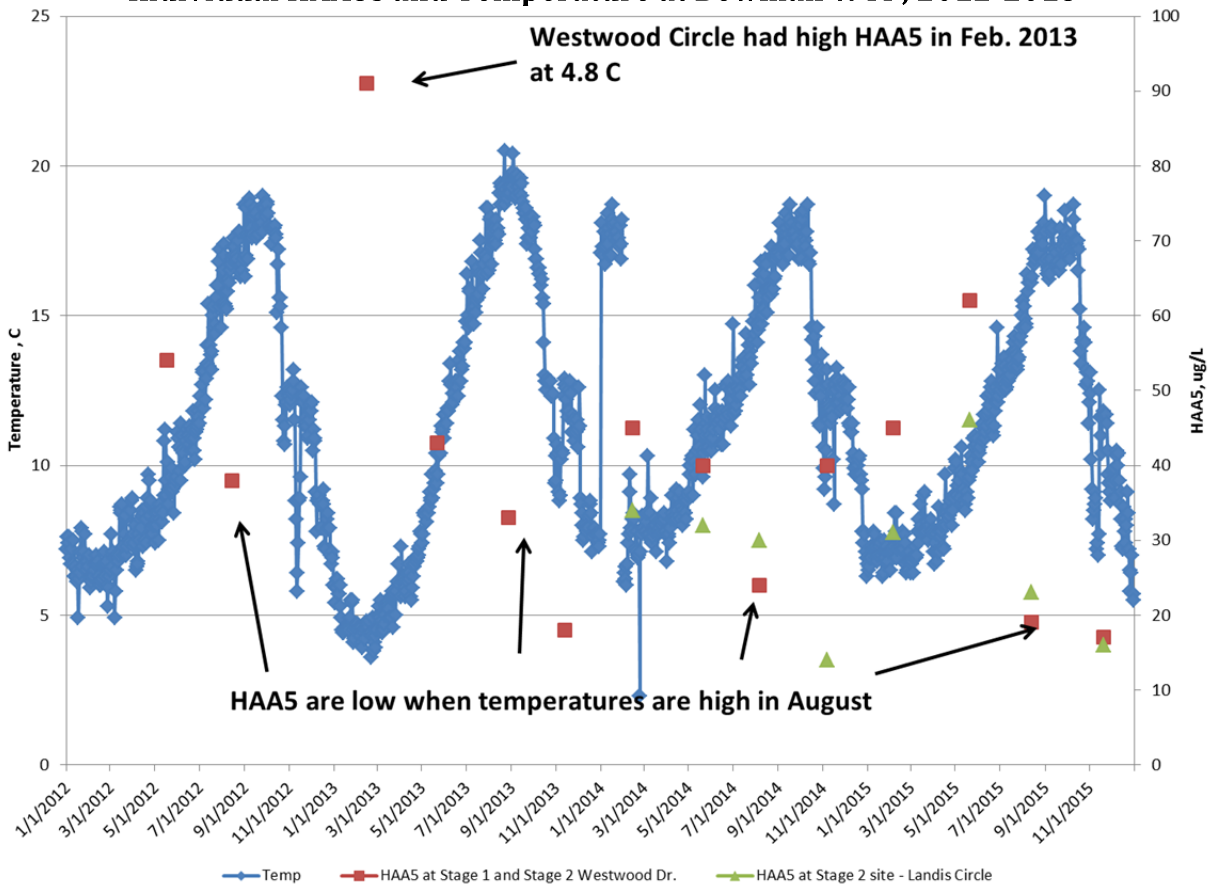


Figure 3-26
Individual HAA5s and Temperature at Bowman WTP, 2012-2015



As shown in **Figure 3-27**, temperature correlates well with TTHM formation at the Loma Rica WTP. With the exception of March 2013 and March 2014, the highest TTHMs occurred during June or September, and the lowest TTHM occurred in December. As shown in **Figure 3-28,** HAA5 formation does not correlate as well with temperature compared to TTHM formation.

Similar to Loma Rica WTP, TTHM formation correlates with temperature at the Lake of the Pines WTP. As shown in **Figure 3-29**, TTHMs were highest in either May or August, and TTHMs were lowest in February or November. As shown in **Figure 3-30**, HAA5 formation does not correlate as well with temperature as TTHM formation.

Compared to Loma Rica and Lake of the Pines WTPs, temperature and DBP formation are less correlated at the North Auburn WTP for both TTHM and HAA5s, as shown in **Figures 3-31** and **3-32**. This could be due to changes in temperature, pH, and TOC content due to algal formation in Rock Creek Reservoir.

Figure 3-27
Individual TTHMs and Temperature at Loma Rica WTP, 2011-2015

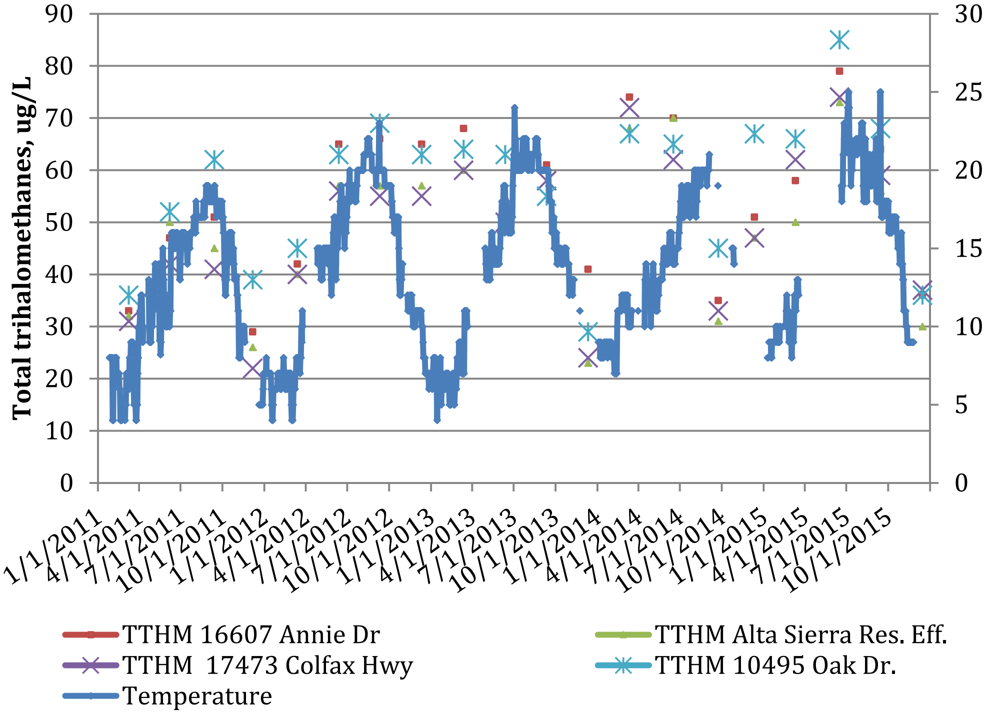


Figure 3-28
Individual HAA5s and Temperature at Loma Rica WTP, 2011-2015

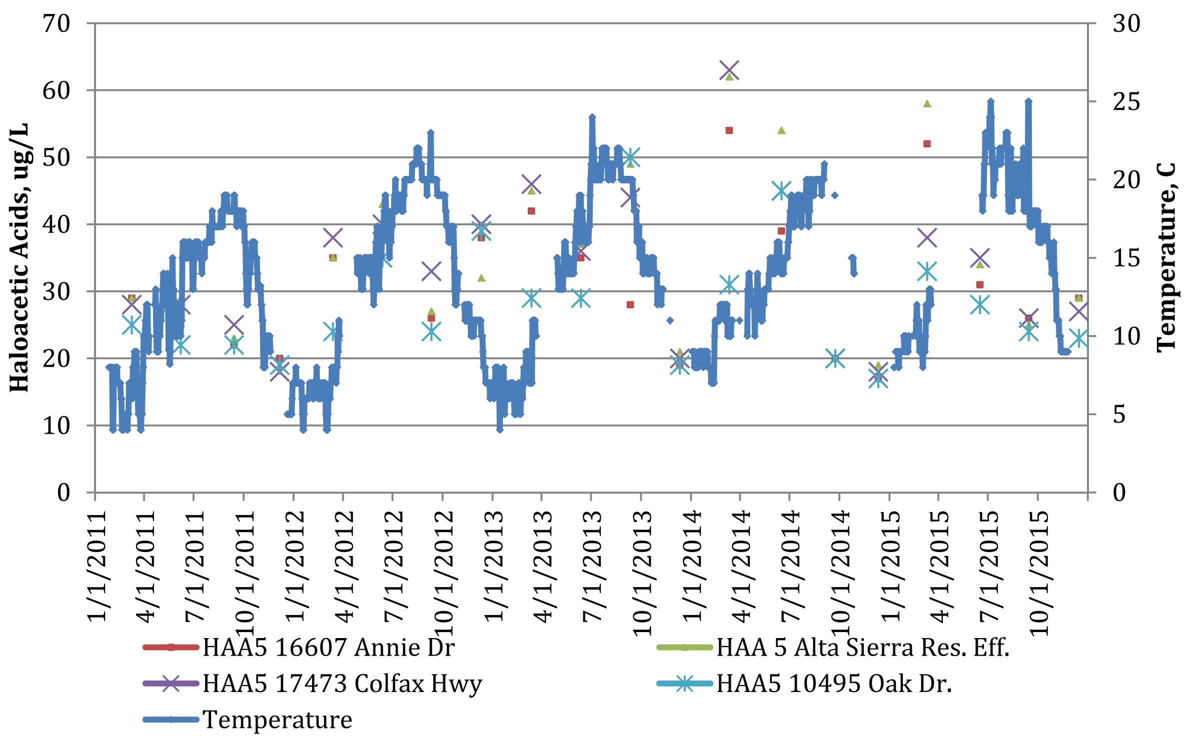


Figure 3-29
Individual TTHMs and Temperature at Lake of the Pines WTP, 2011-2015

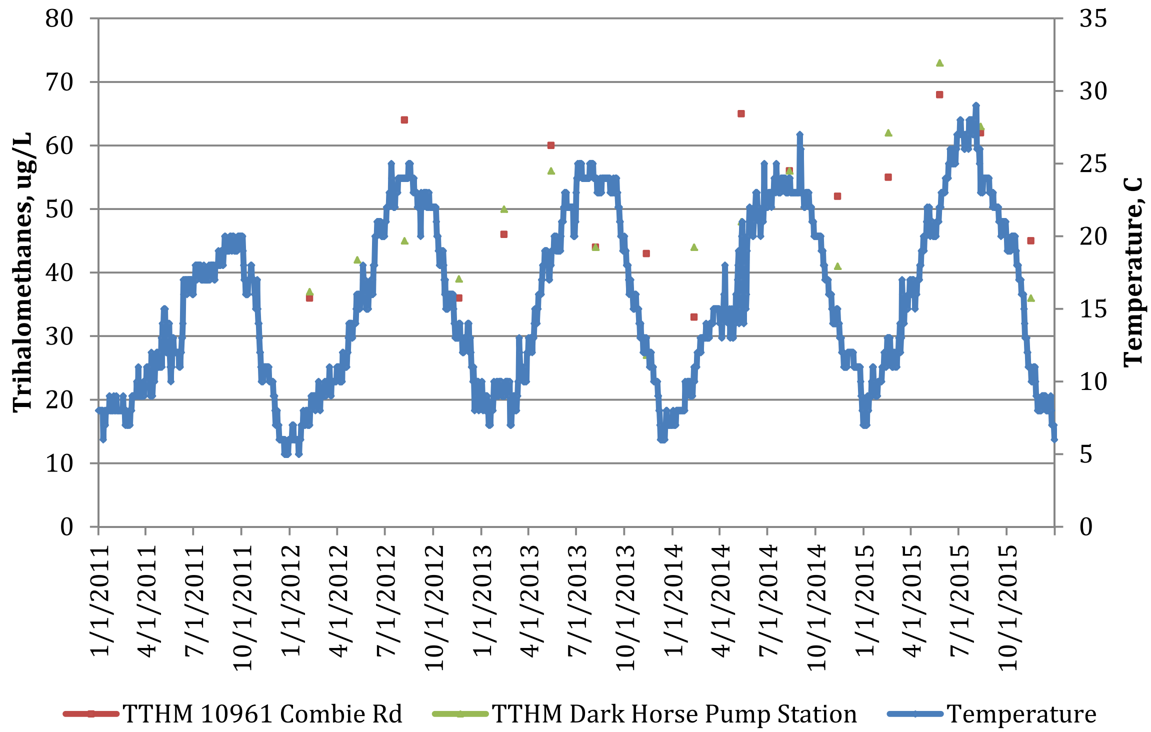


Figure 3-30
Individual HAAs and Temperature at Lake of the Pines WTP, 2011-2015

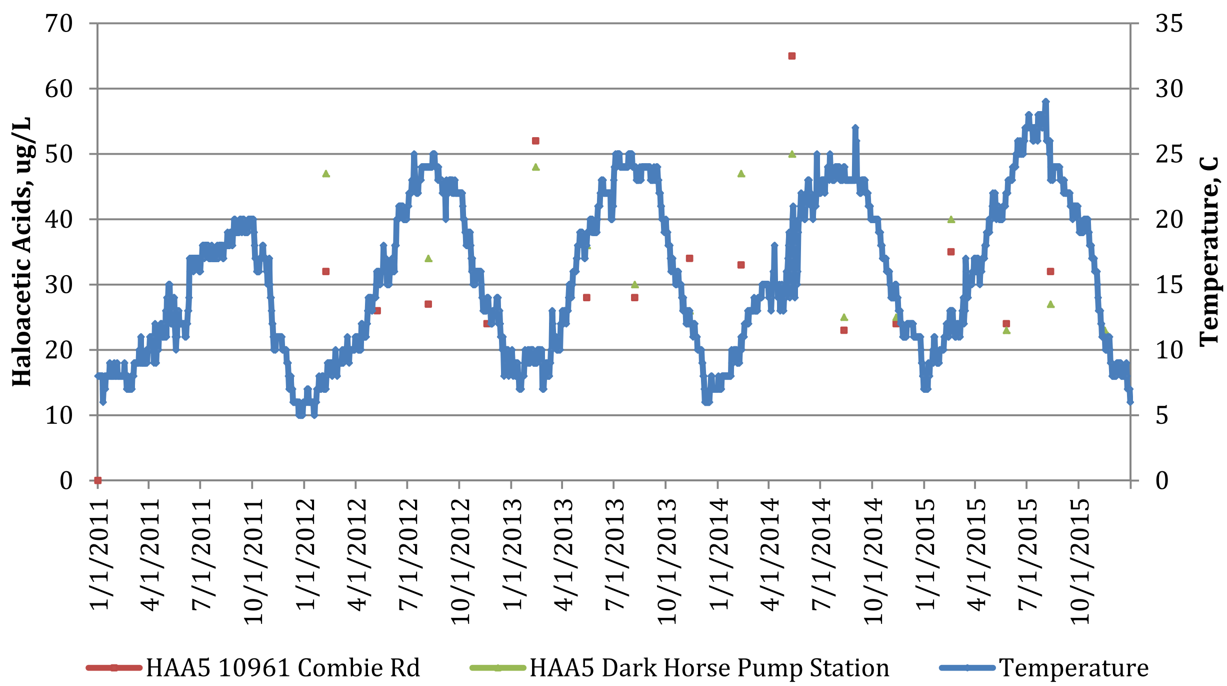


Figure 3-31
Individual TTHMs and Temperature at North Auburn WTP, 2011-2015

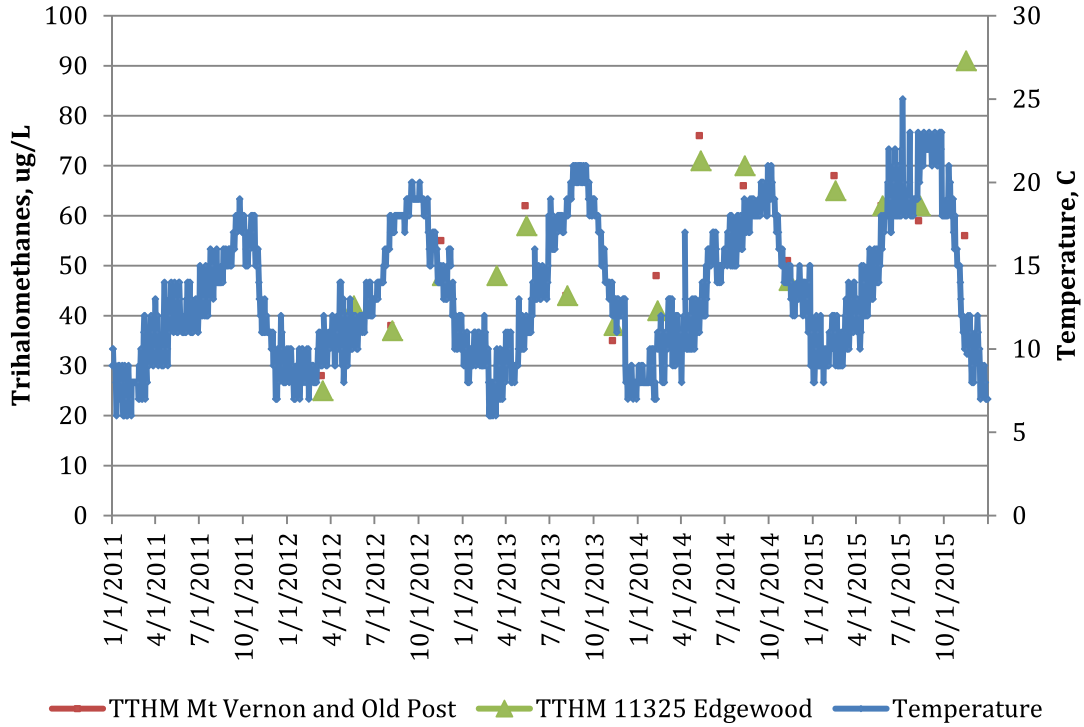
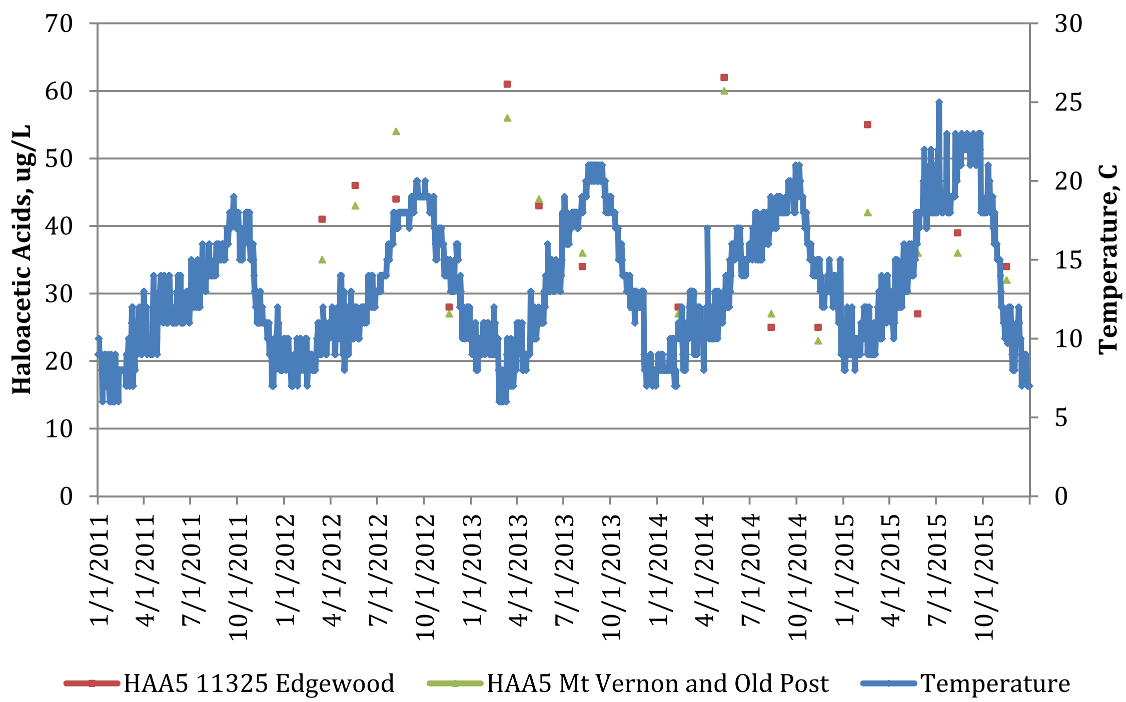


Figure 3-32
Individual HAAs and Temperature at North Auburn WTP, 2011-2015



Summary of Results for Source Water Temperature and DBP Formation

- NID WTPs showed a stronger increasing trend in temperature through the reporting period.

- Temperature plays a role in DBP formation; however it is evident that other factors are also impacting formation (water age, pH, and TOC).

- TTHM formation seems more related to temperature in NID systems compared to PCWA. This could be due to better preservation of colder temperatures in winter at NID WTPs, compared to PCWA WTPs.

- Overall, HAA5 formation is less correlated to temperature than TTHM formation.

This section contains an evaluation of the nine watershed potential contaminant sources selected for review for the 2017 Update. The nine potential contaminating activities that were selected for review as part of the 2017 Update include:

- Canal aquatic herbicide use,
- Livestock grazing,
- Forest activities, including timber harvesting and wildfires,
- Recreation,
- Source water spills,
- Wastewater,
- Urban runoff,
- Mining, including both active and historic, and
- Cannabis cultivation.

The reader is also referred to the Watershed Map, **Figure 2-1,** which provides information on selected activities in the watershed. For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

CANAL AQUATIC HERBICIDE USE

Although there is limited pesticide application in the Yuba/Bear River watershed, it has the potential to be significant in terms of source water quality due to the regulation of many pesticides in drinking water and its proximity of use to the water treatment plants. For that reason, canal operations and maintenance was selected for investigation.

Background

The canals used to collect and transport water from the upper watershed to the lower watershed and to the water treatment plants are owned either by Placer County Water Agency (PCWA), Nevada Irrigation District (NID), or Pacific Gas & Electric (PG&E). These canals can be lined or earthen, and are typically shallow and only slightly sloped. For this reason, there can be times of slow-moving water during the summer months that results in the growth and proliferation of aquatic weeds and algae.

Both PCWA and NID implement seasonal algae control programs as needed, typically sometime between April and October, that are based on chemical control using herbicides. PG&E operates their canals, as well as Rock Creek Reservoir, for the purpose of power generation and does not implement any type of chemical algae control program. They do not add any pesticides or herbicides to the canal or reservoir water. They utilize mechanical methods, such as drawdown to dry out the canals and pressure washing, to address aquatic weeds and algae.

The canals that are subject to treatment with aquatic pesticides range from Alta and Elizabeth George Water Treatment Plants (WTPs) down to the communities of Rocklin and Smartville.

Seasonal Patterns

During the treatment season, April through October, any portion of the canals in the PCWA and NID systems may be treated with aquatic pesticides to effectively control aquatic pests. Not all of these locations are used throughout the year, nor are all locations treated regularly.

Related Constituents

PCWA regularly utilizes aquatic pesticides on an as-needed basis to control the growth of aquatic vegetation that impedes the efficient and reliable flow of water. The aquatic pesticides used for aquatic vegetation control during the study period include:

- Cutrine-Plus (copper ethanolamine herbicide)
- Cutrine–Ultra (copper ethanolamine herbicide)
- Algimycin-PWF (copper chelated based algaecide/cyanobacteriocide)
- Phycomycin (sodium carbonate peroxyhydrate algaecide)
- Round Up Custom (glyphosate herbicide)
- Reward (diquat herbicide)
- Clearcast (imazamox herbicide) – added in 2016

NID also utilizes aquatic pesticides on an as-needed basis to control aquatic vegetation. The aquatic pesticides used during the study period include:

- Cutrine–Ultra (copper ethanolamine herbicide)
- Cutrine-Plus (copper ethanolamine herbicide)
- Aquamaster (glyphosate herbicide) – removed in 2015
- Round Up Custom (glyphosate herbicide)
- Nautique (copper carbonate herbicide)
- Cascade (dipotassium salt of endothall herbicide)
- Green Clean Pro (sodium carbonate peroxyhydrate algaecide)
- Captain (copper ethylenediamine complex chelated copper herbicide)
- Phycomycin (sodium carbonate peroxyhydrate algaecide)

Cutrine-Plus is a liquid that is applied to flowing water using a continuous drip system to achieve desired aquatic pest control with the least amount of chemical use. The active ingredient is copper, which has a secondary drinking water standard of 1 milligram per liter (mg/L).

Cutrine-Ultra has the same active ingredient as Cutrine-Plus, but with an added emulsified surfactant/penetrant.

Algimycin-PWF is a copper-based algaecide that is a liquid formulation designed to effectively control a broad range of algae and cyanobacteria growth. Control of certain forms of algae and cyanobacteria can aid in the reduction of taste and odor problems. Dosage rates and frequency of treatment depends on the sensitivity of species present, the extent/biomass of the bloom, and the depth of the growth present in the water column. The active ingredient is copper, which has a secondary drinking water standard of 1 mg/L.

Phycomycin is a granular herbicide containing sodium carbonate peroxyhydrate that dissolves in the water column. It is effective against algae in slow moving water. It degrades into water and oxygen in 20 minutes or less.

Round Up Custom is applied as a liquid on the inside of canal banks for emerged aquatic plants and other weeds growing at the water line and to floating-leaved aquatic weeds. This is a non-selective aquatic and terrestrial herbicide. It is mixed with a non-ionic surfactant. The active ingredient is glyphosate, which has a primary drinking water standard of 0.7 mg/L.

Reward is also applied as a liquid on the inside of canal banks for emerged aquatic plants and other weeds growing at the water line and to floating-leaved aquatic weeds. This is mixed with a non-ionic surfactant. The active ingredient is diquat, which has a primary drinking water standard of 0.02 mg/L.

Clearcast is a liquid sprayed on the inside of canal banks for emerged aquatic plants and other weeds growing at the water line and to floating aquatic weeds. This may be mixed with a non-ionic surfactant. The active ingredient is imazamox, which does not have a drinking water standard.

Nautique is an aquatic herbicide that is a double chelated copper formulation that provides effective control of floating, submersed, and immersed aquatic plants. The copper carbonate is 15.9 percent, which is equivalent to metallic copper of 9.1 percent. Nautique can be applied directly as a surface spray, subsurface through trailing weighted hoses, or in combination with other aquatic herbicides and algaecides, surfactants, sinking agents, polymers, or penetrants. This product can be applied diluted or directly. The active ingredient is copper, which has a secondary drinking water standard of 1 mg/L.

Cascade is an aquatic herbicide that contains the dipotassium salt of the active ingredient endothall (40.3 percent). Cascade is a liquid concentrate soluble in water which is effective against a broad range of aquatic plants, as a contact herbicide. Dosage rates range from 0.5 to 5.0 mg/L. The drinking water restrictions on the label are to ensure that consumption of water by the public is allowed only when the concentration of endothall in the water is less than the primary drinking water standard of 0.1 mg/L. The drinking water setback distance from functioning potable water intakes is greater than or equal to 600 feet. Cascade should be sprayed on the water or injected below the water surface and should be distributed as evenly as possible. It may be applied as a concentrate or diluted with water depending on the equipment.

Green Clean Pro is an organic granular algaecide containing sodium carbonate peroxyhydrate. Green Clean Pro degradation byproducts include sodium carbonate, carbon dioxide, bicarbonate carbonate, and hydrogen dioxide.

Captain is a chelated copper aquatic herbicide used against algae and elodea. Captain is administered into canals through a drip method. The active ingredient in Captain is copper ethylenediamine complex. Copper has a secondary drinking water standard of 1 mg/L.

Presence in the Watershed

The typical application area for Round Up and Reward products is on the inside banks and adjacent areas of canals and drains located in predominately rural settings away from inhabited dwellings utilizing a back-pack sprayer.

PCWA does not apply copper based herbicides 300 yards upstream of the intake to any water treatment plant. NID does not apply copper based herbicides ½ mile upstream of the intake to any water treatment plant. Generally, the water treatment plants by-pass the canal water during the application of copper based aquatic pesticides. Copper sulfate has not been used since 2012 and has been replaced by other products depending on the algae present.

For both agencies, an application schedule is created each year by the Weed and Brush Supervisor (for PCWA) or the Assistant Maintenance Superintendent Vegetation Control (for NID) detailing the canals to be treated and the dates that they will be treated. This calendar is provided to each of the affected water treatment plants, other water treatment plants and customer services department (which is posted on their website). Affected customers are notified of treatments per customer request or general notification through the Agency newsletter. Affected water treatment plants are again notified the day before the application of copper based aquatic pesticides. A scheduled application of aquatic pesticide may be cancelled if it is determined by the Weed and Brush Supervisor/Assistant Maintenance Superintendent Vegetation Control that the application will have minimal or no effect on the targeted aquatic pests.

The typical application area for copper-based products are in canals located in predominately rural settings away from inhabited dwellings utilizing a continuous drip system to maintain a desired dose rate over the treatment period. There are twenty-one application sites in the PCWA canal system; these are shown in **Table 4-1**. The goal is to treat aquatic vegetation frequently when vegetation is small, in order to minimize buildup of vegetation and potential dissolved oxygen depletion due to decaying vegetation. The sodium carbonate peroxyhydrate products are manually applied in slow moving waters and along the edge of some reservoirs.

The dose rate is dependent on the amount of algae found during a pre-application inspection of the canal to be treated and usually ranges from 0.4 mg/L to 1.0 mg/L, with most canals receiving a dosage that results in a copper concentration of 0.8 mg/L at the point of application. **Table 4-2** provides a summary of the amount of the herbicides applied from 2011 through 2015 by PCWA. **Table 4-3** provides a summary of the amount of all herbicides applied from 2011 through 2015 by NID.

Table 4-1
Permanent Herbicide Application Points in PCWA Canal System

Boardman at Clipper Gap (YB 179) [1]
Boardman at Colfax Header Box (YB 49)
Boardman at Foothill WTP (YB 78)
Boardman at Heather Glenn and 49 Spill [1]
Boardman at Luther and Channel Hill Road
Boardman at McCrary Reservoir (YB 92)
Boardman below Mammoth Reservoir (YB 81)
Bowman Canal (YB 87)
Caperton at Clark Tunnel Road
Caperton below Caperton Reservoir [1]
Cedar Creek (YB 96) [1]
Dutch Ravine at Ridge and Taylor Road
Freeman and Shockley at Luther Road
Lower Antelope and Antelope Stub (YB 181A)
Lower Greeley (YB 91)
Middle Fiddler Green at Raccoon Hollow
Newcastle at Head of South Loop Canal
Perry at Mammoth Drive and Hooter Spill
Red Ravine at Gilardi Road
Shirland at Pacific Ave. (YB 147)
Upper Fiddler Green at RR Spill

[1] Application sites that may affect PCWA water treatment plants

Table 4-2
PCWA 2011 through 2015 Herbicide Application[1,2]

Month	2011			2012[3]			2013		2014				2015[3]	
	Cutrine (gal)	Copper Sulfate (lbs)	Algimycin PWF (gal)	Cutrine (gal)	Copper Sulfate (lbs)	Algimycin PWF (gal)	Cutrine (gal)	Algimycin PWF (gal)	Cutrine (gal)	Cutrine Granular (lbs)	Algimycin PWF (gal)	Captain (gal)	Cutrine (gal)	Algimycin PWF (gal)
April	71.50	25.00	0.00	50.5	0.00	34.50	85.2	12.00	73.00	0.00	18.50	0.00	64.00	15.50
May	110.00	25.00	92.00	133	10.00	52.00	110	58.00	107.00	0.00	53.00	0.00	106.00	17.00
June	100.75	30.00	62.75	141.2	17.00	63.10	149.8	70.85	191.50	200.00	73.00	0.00	111.30	55.50
July	130.25	0.00	64.00	150.5	40.00	69.50	158	77.00	94.50	0.00	66.50	46.50	113.00	65.00
August	140.25	0.00	70.00	184	0.00	79.00	160.5	70.00	65.00	21.00	65.00	85.50	119.50	61.00
September	142.50	0.00	61.00	177.25	7.00	48.00	141	70.00	51.50	40.00	57.00	68.00	107.50	33.50
October	121.50	35.00	23.50	128	0.00	86.00	71.5	62.50	73.00	0.00	67.00	0.00	60.50	46.00
Total	**816.75**	**115.0**	**373.25**	**964.45**	**74.0**	**432.1**	**876.0**	**420.35**	**655.5**	**261.0**	**400.0**	**200.0**	**681.8**	**293.5**

[1] There is 0.909 lbs of available copper per gallon of Cutrine
[2] There is 0.512 lbs of available copper per gallon of Algimycin PWF
[3] There were five pounds of cutrine granular applied in 2012 and 2015

Table 4-3
NID 2011 through 2015 Herbicide Application[1,2]

Herbicide	2011	2012	2013	2014	2015
Aquamaster (gal)		648.25	331.625	4.5	0.00
Captain (gal)		1136.6	1659.75	2109.8	2111.5
Cascade (gal)	226	270	255	155.1	191.55
Cutrine (gal)	2034	1505.75	1629.5	1093.05	1314
Green Clean Pro (lbs)	0.00	0.00	0.00	0.00	175
Nautique (gal)	3311	3547.25	3167.25	3104.5	3357.5
Phycomycin (lbs)		37.5	40.35	30	43
Round Up Custom (gal)		0.00	323.375	647.5	1045.5

[1] There is 0.909 lbs of available copper per gallon of Cutrine Plus
[2] There is 0.96 lbs of available copper per gallon of Nautique

A post assessment of the treated canals is performed within two weeks of the aquatic pesticide application to assess the effectiveness of the treatment.

Table 4-4 provides a summary of the herbicide applications that may impact the various water treatment plants for PCWA and NID.

Regulation and Management

Both PCWA and NID were previously regulated under General National Pollutant Discharge Elimination System (NPDES) Order (2004-0009-DWQ) and have converted to coverage under the new General NPDES Order (2013-0002-DWQ) from the State Board for their pesticide application programs. The current permits included a Notice of Intent (NOI), Aquatic Pesticide Application Plan (APAP), and Notice of Applicability (NOA). The General NPDES Order (2013-0002-DWQ) includes implementation of a monitoring program and Best Management Practices (BMPs).

PCWA aquatic pesticide applications are administered by an outside consultant for Pest Control Advisor Services, who maintains a California Pest Control Advisor License and a California Qualified Applicator Certificate. All applications are made in conformance with current regulations and according to Federal Insecticide Fungicide and Rodenticide Act (FIFRA) label instructions, Department of Pesticide Regulation and Department of Public Health on the use of each chemical. Round-up Custom, Garlon4, Dimension, and Liberate are used to keep walkways and other areas clear for patrolling canals, however, these products are not used inside the berm of the canal.

NID aquatic pesticide applications are administered by the Assistant Maintenance Superintendent Vegetation Control who maintains a California Pest Control Advisor License and a California Qualified Applicator Certificate. All applications are made in conformance with current regulations and according to FIFRA label instructions, Department of Pesticide Regulation, and Department of Public Health on the use of each chemical. Round Up Custom is used to keep right-of-ways clear along canals.

Table 4-4
Application of Products Directly to Canals for Water Treatment Plants

Cedar Creek and Boardman Canals	**Colfax, Applegate and Monte Vista WTPs**	**Active Ingredients**
Cutrine or Algimycin-PWF Copper Sulfate Pentahydrate[1]		0.909 or 0.512 Pounds Copper per Gallon Metallic Copper 25.00%
- Applications of Cutrine/Algimycin-PWF and/or Copper Sulfate occur between April and October. Applications are made at least 0.8 miles above the Colfax WTP, 0.5 miles above Applegate WTP and 0.8 miles above Monte Vista WTP.		
Bowman Canal	**Bowman WTP**	**Active Ingredients**
Cutrine or Algimycin-PWF Copper Sulfate Pentahydrate[1]		0.909 or 0.512 Pounds Copper per Gallon Metallic Copper 25.00%
-Applications of Cutrine/Algimycin-PWF and/or Copper Sulfate occur between April and October. Applications are made at least 1.4 miles above of the Bowman WTP.		
Boardman Canal	**Auburn WTP**	**Active Ingredients**
Cutrine or Algimycin-PWF Copper Sulfate Pentahydrate[1]		0.909 or 0.512 Pounds Copper per Gallon Metallic Copper 25.00%
-Applications of Cutrine/Algimycin-PWF and/or Copper Sulfate occur between April and October. Applications are made at least 3.0 miles above of the Auburn WTP.		
Caperton Canal	**Sunset WTP**	**Active Ingredients**
Cutrine Copper Sulfate Pentahydrate[1]		0.909 Pounds Copper per Gallon Metallic Copper 25.00%
-Applications of Cutrine Plus and/or Copper Sulfate occur between April and October. Applications are made at least 2.0 miles above of the Sunset WTP.		
Newtown Canal	**Lake Wildwood WTP**	**Active Ingredients**
Cutrine Round Up Custom		0.909 Pounds Copper per Gallon Glyphosate 53.8%
-Applications of Cutrine occur between April and October. Applications are made at least 0.5 mile above of the Lake Wildwood WTP. The application is 0.5 ppm. - Round Up Custom is applied only as needed, at a 1.0 percent solution, and only to foliage. – Lake Wildwood WTP is off-line for 24 hours after a treatment.		
Meade & Town Canals	**Smartville WTP**	**Active Ingredients**
Cutrine Round Up Custom		0.909 Pounds Copper per Gallon Glyphosate 53.8%
-Applications of Cutrine occur only on Meade Canal between April and October. Applications are made at least 1.0 mile above of the Smartville WTP. The application is 1 ppm. - Round Up Custom is applied only as needed, at a 1.0 percent solution, and only to foliage. – Canals are dosed separately to allow Smartville WTP to run on untreated water.		

Table 4-4 Cont'd
Application of Products Directly to Canals for Water Treatment Plants

Magnolia III Canal	**Lake of the Pines WTP**	**Active Ingredients**
Cutrine Round Up Custom		0.909 Pounds Copper per Gallon Glyphosate 53.8%
-Applications of Cutrine occur between April and October. Applications are made at least 1.25 mile above of the Lake of the Pines WTP. The application is 1 ppm. - Round Up Custom is applied only as needed, at a 1.0 percent solution, and only to foliage. - WTP is off-line for 24 hours after a treatment.		
Combie Ophir III Canal	**North Auburn WTP**	**Active Ingredients**
Copper Sulfate Pentahydrate Round Up Custom		Metallic Copper 25.00% Glyphosate 53.8%
-Applications of Copper Sulfate occur between April and October. Applications are made at least 0.5 mile above of the North Auburn WTP. The application is 0.5 ppm. - Round Up Custom is applied only as needed, at a 1.0 percent solution, and only to foliage. - WTP is off-line for 24 hours after a treatment.		
Cascade Canal	**Loma Rica WTP**	**Active Ingredients**
Copper Sulfate Pentahydrate Round Up Custom		Metallic Copper 25.00% Glyphosate 53.8%
-Applications of Copper Sulfate occur between April and October. Applications are made at least 0.5 mile above of the Loma Rica WTP. The application is 0.5 ppm. - Round Up Custom is applied only as needed, at a 1.0 percent solution, and only to foliage. - WTP is off-line for 24 hours after a treatment.		

[1] Copper Sulfate was only used for spot treatment on an as needed basis prior to 2013. Round Up Custom is applied at a 1.75 percent solution and is only applied to vegetation along the edge of the canal, not into the water (rarely used).

All PCWA and NID representatives involved with the transportation and/or application of pesticides are either Qualified Applicators or work with a Qualified Applicator. Annually all applicators attend a training session on the mixing, loading and application of pesticides. All new staff are required to attend the same training before being permitted to transport or apply any pesticides. The training is conducted by a licensed and/or certified Pest Control Advisor / Qualified Applicator.

In adherence with the NPDES permits issued to PCWA and NID, water quality tests are performed in the receiving waters. NID is required to sample Squirrel Creek, Deadman's Ravine, and Sailor's Ravine for copper and glyphosate. Field tests are performed before the application (background monitoring), during the application (event monitoring), and within seven days after the application of aquatic pesticides (post-event monitoring) to demonstrate the full restoration of water quality and protection of beneficial uses of the receiving waters following aquatic pesticide application. Water samples are also collected at the same time and area to be analyzed at an independent lab for the active ingredient in the aquatic pesticide being used.

The NPDES permits also require implementation of best management practices. This includes; herbicide spill prevention, selection of appropriate herbicides and application rates, education of staff, and coordination with water users.

Monthly reports on the amounts of pesticide used is prepared by PCWA and NID and sent to their respective County Agricultural Commissioners by the Weed and Brush Supervisor/Assistant Maintenance Superintendent of Vegetation Control. An annual report is sent to the State Water Resources Control Board (State Board) and Central Valley Regional Water Quality Control Board (Regional Board) in compliance with the NPDES permit. The annual report to the State includes the amounts of aquatic pesticide used, testing sites, the results of water quality testing, and compliance with the permit. There are also 24-hour and five day non-compliance reports due to the State Board and Regional Board.

The NPDES permit requires that PCWA and NID implement BMPs to protect water quality. This includes spill prevention, appropriate application rates, staff education, and coordination with users of the treated water.

Water Quality Issues and Data Review

A review of water quality from the PCWA and NID water treatment plants shows that there have been no detects of glyphosate or diquat in the source water. Also, copper levels in the treated water are either non-detectable or well below the secondary MCL of 1 mg/L and the Action Level of 1.3 mg/L.

Source Water Protection Activities

PCWA and NID both implement direct coordination between the aquatic herbicide application staff and the water treatment plant operations. This prevents the treated water from entering the plants and minimizes the vulnerability to the activity.

LIVESTOCK GRAZING

Background

In the Yuba/Bear River watershed, grazing can occur on either pastureland, which is irrigated, or rangeland. Livestock in the Yuba/Bear River watershed primarily includes cattle and sheep. There is a relatively small livestock population in the watershed, especially rangeland grazing cattle. Cattle are a known host for *Cryptosporidium parvum* and *Giardia*. Just one infected animal can shed a large number of *Cryptosporidium parvum* oocysts and *Giardia* cysts. Calves are present year-round in dairies; calves are known to be able to transmit *Cryptosporidium*, and a single infected calf can shed millions of oocysts. Livestock grazing can impact water quality by contributing sediment, total organic carbon (TOC), nutrients, and pesticides used for weed control in pastures.

Irrigated pastureland is included as part of the Irrigated Lands Regulatory Program. Good management of pastureland is no longer voluntary through elective participation in the Rangeland Water Quality Management Program. Non-irrigated rangeland grazing mostly occurs higher in the watershed on United States Forest Service (USFS) lands and is managed under lease conditions set by those agencies or on other private lands.

Information for this section was obtained from several agencies' websites and from discussions with personnel from the State Board, the Regional Board, the USFS, as well as staff at UC Davis.

Seasonal Patterns

The risk of loading viable *Cryptosporidium parvum* oocysts and *Giardia* cysts into the river system from cattle in the watershed appears to be highest during storm events. Storms can cause sheet flow over rangeland areas that can pick up fecal matter from grazing livestock. Storm runoff from rangeland grazing areas is more likely to carry *Cryptosporidium parvum* during the calving season since calves are more likely to be infected with the pathogen than adult cows. Spring is calving season and therefore is the time of peak risk of infected herds and also still a time when oocysts likely survive well. Early summer can also result in oocysts being contributed from young calves as they graze with cows.

Peak *Cryptosporidium* shedding occurs within a very limited group of calves (two months of age[1]), and therefore manure management for the young is of far more importance than manure management for adult animals. Since transport of *Cryptosporidium* overland is inefficient in most range environments, rangeland located proximally to rivers and tributaries is of primary concern. Survival of oocysts is also likely affected by seasonal temperature. Research shows that when the temperature of a cow fecal pat exceeds 104°F the *Cryptosporidium* will die within a matter of hours[2]. When air temperatures exceed 78°F, a fecal pat in direct sunlight will achieve the required 104°F. The killing rate declines as the temperature or sunlight exposure declines so that fecal pats deposited in winter (January through April) may provide temperature conditions that allow for oocysts survival for 90 plus days.

Giardia and *Cryptosporidium* survive well in cool, moist environments and can be transported overland. However, freeze-thaw cycles reduce survivability. Overland transport may be required which will reduce the viability of oocysts; studies show that grassland buffers can capture up to 99.9 percent of oocysts[6].

Another source is created when ranchers use check dams on small watercourses to create waterholes for grazing livestock. Ranchers typically release the boards on these check dams in anticipation of storm events, to prevent flooding of the rangeland upstream of the

[1] University of California Agriculture and Natural Resources, California Rangeland Watershed Laboratory, Department of Plant Sciences, University of California at Davis. www.Rangelandwatersheds.ucdavis.edu/MWQIC/MWQIC/Indicators_Crypto_window.html. May 13, 2015.

[2] www.Rangelandwatersheds.ucdavis.edu/MWQIC/MWQIC/Indicators_Crypto_window.html

check dam. Close proximity of fecal waste to water bodies would reduce the opportunity for desiccation, which can cause inactivation of oocysts.

High levels of coliform in the Yuba/Bear River system can be associated with precipitation, as discussed in **Section 3**. Even though coliform are not considered a good indicator for *Cryptosporidium* and *Giardia*, the bacteria data available for the water treatment plants supports the theory that storm events are the time of highest risk with respect to microbial contaminants. There is no similar correlation for *Cryptosporidium* and *Giardia* data, which possibly indicates that insufficient data exists to consistently connect the source impact to water quality.

Related Constituents

Giardia and Cryptosporidium

Although *Giardia* and *Cryptosporidium* can come from a variety of animal populations, loading from cattle is a source of key interest. In the Western United States studies have shown that about 19 percent of cattle are infected with *Giardia* and about four percent are infected with *Cryptosporidium*[3]. According to the University of California, California Rangeland Watershed Laboratory, an infected calf can shed upwards of 10,000,000 *Cryptosporidium* oocysts per gram of feces and up to 1,000,000 *Giardia* cysts per gram of feces. Loading is a function of animal density, or stocking rates, timing of grazing, and infection rate among the herd. Calves from one to four months contribute over 99 percent of oocysts shed by cattle. Given the low ratio of calves to adults in grazing cattle as compared to dairy cattle, as well as their geographic spread, it may be that grazing cattle populations do not spread *Cryptosporidium* as readily as dairy cattle. Current studies suggest that the daily contact between a calf and a carrier mother results in an initial infection that is then spread between calves though calf play. Therefore, dairies are expected to have greater opportunity for spreading infection than rangeland cattle.

Pesticides

Ranchers use selected pesticides to manage irrigated pastureland and non-irrigated rangeland. Invasive weed management typically includes chemical treatment, only applied in spot treatments as needed, during the spring and fall. The most commonly used pesticides are glyphosate and triclopyr. Glyphosate is a regulated constituent with a primary drinking water standard of 0.7 mg/L. Triclopyr has been used on pastureland through the study period. There is no drinking water standard for triclopyr.

[3] University of California Agriculture and Natural Resources, California Rangeland Watershed Laboratory, Department of Plant Sciences, University of California at Davis. www.Rangelandwatersheds.ucdavis.edu/MWQIC/MWQIC/Indicators_Giardia_window.html. May 13, 2015.

Presence in Watershed

There are several impediments to collecting comparable, accurate data for livestock in the watershed, including the possible changes in cattle population through the year as well as the difference between County and watershed boundaries, which results in an overestimate in the cattle population in the Yuba/Bear River watershed. Nevertheless, the numbers provide a general picture of livestock populations and overall changes in the watershed. The total livestock population documented by the US Department of Agriculture for Nevada County, including both rangeland and dairy cows, was nearly 4,800 in 2012, as shown in **Table 4-5.** This is 15 percent decrease over the five-year period from 2007 to 2012, and a five percent decrease over the ten-year period from 2002 to 2012.

Table 4-5
Inventory of Livestock[1], 2002, 2007, and 2012

County	Cattle and Calves				
	2002	2007	2012	5 Year Change	10 Year Change
Nevada	5,042	5,615	4,778	-15%	-5%

Based on information from the USDA website: www.nass.usda.gov.
Data reported are inventory numbers and do not reflect livestock sold off during the course of the year.
[1]Includes rangeland and dairy cattle

The Nevada County Agricultural Commissioner also keeps statistics on cattle and calf populations in the county. These statistics are updated annually. The annual populations for cattle varied, decreased through the study period, and did not match the USDA statistics; 2011 was 8,200 head, 2012 was 8,100 head, 2013 was 7,400 head, 2014 was 6,900 head, and 2015 was 7,000 head. The sheep population ranged between 1,130 and 2,400 head each year during this period. It can be seen that the overall populations in the entire county are quite low, with the majority of livestock being cattle.

The Nevada County Agricultural Commissioner also keeps statistics on pastureland and rangeland in the county. Consistently, there have been 10,000 acres of pastureland and 95,000 acres of rangeland.

There are three USFS grazing allotments in the upper watershed. One is active, the Canyon Creek Allotment, and the other two are vacant, Devil's Peak and English Mountain. Devil's Peak allotment is along the South Yuba River but it would require a full National Environmental Policy Act (NEPA) analysis before it could be activated. The English Mountain allotment, upstream of Jackson Meadows Reservoir, is being planned to be returned to service. The active allotment covers land in the Canyon Creek and Texas/Fall Creek sub basins. The permit currently covers 65 head of cattle grazing during the summer, between July 16 and September 20, but is under review to increase the count to 100 head. This is a term permit covering 10 years and is granted to a rancher with adjacent lands. The permit requires the permittee to prepare a Management Plan to detail the season of use, number and kind of livestock, and imposes fees for use. The permittee is also required to submit an Annual Operation Plan to the USFS. The cattle tend to prefer grazing near the Loney Meadows area, located on the western portion of the Texas/Fall Creek sub basin.

Livestock grazing also occurs on private lands in the upper watershed and the lower watersheds. These are typically small operations with limited number of head. Three areas of particular interest are private ownership along Highway 20 between Penn Valley and Smartville, northwest of Lake Combie, and along the Ragsdale Random in Meadow Vista due to their proximity to NID and PCWA canals and water treatment plants. NID operates one limited grazing allotment in the watershed, the Luster Lease, located north of the Bear River below Rollins Reservoir. A portion of the grazing allotment is contributory to the Bear River, but the terrain is steep and the rancher fences the allotment to prevent cattle from grazing close to the river.

Pastureland and rangeland in the watershed have been treated with pesticides to control the growth of invasive weeds. **Table 4-6** provides a summary of the glyphosate and triclopyr applications between 2010 and 2014 for pastureland and rangeland in Nevada County. It can be seen that the overall level of chemical applied, as well as the prevalence on pastureland versus rangeland, varies from year to year.

Table 4-6
Chemical Application on Pastureland and Rangeland, pounds[1]

Chemical	2010	2011	2012	2013	2014
Glyphosate	6.95	46.33	79.69	34.47	21.89
Triclopyr	57	18.37	22.18	51.63	7.12

[1]Source is California Department of Pesticide Regulation

Regulation and Management

Runoff from rangeland is considered a non-point source of pollution and it is covered under the State Board's Non-Point Source (NPS) Program. As for all non-point sources under this program, the state has a three-tiered approach to regulation:

- Tier 1: Self-determined implementation – non-regulated management practices.
- Tier 2: Regulatory based encouragement – conditional waiver of WDRs.
- Tier 3: Effluent limitations and enforcement actions - WDRs.

In order to address rangeland issues in California, the Rangeland Management Advisory Committee (RMAC) was created. This committee is comprised of livestock industry and public members. The RMAC advises the California Department of Forestry and Fire Protection (CALFIRE) Board of Forestry on issues related to rangeland management. The RMAC worked with the State Board to create a rangeland water quality management program to comply with Tier 1 for the NPS program.

Federal lands owned by the USFS and the USBLM continue to be used extensively for rangeland grazing. Grazing on these lands is governed by the Water Quality Management Plan (WQMP) for National Forest System Lands in California. This was developed in 2000 and includes standards and guidelines to meet the CWA and California Standards. This program focuses on range management through BMPs. This includes range analysis and planning, grazing permits, and rangeland improvements as necessary.

The State Board began development of a statewide waiver for USFS (including timber harvest, roads, range, recreation, and fuel management) in 2009 in order to streamline management policies state-wide for non-point source activities. A proposed Resolution was prepared in 2011 to cover the USFS statewide activities under one order, but it has not yet been finalized or adopted. As part of the resolution development, the USFS worked in collaboration with the State Board and Regional Boards to develop a new Water Quality Management Handbook (WQMH) to address control of nonpoint source pollution generated by various activities on National Forest System lands in California. The WQMH was adopted by the USFS in May 2011, with an entire chapter dedicated to best management practices for range management to improve water quality protection. Some key new provisions include road, range, and recreation management policies; BMPs with adaptive management; and an expanded monitoring program.

Grazing Regulatory Action Project

The State Board created the Grazing Regulatory Action Project (GRAP) in 2014 to try to create a statewide approach for water quality impacts from grazing activities. After two years of focused listening sessions, the State Board determined in September 2015 that due to regional differences in hydrology, topography, climate, and land use, they will discontinue the GRAP and direct the Regional Boards to work collaboratively with individual property owners, livestock grazing operators, and other interested stakeholders to develop regional programs to protect water quality and beneficial uses, including regulatory actions and effective non-regulatory efforts for BMP implementation.

The State Board adopted a resolution that directs the Regional Boards to consider prioritizing actions to address livestock grazing operations that cause impairment, or have the likelihood to do so. The resolution directs that the Regional Boards should consider BMPs, where appropriate, and should consider establishing monitoring programs to evaluate the effectiveness of those BMPs. Finally, the resolution directs the Regional Boards to take actions they determine to be necessary to protect water quality and the beneficial uses of waters from pollution consistent with state and federal laws.

The State Board has directed staff to work with academia and resource groups to update grazing BMPs and Ranch Management Plans and to report back to them in late 2016 regarding the status of those efforts. Regional Board Staff anticipates providing this update by January 2017.

Rangeland Water Quality Management Program

The Rangeland Water Quality Management Program (RWQMP), developed in 1995 by the UCCE, the Cattlemen's Association, and the USDA's NRCS for the State Board as a Tier 1 approach, continues to be used as a voluntary management program for privately owned rangeland. The heart of the program was a series of short courses given to ranchers to help them develop and implement water quality management plans at their ranch. This included grazing and irrigation management practices to improve runoff quality. The last workshop was in 2009 and over 1,000 ranchers, covering over 2 million acres, took the course. The courses are still available on the website.

University of California Cooperative Extension

The UCCE Sierra Foothill Research and Extension Center is located east of Marysville and conducts research on various topics, including grazing. Current and recent research focuses on rangeland watershed and water quality management, invasive species management, native plant conservation and restoration, as well as cattle production and health. In addition, the UCCE county offices provide support to ranchers and farmers.

University of California at Davis

The University of California's Division of Agricultural and Natural Resources also hosts two programs through the College of Agriculture and Environmental Science: the California Rangeland Watershed Laboratory (CRWL) and the California Rangelands Research and Information Center (CRRIC). These both have informative websites. The CRWL conducts extensive research coordination, while the CRRIC focuses more on public outreach and information sharing. This includes the Rustici Rangeland Science Symposium, held in 2013, 2014, and 2015, to discuss rangeland management and water quality. Updates on applied research findings from the Sierra Foothill Research and Extension Center and strategies to ranchers are presented. These also provide a short course on grazing management for ranchers.

United States Department of Agriculture

The USDA has two services that implement assistance programs for farmers and ranchers. One is the Farm Services Agency (FSA) and the other is the Natural Resources Conservation Service (NRCS).

The FSA implements numerous voluntary programs for ranchers related to conservation.

- Conservation Reserve Program – This program provides yearly rental payments to farmers/ranchers in exchange for removing environmentally sensitive land from agricultural production and planting species to improve environmental quality.
- Conservation Reserve Enhancement Program – This program is an offshoot of Conservation Reserve Program that targets high-priority conservation issues identified by government and non-governmental organizations. Range that falls under these

conservation issues is removed from production in exchange for annual rental payments.

- Emergency Conservation Program – This program provides funding and technical assistance for farmers and ranchers to restore farmland damaged by natural disasters and for emergency water conservation measures in severe droughts.
- Emergency Forest Restoration Program – This program is very similar to the Emergency Conservation Program as it provides funding to restore privately owned forests damaged by natural disasters.
- Grassland Reserve Program – This program works to prevent grazing and pasture land from being converted into cropland or used for urban development. In return for voluntarily limiting the future development of their land, farmers receive a rental payment.
- Source Water Protection Program – This program is designed to protect surface and ground water used as drinking water by rural residents. The program targets states based on their water quality and population.

The NRCS implements multiple voluntary programs on financial, technical, and easement assistance basis for farmers and ranchers related to conservation.

Financial Programs:

- Environmental Quality Incentives Program – This is a program that provides financial and technical support to farmers and ranchers to promote agricultural production and improve environmental quality. This includes the Conservation Innovation Grant Program. Cost shares from the NRCS are 50 to 90 percent.
- Conservation Stewardship Program – This program provides financial and technical support to farmers and ranchers to help conserve and enhance soil, water, air, and habitat on working lands for selected watersheds. Payments are based on conservation performance, with higher payment for higher performance.
- Agricultural Management Assistance – This program helps agricultural producers use conservation to manage risks.

Technical Programs:

- Conservation Technical Assistance Program – This program is available to any group or individual interested in conserving our natural resources and sustaining agricultural production in this country. The program functions through a national network of locally-based, professional conservationists located in nearly every county of the United States. This assistance may be in the form of resource assessment, practice design, resource monitoring, or follow-up of installed practices. This program does not include financial or cost-share assistance, but may lead to participation in other USDA financial or easement assistance programs. This assistance can help land users:
    - Maintain and improve private lands and their management
    - Implement better land management technologies
    - Protect and improve water quality and quantity
    - Maintain and improve wildlife and fish habitat
    - Enhance recreational opportunities on their land

- Maintain and improve the aesthetic character of private land
- Explore opportunities to diversify agricultural operations and
- Develop and apply sustainable agricultural systems

Easement Programs:

- Agricultural Conservation Easement Program – This program provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.
- Healthy Forests Reserve Program – This program helps landowners restore, enhance, and protect forestland resources on private lands through easements and financial assistance. Through the program landowners promote the recovery of endangered or threatened species, improve plant and animal biodiversity, and enhance carbon sequestration.

Water Quality Issues and Data Review

Giardia and Cryptosporidium

There has been no monitoring of runoff from pastureland or rangeland for fecal indicator bacteria or protozoa during the study period. **Section 3** presents a discussion of the available *Cryptosporidium* analyses for the PCWA and NID source waters. The data presented are the presumptive sample results (total immunofluorescence assay). Under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) Round 1 monitoring, most of the water treatment plants in the upper watershed had relatively low levels of *Giardia*, *Cryptosporidium* (averages less than 0.075 oocysts per liter), or *Escherichia coli* (*E. coli*). Only two plants (Lake Wildwood and Bowman) were placed in a Bin 2 classification requiring additional action. In addition, Smartville WTP has higher *E. coli* levels at its influent. Finally, levels increase along Magnolia III Canal between Lake Combie and Lake of the Pines WTP. There is potential for grazing upstream of each of these intake locations.

Pesticides

There has been no monitoring of runoff from pastureland or rangeland for pesticides in the watershed either. A review of the raw and treated water monitoring for the water treatment plants shows that there were no detects of glyphosate in the Yuba/Bear River water supply. Triclopyr is not regulated in drinking water; therefore there is no monitoring data available at the water treatment plants.

Source Water Protection Activities

NID manages one grazing allotment in the watershed and as part of the management plan for the allotment there are BMPs specified to protect source water quality, including fencing to keep cattle away from the river.

FOREST ACTIVITIES

Since most of the watershed is covered by evergreen forest and a large portion of the upper watershed is part of the Tahoe National Forest, the activities occurring on these lands are critical to the long-term quality of the water supply. This study identified timber harvesting and wildfires as activities of significant interest and these are discussed below.

Timber Harvest

Background

Timber harvesting activities can impact ambient water quality directly and indirectly. Direct impacts include development and use of dirt roads, water crossings used to assist timber removal, and the use of chemicals for silviculture or revegetation. Indirect impacts include the increased access for other forest users, increased soil erosion, and increased nutrient loading to the waterways. The USFS and the State Board agree that the most important source of pollution in the forests is the timber harvesting road system. Timber harvesting can occur on both public and private lands and is regulated separately.

Seasonal Patterns

Timber harvesting activities occur throughout much of the year, depending on the location of the harvest. For locations below the normal snowline, tree felling and removal can occur almost any time of year. It is easier to complete prior to the wet season, but can be conducted during the winter. For locations above the normal snowline, tree felling historically occurred during the summer months, after snow melted and access roads were cleared. This would allow removal of the timber prior to the next wet season. More recently, and with the increased use of helicopter removal, tree felling has extended into the fall. Trees are cut down and brought to a removal landing site. The trees can then be removed from the landing into the winter months.

Related Constituents

The primary concerns associated with timber harvesting are the potential for increased erosion and the subsequent increase in solids loading to receiving waters resulting in higher turbidity. TOC and nutrients may increase as a result of the increase in solids loading. Another concern is the use of pesticides and herbicides in silviculture and revegetation programs, such as 2,4-D, glyphosate, imazapyr, and triclopyr. Of these, only glyphosate and 2,4- D have drinking water standards.

Presence in the Watershed

As described in **Section 2**, much of the Yuba/Bear River watershed is covered with evergreen forest. Harvesting activities occur in most of the sub basins, but more commonly in those locations greater than 3,000 feet of elevation. Timber harvesting on federal lands is regulated by the USFS and by CALFIRE on state and private lands. These agencies do not track statistics on the quantity of acres harvested in a comprehensive manner so there are no means to estimate accurately the presence in the watershed. Since the mid-1990s there has been a significant shift away from timber harvest on federal lands to harvesting on state and private lands. CALFIRE does provide electronic shape files of the Timber Harvest Plans (THPs), Notice of Timber Operations (NTOs), and Non-Industrial Timber Management Plans (NTMPs) on non-federal lands. **Figures 4-1** and **4-2** were prepared for the upper watershed and lower watershed, respectively, to see the general geographic spread and intensity in timber harvest operations on non-federal land.

Figure 4-1
Timber Operations Documented by CALFIRE in Upper Yuba/Bear River Watershed

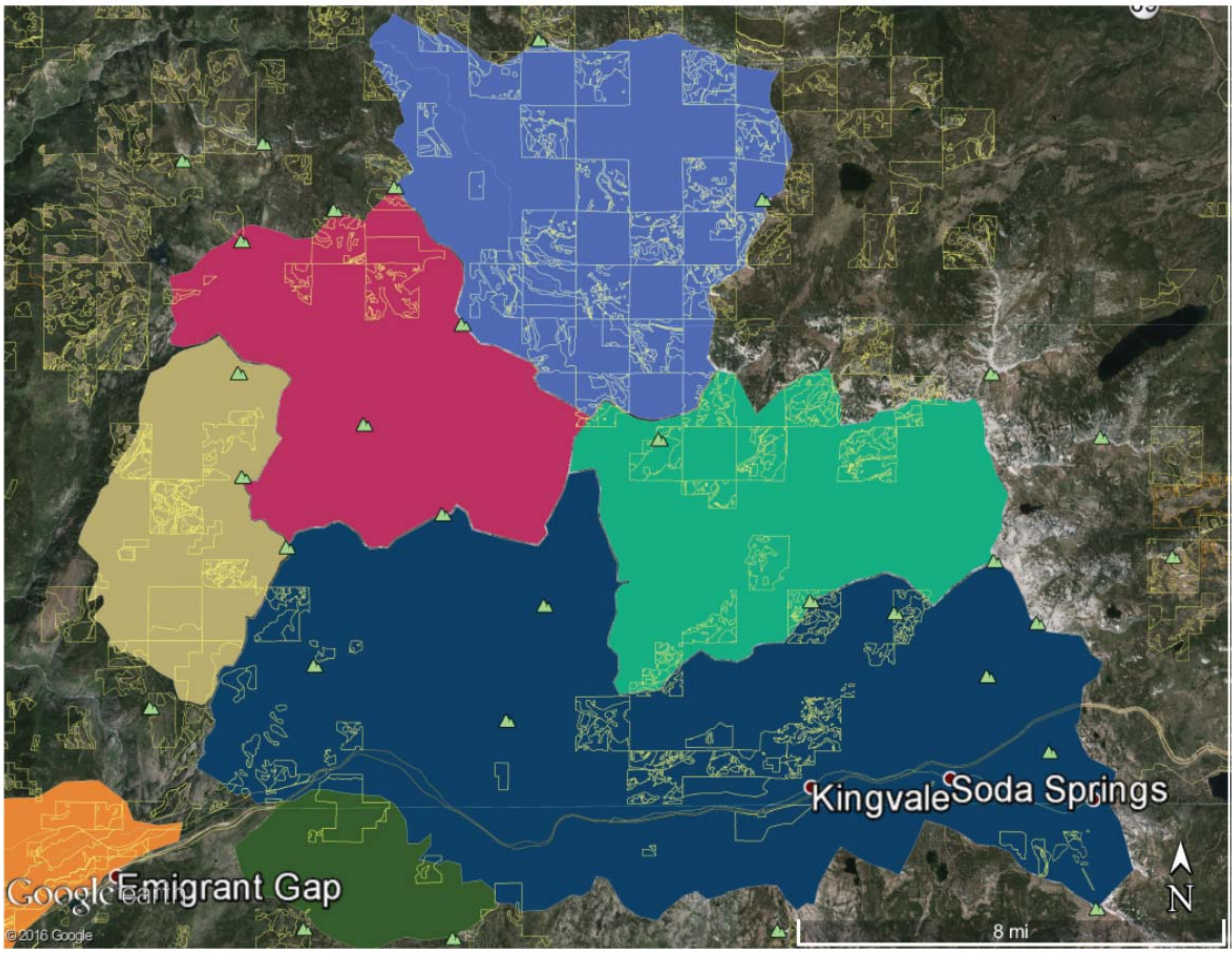
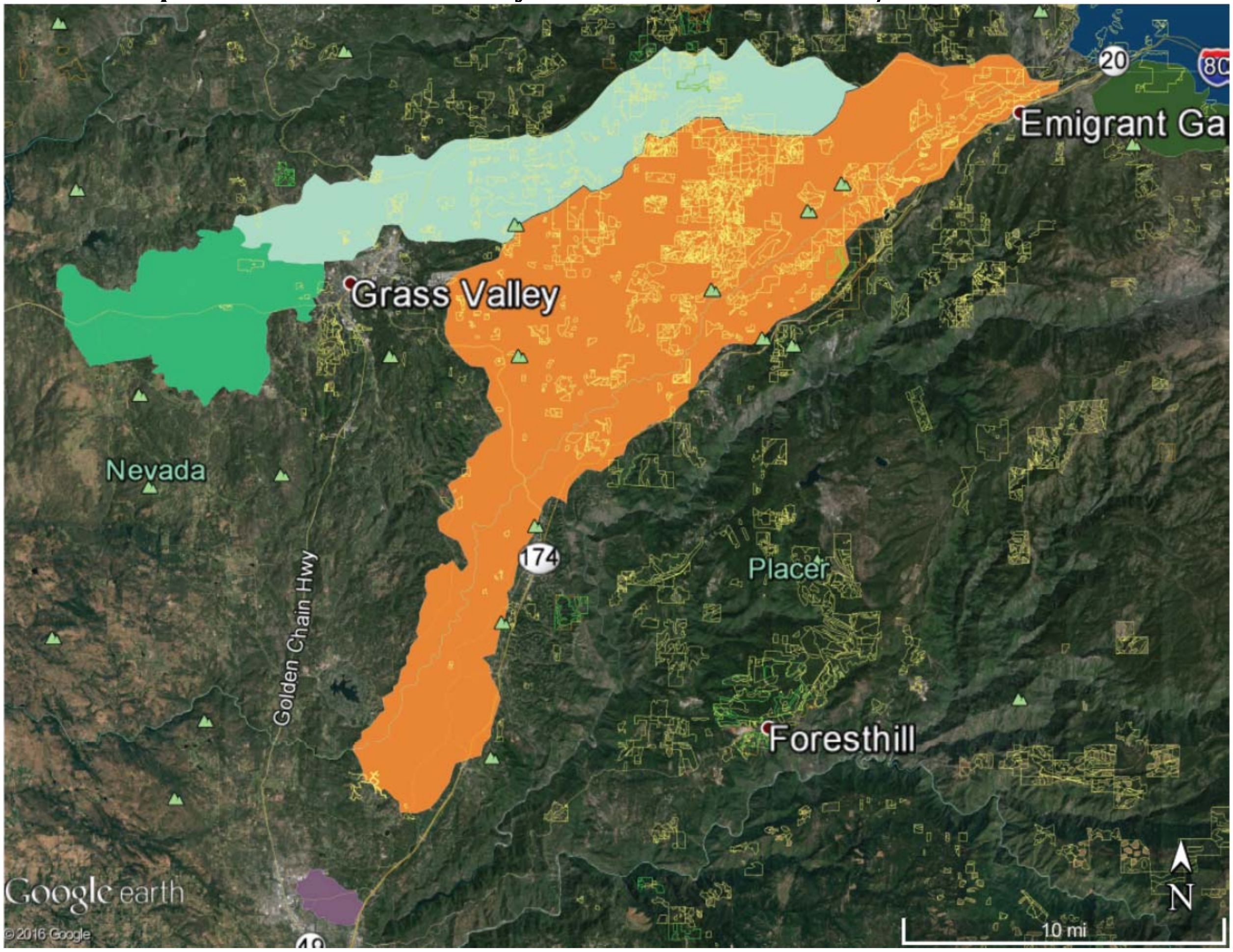


Figure 4-2
Timber Operations Documented by CALFIRE in Lower Yuba/Bear River Watershed



The Nevada County Agricultural Commissioner tracks the production of timber, in terms of board feet. This is not an accurate account of the acreage or amount of timber harvesting occurring in the watershed, but can provide an idea on the relative scale of timber harvesting operations over time in the county. **Table 4-7** provides a summary of the annual timber harvest between 2011 and 2015. This table shows that the harvesting operations vary quite widely between the years. This could be explained by the fact that most of the timber harvesting in the Yuba/Bear River watershed is by commercial growers, such as Sierra Pacific Industries, who plan their harvesting in rotation cycles. Also, salvage operations from a wildfire burn area can account for large amounts of harvest.

Table 4-7
Timber Harvested in Nevada County, board feet

	2011	2012	2013	2014	2015
Timber	16,147,000	14,531,000	25,290,000	8,211,000	10,358,000

There are numerous chemicals applied to forested land in the process of silviculture but only four were used consistently at levels of interest. **Table 4-8** provides a summary of the pesticides used on timberland forest.

Table 4-8
Chemical Application on Timberland Forest, pounds[1]

Chemical	2010	2011	2012	2013	2014
2,4-D	-	-	5452.48	-	-
Glyphosate	2140.51	110.92	7923.93	7867.31	1013.1
Imazapyr	-	25.48	150.48	198.5	225.42
Triclopyr	-	62.44	4.38	352.07	-

[1]Source is California Department of Pesticide Regulation

Regulation and Management

As mentioned previously, there are two separate, parallel regulatory programs for timber harvesting, including fuel management and salvage operations as well. The USFS governs timber harvesting on federal lands according to the Forest Service Directives and the Land Management Plan for the region, while CALFIRE governs timber harvesting on state and private lands according to the California Forest Practice Act of 1973 and subsequent Forest Practice Rules. These programs are discussed separately. The State Board is more satisfied with the management of timber operations on federal lands than on state and private lands. In addition, as of 2003 all timber harvesting operations must obtain a Waiver of Discharge Requirements for Discharges Related to Timber Harvest Activities from the Regional Board.

It should be noted that if the State Board adopts a Water Quality Management Plan for National Forest System Lands, as discussed under Livestock Grazing above, then this would include timber harvesting activities as well and the management strategy could change.

In 2013, California modified its Public Resources Code, Division 4, Part 2, Chapter 8 (Z'berg-Nejedly Forest Practice Act of 1973) to add new Article 7.7 - Working Forest Management Plan (WFMP). It is effective January 2017. The purpose of this is to encourage long-term planning, increased productivity of timberland, and the conservation of open space on a greater number of nonindustrial working forest ownerships and acreages. These are limited to 15,000 acres in size. A WFMP is submitted to CALFIRE by a person who intends to become a working forest landowner with the long-term objective of an uneven aged timber stand and sustained yield through the implementation of a WFMP. The management plan includes watershed protections and shall be prepared by a registered professional forester.

<u>United States Forest Service</u>

The USFS requires proposed harvesters to submit a Timber Harvest Plan (THP), prepared by a Registered Professional Forester (RPF). The THP must substantially meet the intent of the National Environmental Policy Act (NEPA) procedures as a complete discovery document. The THPs are reviewed by the USFS, as well as the Regional Board, for possible impacts to receiving waters. This includes road construction, road abandonment, and water crossings. The USFS has several key rules for timber harvesting on public lands:

- No clear cutting is allowed,
- Maximum area is 60 acres,
- Only trees of 30-inch diameter (at breast height) can be harvested,
- No herbicide application is allowed,
- Thinning from below is the preferred harvest method,
- Revegetation plan is required, with restocking for five years, and
- Waterbodies must be protected from blockage and sediment deposition.

California Department of Forestry and Fire Protection

The CALFIRE requires proposed harvesters to submit a THP prepared by a RPF. The THP must substantially meet the intent of the California Environmental Quality Act (CEQA) procedures as a complete discovery document. The THPs are reviewed by CALFIRE staff, as well as the Regional Board, for possible impacts to receiving waters. This includes road construction, road abandonment, and water crossings. THPs include:

- Checklist of proposed activities
- Description of proposed harvest area, method for harvest, season of operations
- Assessment of:
    - Road Construction
    - Erosion Control
    - Stream Protection
    - Protection of Unstable Areas
    - Hazard and Fire Control
    - Cumulative Impacts
    - Archaeology
- Revegetation Plan
- Pre-harvest on-site inspection by CALFIRE and other related state regulatory agencies, as well as periodic inspections by CALFIRE Forest Practice Inspectors.

Once harvesting activities are complete, CALFIRE staff will inspect the area to certify that all forest practice rules were followed. THPs are valid for three years and can be renewed up to two times.

Central Valley Regional Water Quality Control Board

In January 2003, the Regional Board adopted the initial Waiver of Waste Discharge Requirements Related to Timber Harvest Activities. Waivers are effective for five years and must be renewed. In March 2010, the Regional Board adopted the Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities, Order No. R5-2010-0022, which was modified slightly by the State Board in Order WQ 2011-014-DWQ. The Waiver was renewed in 2014, under Order R5-2014-0144. The Waiver specifies eligibility criteria and conditions that must be met by dischargers engaged in timber harvest activities on private and USFS lands in order to qualify for a waiver of waste discharge requirements (WDR). There are five categories of permittees, four on private and state lands and one on public lands. The Waiver includes a Monitoring and Reporting Program (MRP) which identifies times and types of monitoring to be conducted to ensure that high standards of water quality protection are achieved. In April 2010 the Regional Board published Guidelines for Required Waiver Monitoring on Private and Federal U.S. Forest Service lands to assist with implementation.

Regional Board has drafted a General Order for Timber Harvesting Activities and Federal and Non-Federal Lands (R5-2016-xxxx) to replace the soon to expire Order R5-2014-0144, and address the new WFMP. It also includes more specific direction on salvage operations, low threat THPs, watercourse crossing, and attempts to streamline requirements.

Water Quality Issues and Data Review

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that the Boardman Canal and the Bear River Canal water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season. It is possible that timber harvesting contributes to the increased solids loading due to storm runoff from dirt access roads and watercrossings. It should be noted that both systems have upstream reservoirs that serve to buffer many water quality impacts downstream, including turbidity.

As noted previously, there were no detects of pesticides in the treated water for any water treatment plants. Also, there are no significant nutrient water quality concerns in the source water either.

Wildfires

Background

Another potential contaminating activity associated with forests is wildfires. The loss of ground cover, the chemical transformation of soil, and the reduction in soil infiltration rates all increase the likelihood of erosion and hydrophobic soils. These all contribute to increased solids in the receiving water and an increase in the turbidity of the raw water at the water treatment plants.

Seasonal Patterns

Wildfires can be caused by several activities, including naturally induced (such as lightning), human induced (arson or accident), and loss of control of a prescribed burn. Conditions that contribute to a wildfire include dry, tinder wood, heavy fuel loads, warm, dry weather, and wind. These conditions typically occur during the late summer and early fall in the Yuba/Bear River watershed, but can occur during the late spring and early summer as well.

The impacts of wildfires on water quality are usually not seen at the time of the fire but rather later, during the following wet season and even up to 15 years later, when precipitation falls on the recently burned area causing erosion.

Related Constituents

Since erosion is the key concern associated with wildfires, turbidity and total dissolved solids are the key constituents of concern. In addition to turbidity, it is possible that the soils in the Yuba/Bear River watershed could also increase the levels of iron, manganese, metals, nutrients, and TOC in the source water. Also, aerial application of fire retardants is common practice in California so retardants could be present as well.

Presence in the Watershed

Most wildfires, whether prescribed, accidental, or arson, occur during the summer and fall months in the watershed.

A review of prescribed burns for fuel management by the USFS and CALFIRE resulted in numerous small burns in the Yuba/Bear River watershed. Generally these are low in acreage and are very controlled burns, therefore not high in intensity and unlikely to significantly impact source water quality. The USFS had 67 controlled burns in watershed during study period, from 1 to 274 acres, most of them consisting of handpiles. CALFIRE also conducts controlled burns as part of fuel management program, but no detailed lists were provided.

Fires can be either under the jurisdiction of CALFIRE or the USFS. There were only three fires at larger size, at or greater than 20 acres, identified from the Inciweb. The Chalk Fire was 20 acres and occurred in December 2011, 10 miles east of Nevada City in the Bear River sub basin. The Dog Bar Fire was 247 acres and occurred in September 2014, near Dog Bar Road at Taylor Crossing in the Bear River sub basin. The Lowell Fire was 2,304 acres and occurred in July and August 2015, in Steep Hollow west of Alta in the Bear River sub basin. A map displaying the approximate location of each fire is shown on **Figure 4-3**. The runoff from all of these burn areas is tributary to Rollins Reservoir. This could potentially impact the water diverted into the Bear River and the Bear River Canal, thus potentially impacting the downstream WTPs. During larger wildfire events, CALFIRE periodically issues briefing maps to delineating the current burn areas. **Figure 4-4** is a briefing map for the Lowell Fire on July 28, 2016, approximately midway through the burn period.

Figure 4-3
Large Wildfires in the Yuba/Bear River Watershed, 2011 - 2015

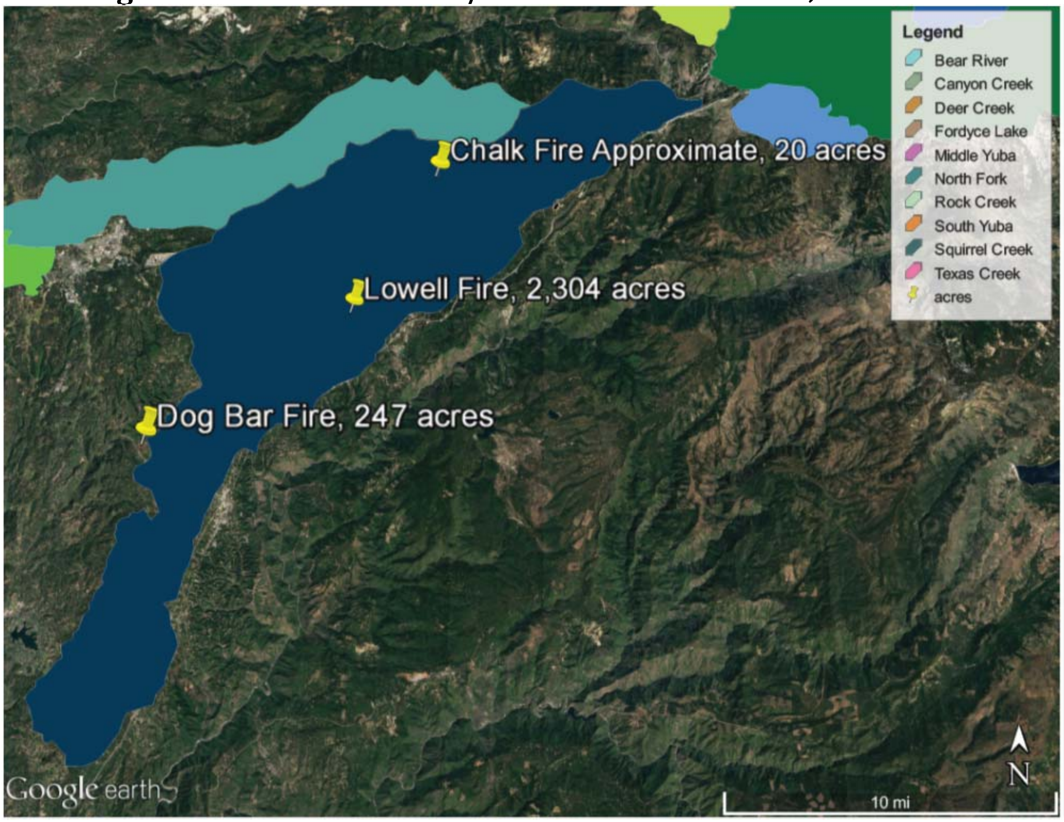
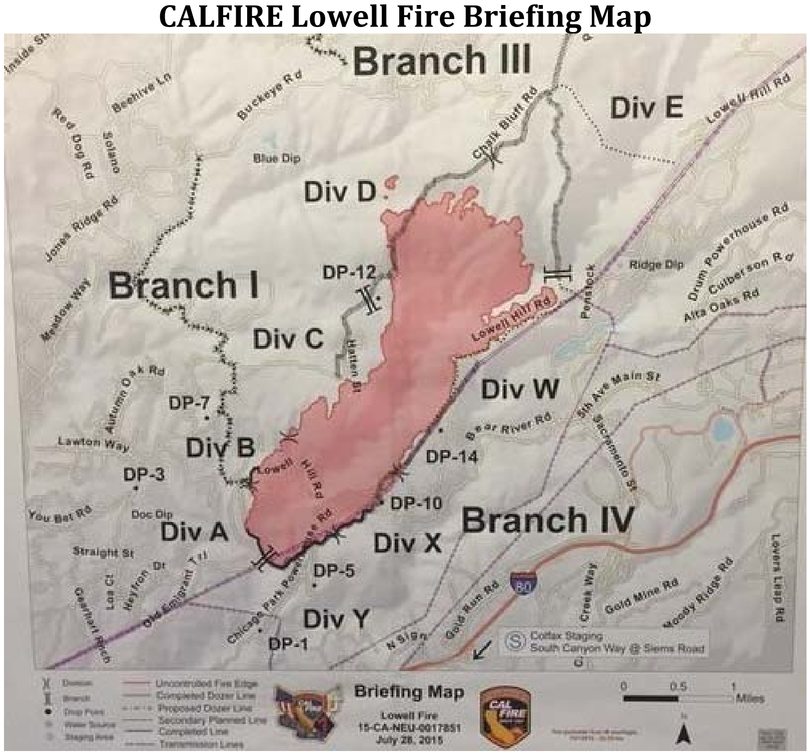


Figure 4-4
CALFIRE Lowell Fire Briefing Map



Regulation and Management

Wildfire response and management is led either by the USFS or by the CALFIRE, depending on the fire location. The agencies usually end up working together on larger fires, along with other local fire agencies. Once a fire is controlled and extinguished, a detailed field survey is conducted to assess the damage. If the burn is high in intensity and likely to impact future natural revegetation, a report is prepared which summarizes the location and extent of burn damage. The report also outlines recommended actions to implement to restore the vegetation if appropriate. Revegetation is only recommended for severe burn areas where natural reforestation is unlikely.

Water Quality Issues and Data Review

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that the Bear River and the Bear River Canal water treatment plants show a distinct seasonal trend with most peaks occur during the wet weather season. Erosion for recent burn areas could be contributing to these peaks.

Source Water Protection Activities

Cosumnes, American, Bear, and Yuba Integrated Regional Water Master Plan

The Integrated Regional Water Master Plan (IRWMP) is a planning document that identifies a vision, guiding principles, broadly-supported goals, objectives, strategies, actions and projects for the purposes of enhancing the beneficial uses of water for the Cosumnes, American, Bear and Yuba (CABY) region. This effort was initiated by water suppliers, power utilities, and watershed conservation groups to; provide long-term water supplies, protect and improve water quality, and enhance environmental and habitat resources. The IRWMP was completed in 2007 and has been subsequently updated, most recently in May 2014.

There are nine goals of the IRWMP including; reducing impacts from catastrophic fire, protecting and improving watershed resources through land use practices, managing sediment for water resources, and reducing contamination of surface water resources. The Plan also identifies objectives, which describe how goals are to be attained. The Plan identifies 26 objectives, including two that are related to forest management: implement measures to manage and reduce erosion and sedimentation, and implement measures to manage and reduce contamination of waterways.

CABY applies for California Department of Water Resources (DWR) Proposition 84 grant funding for a wide variety of projects. This does include projects related to forest activities, such as scotch broom removal, fuel management, and overall forest health.

RECREATION

Background

There is a large amount of recreation that occurs in the Yuba/Bear River watershed. Recreation occurs in each of the sub basins, at varying levels. Recreation includes body and non-body contact activities. Body contact recreation includes swimming, wading, and rafting and is allowed on all major reservoirs and river reaches in all sub basins. The number of body contact recreationalists cannot be estimated, but is expected to be far less than the total number of recreationalists. Non-body contact recreation includes camping, boating, off-highway vehicle (OHV) use, fishing, hiking, biking and winter activities such as snow play, skiing, and snowmobiling.

Seasonal Patterns

Body contact recreation occurs primarily between Memorial and Labor days. Most non-body contact recreation can occur throughout the year. Most camping, and associated activities, occurs in the upper watershed and is limited to May through October, with peak use over the summer holiday periods. During the winter months, December through March, winter activities such as skiing and snowmobiling primarily occur in the upper watershed only. Recreation in the lower watershed consists of more day-use activities such as boating, OHV use, fishing, hiking, and biking and can occur throughout the year, but is most significant during the spring, summer, and fall.

Related Constituents

Body contact recreation in general has long been known to be a source of pathogen contamination, resulting partly from personal sanitary conduct and partly from a natural shedding process. Pathogens shed by recreationalists include bacteria, viruses, and protozoa. Moreover, because their origin is human, microorganisms shed by recreationalists are transmissible to other humans. Also, boaters may dump sewage waste into a waterbody rather than use a pumpout.

Non-body contact recreation can also contribute to pathogen levels in the watershed but the more significant concern is associated with erosion caused by land-based activities which may in turn cause an increase in the solids loading to the receiving water and a subsequent increase in constituents such as turbidity, total dissolved solids, TOC, iron, and manganese at the water treatment plants.

Presence in the Watershed

Multiple agencies own and manage recreational facilities in the Yuba/Bear River watershed, including the USFS, PG&E, and NID. Recreational facilities are located from the headwaters down to the lower reaches of the watershed. This discussion has been separated into camping and day-use to assist with presentation.

Camping

Overnight camping occurs throughout the watershed and in all sub basins. Camping occurs in both formal campgrounds and dispersed in the Tahoe National Forest. **Table 4-9** provides a summary of all of the formal campgrounds, by sub basin, and the number of developed campsites.

Table 4-9
Formal Campgrounds in Yuba/Bear River Watershed

Sub Basin	Campground	Operator	Number of Sites
Middle Yuba River	Jackson Meadows - Pass Creek	NID	30
	Jackson Meadows - Pass Creek Annex (Overflow)	NID	6
	Jackson Meadows - East Meadow	NID	46
	Jackson Meadows - Woodcamp	NID	20
	Jackson Meadows - Findley	NID	14
	Jackson Meadows - Fir Top	NID	12
	Jackson Meadows - Jackson Point	NID	10
	Jackson Meadows - Aspen Group	NID	3 Units (100 max)
	Jackson Meadows - Silvertip Group	NID	2 Units (50 max)
	Jackson Meadows - Little Laiser Meadow Horse Camp	NID	11
Canyon Creek	Bowman Lake	USFS	7
	Jackson Creek	USFS	14
	Faucherie Group	NID	2 Units (50 max)
	Canyon Creek	USFS	16
	Sawmill Lake - Dispersed	USFS	5
	Milton - Dispersed	USFS	4
Texas/Fall Creek	Carr-Feeley Lakes - Dispersed	PG&E	11
	Upper Rock Lake – Dispersed	PG&E	4
	Lower Rock Lake – Dispersed	PG&E	3
	Culbertson Lake – Dispersed	PG&E	3
	Fuller Lake – Dispersed	PG&E	9
	Middle Lindsey Lake – Dispersed	PG&E	3
	Lower Lindsey Lake – Dispersed	PG&E	12
	Blue Lake – Dispersed	PG&E	6
	Rucker Lake – Dispersed	PG&E	7
	Grouse Ridge - Dispersed	PG&E	9
Fordyce Lake	Meadow Lake Individual and Groups	PG&E	25 + 2 Units (50 max)
	White Rock Lake - Dispersed	PG&E	6
	Sterling Lake - Dispersed	PG&E	8

Table 4-9 Cont'd
Formal Campgrounds in Yuba/Bear River Watershed

Sub Basin	Campground	Operator	Number of Sites
South Yuba River	Big Bend Group	USFS	2 Units (max 50)
	Hampshire Rocks	USFS	30
	Indian Springs	USFS	34
	Woodchuck	USFS	8
	Cisco Grove Campground and RV Park	Private	235
	Thousand Trails Snowflower RV Park	Private	208
	Kidd Lake Group	PG&E	10 Sites (69 max)
	Lake Spaulding	PG&E	26
NF of the NF of the American River	Lodgepole	PG&E	35
Deer Creek	Scotts Flat Reservoir – Individual and Groups	NID	169 + 3 Units (200 max)
	White Cloud	USFS	45
	Skillman Horse Group	USFS	11 Units (96 max)
Bear River	Rollins Reservoir - Peninsula	NID	70
	Rollins Reservoir - Orchard Springs	NID	100
	Rollins Reservoir - Greenhorn	NID	84
	Rollins Reservoir - Long Ravine	NID	73
	Bear River Campground – Individual and Group	Placer Co.	23 units + 2 units (100 max)
	Bear Valley Group	PG&E	1 Unit (50 max)

The facilities at each campground vary, from full flush toilets to pit toilets and from running water to bring your own. The formal campgrounds are actively operated by various entities that are responsible for waste management and disposal and on-going maintenance. No formal statistics are kept by the Tahoe National Forest for recreational uses, therefore no assessment of overall impact or change during the past five years could be made.

Annual user statistics were provided for the NID recreation facilities at Scotts Flat and Rollins reservoirs, see **Table 4-10**.

Table 4-10
NID User Statistics for Recreation Facilities

Facility	2011	2012	2013	2014	2015
Scotts Flat Campground	418,490	412,998	416,156	394,598	380,244
Long Ravine Campground – Rollins Reservoir		126,822	168,122	172,436	187,758
Orchard Springs Campground – Rollins Reservoir	157,831	164,720	156,262	172,696	142,818
Peninsula Campground – Rollins Reservoir			118,497	112,823	122,873

PG&E also tracks user statistics for its recreation facilities. User statistics are tallied every six years using the Federal Energy Regulatory Commission (FERC) From 80, with the most recent tally completed in 2014. **Table 4-11** provides a summary of the statistics for facilities in the upper watershed.

Table 4-11
PG&E Recreation Facility Annual User Statistics, 2014

Sub Basin	Facility	Daytime	Nighttime
Texas/Fall Creek –	Carr-Feeley Lakes	1,977	3,590
	Upper Rock Lake		
	Lower Rock Lake		
	Culbertson Lake		
	Upper Lindsey Lake		
	Middle Lindsey Lake		
	Lower Lindsey Lake		
	Blue Lake	7,159	1,638
	Rucker Lake		
	Fuller Lake		
Fordyce Lake	White Rock Lake	-	1,783
	Meadow Lake		
	Lake Fordyce	225	1,453
	Lake Sterling		
South Yuba	Kidd Lake	1,289	1,003
	Cascade Lake		
	Lake Spaulding	10,491	4,395
North Fork	Lake Valley	5,742	4,487
	Kelly Lake		
Deer Creek	Deer Creek Forebay	16	-

Another facility of interest is the Bear River Campground, since it is located adjacent to the Bear River below Rollins Reservoir. This campground is owned and operated by Placer County. The campground is open from March 1 through October 31. Primary use is between May and September when the campground is generally full on a daily basis. There are 23 sites, which are allowed eight persons, but are generally used by four. There is also a group site that can hold up to 100 persons, but is generally booked for around 50 people on the weekends. This accounts for over 100 campers per day during the summer months. The campground has vault toilets, which were recently installed. There is no site manager, but the site is monitored and maintained daily during the season of use. The vault toilets are pumped regularly, typically between three and four times per year.

Day-Use Activities

Some of the key day-use activities that occur in the watershed include hiking, OHV use, boating, fishing, cross-country skiing, and snowmobiling. Hiking, OHV use, cross-country skiing, and snowmobiling largely occurs on public lands. Boating and fishing can occur on public and private lands.

Highly used hiking trails in the region include; Loch Leven Lakes Trail (near Big Bend Visitor Center), Grouse Lakes Area, Pioneer Trail east of Nevada City off Highway 20, Palisade Creek Trail (near Kidd Lake), and Pacific Crest Trail (along the summit).

OHV use can occur throughout the watershed, but is more prevalent in the upper watershed in the Tahoe National Forest. Some popular areas for OHV use include White Cloud, Meadow Lake, and along Fordyce Creek/I80 corridor.

Boating and fishing occurs on most waterbodies in the watershed. Public boat ramps are available for the large reservoirs including; Jackson Meadows, Bowman Reservoir, Lake Spaulding, Lake Valley Reservoir, Scotts Flat Reservoir, and Rollins Reservoir. There are also private docks and access on Lake Combie. PG&E allows access to most of its facilities for day-use, including boating and fishing. This includes access to parts of the water supply system such as Deer Creek Forebay, Drum Forebay and Afterbay, Alta Forebay, Halsey Forebay and Afterbay, Rock Creek Reservoir, and Wise Forebay. Most of these are limited to on-shore fishing with limited parking available.

Day-use for the lower Bear River and Squirrel Creek has significant use during the warm weather months of July, August, and September. Access to the Bear River is used at the Highway 174 and Dog Bar Road crossings, as well as the adjacent landowners. There are no sanitation facilities at any of these areas. Squirrel Creek recreation is centered around Western Gateway Regional Park in Penn Valley. The park offers baseball fields, playgrounds, off-leash runs for dogs, and creek access for body contact recreating. There are sanitation facilities provided.

Another day-use activity is winter use for snow play, cross-country skiing and snowmobiling. These uses are significantly lower than the other summer season activities. There are several areas where snow play occurs. Most are located along Interstate 80, including: Loch Leven, Rainbow, Cisco Grove, Sno-Park at Yuba Gap, Nyack, and Blue Canyon. A few are located on the eastern end of Highway 20, including: Bear Valley and Omega Rest Area. Also, the Soda Springs/Boreal ski resorts are located in the uppermost part of the watershed and continue to expand and have significant operations.

There are five areas designated for cross-country skiing and two of those also have trails for snowmobiling, or over-snow vehicles (OSV). They include Castle Peak, Rattlesnake (near Yuba Gap), Big Bend, Donner Sno-Park, and Steephollow. There is also a multi-use snow trail loop from Jackson Meadows Reservoir to Meadow Lake. The key areas for OSV use are Pass Creek, Meadow Lake, Road 18, Rattlesnake, Sterling Lake, and Lola Montez.

Regulation and Management

There is regulation over recreation in the Yuba/Bear River watershed. As described previously, the owners and operators of the formal recreational facilities are required to conduct on-going maintenance and operations and appear to be vigilant in their activities. One management activity of note is the USFS Travel Management Plan. The Travel Management Plan consists of three Subparts; A – Forest-Wide Road Analysis, B-OHV road and trail designation, and C-OSV road and trail designation. Subpart A was completed in 2005, and updated every five years thereafter. The most recent Travel Analysis Report was published in 2015. The Report assesses the Tahoe National Forest's road system to determine the minimum roads and trails needed to serve its goals, it is not an assessment of the road conditions. The Report looks at trends in road uses and makes general recommendations for the future. Roads are recommended as either "keep", "convert", "decommission", or "store". The USFS uses this Report to inform future planning and maintenance activities in the forest.

The Pacific Southwest Region of the USFS completed Subpart B to designate routes for wheeled motorized vehicle use in the Tahoe National Forest. Routes were designated between 2005 and 2010, following a five-step Route Designation Strategy. Not all existing routes were designated for future use. After an intensive public input process, the Tahoe National Forest completed the designation process and approved the Motorized Travel Management Program Environmental Impact State in September 2010. This included a Motorized Vehicle Use Map, which shows the roads and trails approved for use.

Subpart C of the Travel Management Plan, OSV road and trail designation, is currently in development for the Tahoe National Forest. The USFS estimates that there are 300 miles of groomed OSV trails in the Tahoe National Forest. As part of the planning effort, a draft OSV Use Map has been created, indicating that most of the USFS land in the Yuba/Bear River watershed will be open to OSV use and includes several key groomed trails. This process is in final analysis and could be finalized in 2017.

As part of their FERC relicensing process, NID and PG&E continue to evaluate recreational use of their facilities in the Yuba/Bear River watershed. Both agencies indicate in their current Recreation Plans that they will be expanding, or improving, recreational access. This includes improved access for fishing at forebays, improved boat access at reservoirs, and improved campground facilities.

Water Quality Issues and Data Review

Microbiological Data

There has been very limited monitoring of runoff from recreational areas for microbial constituents. **Section 3** presents selected results from the Regional Board Safe to Swim Study along Squirrel Creek and the South Yuba River and it indicates that there may be a seasonal influence from recreational activities at these locations. **Section 3** also presents *E. coli* data for the water treatment plants. The various water supply systems have variable water quality. None of the water treatment plants show a distinct increasing trend in *E. coli* during the summer use season, June through August. Although, Applegate WTP sees a peak monthly median in September.

Section 3 also presents a discussion of the available *Giardia* and *Cryptosporidium* analyses for the water treatment plants. The data presented are the presumptive sample results (total immunofluorescence assay). The low levels of protozoa in the water and sporadic nature of detection likely indicate that body contact recreation is not significantly contributing.

Solids Data

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that the Boardman Canal and the Bear River Canal water treatment plants show a distinct seasonal trend with most peaks occur during the wet weather season, but some occurring during summer months. The summer months are when algal blooms can occur, which would contribute to both TOC and turbidity, so it is thought that these are likely responsible for those peaks. Since there are numerous activities in addition to general watershed erosion that could contribute, it is uncertain how much is attributable to recreational activities.

Source Water Protection Activities

There is limited opportunity for stakeholder activity in the recreation source. NID manages its recreation facilities using BMPs to protect source water quality.

SOURCE WATER SPILLS

Background

A hazardous material spill or leak into the river system could occur as a result of a vehicular traffic accident, railroad accident, pipeline leak or spill, wastewater treatment plant spill, or other incident. In the event of a leak or spill, timely notification is critical to ensure that the water treatment plant operators are provided with sufficient time and information to best respond to potential treatment concerns or plan measures to protect the water supply. Formal notification to potentially impacted water utilities is provided by DDW, if DDW is apprised of a hazardous material spill with risk to drinking water through the California Office of Emergency Services (Cal OES) State Warning Center. PCWA and NID have established voluntary direct notification agreements and procedures to create additional assurance that each of the water treatment plants will receive notification in the event of a spill upstream of its intake.

Seasonal Patterns

Spills associated with vehicular traffic, railroads, and pipelines could occur at any time of the year. Sewage spills typically occur during wet weather as a result of capacity exceedences, facility failures, or power outages affecting wastewater treatment plant operations, but they can also occur during other seasons.

Related Constituents

The most common spills are related to oil and petroleum products or sewage spills. Therefore, typical constituents of concern include volatile organic compounds (VOCs) and hydrocarbons to microbial constituents (i.e. viruses, bacteria, *Giardia*, *Cryptosporidium*). However, hazardous materials emergencies can involve a virtually infinite number of chemicals or chemical combinations.

Presence in the Watershed

There are a tremendous number of roadways in the watershed, many of which cross either the rivers, creeks, or canals associated with the Yuba/Bear River water supply. The main truck transportation routes through the watershed are Interstate 80, Highway 20, Highway 174, and portions of Highways 49 and 193, as shown on **Figure 2-1**. There are no restrictions on transport of hazardous materials in the watershed. The greatest threat is near bridge crossings because of the immediate potential for spilled material to enter the river system.

A review of the USEPA Toxics Release Inventory Program revealed that there are no facilities located in the watershed, and no discharges occurred.

Union Pacific Rail Road (UPRR) owns and operates the railroad tracks that parallel Interstate 80. Both railroad lines are used by UPRR and BNSF Railway Company to transport hazardous materials as long as they follow the Federal Department of Transportation guidelines for the transportation of hazardous materials. This includes an increase in the amount of Bakken crude oil transported into California via rail. Spills could occur at any time, and at any location, however no significant spills occurred during the study period.

Kinder Morgan owns a petroleum product pipeline that closely parallels Interstate 80 and the UPRR rail road tracks through the watershed. The pipeline ranges from six to eight inches in diameter, and transports a variety of petroleum products. No significant spills were reported during the study period.

A review of the Cal OES Hazardous Materials Spill Reports revealed 28 spill events occurring that resulted in a discharge that reached a receiving water upstream of the water treatment plants. A complete list of all the Cal OES-reported spill events in the watershed during the study period is provided in **Table 4-12**. The majority of spills were small or medium sized wastewater or petroleum discharges. There was no pattern of repeating events.

A review of the California Integrated Water Quality System (CIWQS) database for SSOs showed that there were two Category I discharges. The first SSO was on May 12, 2012 from the Nevada County Sanitation District Number 1 collection system. It resulted in 60 gallons discharged to Scotts Flat Reservoir. The second SSO was on November 4, 2012 from the City of Grass Valley collection system. It resulted in 13, 290 gallons discharged to Deer Creek near Slate Creek Road. The Regional Board issued an Administrative Civil Liability (ACL) Order (R5-2012-0566) to the City, including this discharge and others, and later settled.

Regulation and Management

UPRR inspects the train tracks regularly and conducts inspections whenever a problem is detected. There have also been improvements to the train tracks in areas where there have been historical problems, such as in the mountains along Interstate 80.

The California Department of Forestry and Fire Protection, Office of the State Fire Marshal, Pipeline Safety Division currently regulates the safety of intrastate hazardous liquid transportation pipelines. Staff inspect pipeline operators to ensure compliance with federal and state pipeline safety laws and regulations. The Division is also responsible for the investigation of all spills, ruptures, fires, or pipeline incidents. California pipeline safety standards exceed the minimum federal standards by mandating that a pipeline system be hydrostatically tested before initial operation begins; they must then be tested at least every five years by an independent third-party approved by the Division. In these hydrostatic tests the hazardous liquid is removed from the pipe and replaced with water. The pipe is then pressurized to 125 percent of the maximum pipeline operating pressure and held for eight hours. Testing results are submitted to the Division for review and concurrence. Tests are randomly witnessed by Division engineers. In certain cases, the Division has approved the use of internal inspection tools "smart pigs" in lieu of hydrostatic testing. In these cases, the test results are also submitted to the Division for review and concurrence. Kinder Morgan has installed cathodic protection on each of these pipelines. The lines are inspected regularly and are also inspected whenever a problem is detected or construction occurs near the pipelines. Kinder Morgan monitors the pipelines for spills by checking for pressure changes along the pipeline and also by comparing flow in and flow out. If these show discontinuities, the pipeline is inspected.

Table 4-12
Cal OES Hazardous Materials Spill Reporting, Yuba/Bear River Watershed, 2011 - 2015

Incident Date	Material	Quantity	Unit	Description	Waterway Impacted	Spill Location	Spill City
1/11/2011	Diesel	100	Gal(s)	A semi truck had its saddle tank punctured during a collision which spilled the product. It is unknown what surface it is on at this time.		WB 80 at Blue Canyon	Blue Canyon
1/20/2011	Sewage	Unknown	Gal(s)	Per RP, there is one mobile home and at least two (2) approx 28 foot travel trailers that do not have septic tanks and allow their sewage to flow from a pipe from the trailers directly into a creek. Release has been occurring for at least two (2) years. Location is near the shop at the below address, not at the mill.	Unknown creek that runs into Deer Creek	Kubitch Saw Mill - 10972 Mountaineer Trail	Grass Valley
1/21/2011	Sewage	1000-2000	Gal(s)	The caller is reporting a pump line at a small commercial complex ruptured and caused the spill. The sewage spilled into an unnamed drainage and then to Clear Creek. The spill has been contained and repairs completed.	Clear Creek	10118 Commercial Ave	Penn Valley
3/15/2011	Sewage	500	Gal(s)	Caller states due to storm water run off caused release in a residential area to overflow and into a manhole. Clean up was done at the house. The rest of the release was unrecoverable.	Rock Creek	4254 Meadow Glen Rd	Auburn
4/19/2011	Sediment	Unknown	Unknown	The caller is reporting an unstable soil condition along the Bear River Canal caused soil to fracture and fall away from a steep slope and into the Bear River. An area of 60 feet by 100 feet was washed into the river.	Bear River	1 1/2 miles downstream from the Rollins Reservoir, near Colfax Long -120. 97000 Lat 39.12000	Unincorporated Placer County
8/9/2011	Fuel	150	Gal(s)	Caller states a big rig went over its side and leaking fuel. It may be leaking into some running water below Rollins Lake.	Rollins Lake Reservoir	Rollins Lake Rd approximately 3/10 miles from Long Ravine Rd	Colfax
12/16/2011	Turbine Oil	2	Pt.(s)	Caller states substance released from a turbine due to unknown cause. Caller states substance released to the South Yuba River. Sheen is 20 Ft X 20 Ft. Caller states release has been boomed and pads applied.	South Yuba River	Migrant Gap at the Spalding #2 Powerhouse	Nevada City
12/31/2011	Vehicle Fluids	Unknown	Gal(s)	**Potential Release** While launching a vessel the vehicle entered the water possibly causing a release, unknown cause, unknown who is handling containment or clean up.	Rollins Lake	Rollins Lake Rd - Boat Launch, Long Ravine Campground	Colfax
5/12/2012	Sewage (clear effluent)	500	Gal(s)	RP is reporting a lift station failure which caused the clear effluent to flow down to Scotts Flat Reservoir. Clean up is complete but the portion in the lake is unrecoverable.	Scotts Flat Reservoir	End of Lake Lane in the Cascade Shores Community	Nevada City
8/21/2012	Gasoline	Unknown	Unknown	The caller is reporting a traffic accident and a vehicle into an irrigation ditch.	Irrigation Ditch	Champion Mine Road at Newtown Road	Unincorporated Nevada County
9/12/2012	Sewage	Unknown	Gal(s)	While fishing there appeared to be raw sewage in the river, paper and solid products were observed, unknown cause, unknown source.	Middle Yuba River	1/4 Mile Downstream from Jackson Reservoir Dam (Large pool near big rock)	Sierraville

Table 4-12 Cont'd
Cal OES Hazardous Materials Spill Reporting, Yuba/Bear River Watershed, 2011 - 2015

Incident Date	Material	Quantity	Unit	Description	Waterway Impacted	Spill Location	Spill City
11/4/2012	Sewage	15,000	Gal(s)	RP states that a manhole overflowed due to a blockage in the mainline resulting in the release of approx 15,000 gallons of sewage into an irrigation pond. A small outlet to the pond was also impacted which leads to Deer Creek. The release is contained and cleanup is underway.	Irrigation pond, Deer Creek	11442 Slate Creek Road	Grass Valley
12/5/2012	Diesel	2	Gal(s)	Per caller, a punctured saddle tank releasing diesel (less than 2 gallons) onto the dirt into the ditch. Log # 037.		Eastbound HWY 80 just west of Whitmore (near Blue Canyon)	Alta
1/24/2013	Unknown white substance	100 feet x 30 feet	Unknown	RP is reporting that there is a unknown white substance that could be paint in the pond on her property and the pond 5 foot wide outlet that flows down to Rollins lake about 1/4 mile away. RP husband has a 5 gallon bucket with some of the product in it for possible testing.	Unnamed creek	19251 Country Lane near Orchard Springs	Chicago Park
6/10/2013	Sodium Carbonate - Pro Blue, CAS 497-19-8	2-3	Gal(s)	During air conditioner maintenance the release occurred, a sudden rain event caused the material to run off the equipment, material flowed onto a structure, asphalt and a storm drain, RP handled containment, unknown who is performing clean up.	Unknown	13079 Earhardt Ave	Auburn
6/13/2013	Potential Release of Gasoline and Motor Oil	N/A	N/A	Caller states this is potential release due to a pick-up truck in Fordyce Lake. Caller states the vehicle is on its side and 25% submerged. Caller states no sheen is visible at this time. Caller also states both occupants are out of the vehicle.	Fordyce Lake	Fordyce Lake	Unincorporated Nevada County
6/29/2013	Sewage	Unknown	Gal(s)	Homeless subjects living on the Nevada side of the river are dumping raw sewage into the waterway causing the release, material is being dumped directly into the river from buckets, unknown who is handling containment and clean up.	Bear River	Across from Bear River Overnight Campground	Grass Valley
7/19/2014	Oil & Gasoline	5	Qt.(s)	Per the caller a boat sank causing the spill.	Rollins Lake	Near the Marina in a cove on Rollins Lake	Unincorporated Nevada County
9/22/2014	Diesel Fuel	35	Gal(s)	RP states that an accident resulted in a roll-over of a cement truck into the Squirrel Creek. Accident resulted in one fatality and one with major injuries transport to medical facility. Closure of one lane of WB I-20, for cleanup and investigation. CHP Log # 1377.	Squirrel Creek	WB I-20 near Rough and Ready Off Ramp	Penn Valley

Table 4-12 Cont'd
Cal OES Hazardous Materials Spill Reporting, Yuba/Bear River Watershed, 2011 - 2015

Incident Date	Material	Quantity	Unit	Description	Waterway Impacted	Spill Location	Spill City
10/1/2014	Hydraulic Oil	(11) 5 gallon pails	Sheen	Caller states a helicopter was long lining a load of (11) 5 gallons pails of hydraulic oil when the helicopter experienced turbulence and dropped the pails into the water for safety reasons. Unknown how many pails broke open when they hit the water, however, there is a sheen visible on the water. Unknown how much hydraulic oil has released into the water. A contractor will handle the cleanup.	Lake Spaulding	Latitude: 39° 20' 16" N Longitude: 120° 38' 00" W, near Emigrant Gap	Unincorporated Nevada County
3/21/2015	Unknown Oil	50 yds x 20'	Sheen	Per the NRC Report: CALLER IS REPORTING AN UNKNOWN SHEEN FROM AN UNKNOWN SOURCE IN RAWLINGS LAKE. CALLER STATED THERE ARE SEVERAL DUCKS SWIMMING IN THE MATERIAL. MAKING NOTIFCATION	Rollins Lake	Rollins Lake park	Colfax
5/23/2015	Gasoline	0.5 - 1	Gal(s)	RP states that a pickup truck is overturned in Jackson Creek resulting in the release of a small amount of fuel, estimated to be approx 1/2 gal to 1 gal of gasoline into the creek.	Jackson Creek	Lat: 39deg 27' 15.8" Long: 120deg 35' 01.0"	Unincorporated Nevada County
6/2/2015	Diesel Fuel	200	Gal(s)	Per the caller an accident caused the rupture of a saddle tank causing the spill. The fuel is leaking into a drain that leads to a creek. Unknown if the fuel has reached the creek.	Storm Drain	Eastbound Interstate 80 Just East Of Drum Forebay	Unincorporated Placer County
9/5/2015	Fuel - Gasoline	7-8	Gal(s)	Vehicle left the roadway and drove into a creek causing the release, material flowed directly into the water, FD is handling containment, unknown who is performing clean up.	South Yuba River	EB 80 JEO Eagle Lakes, 100 yards from roadway, Near Shinneyboo Campground	Soda Springs
11/2/2015	Diesel	75	Gal(s)	RP states that a big rig was involved in a traffic accident resulting in the release of approx 75 gal of diesel onto the roadway and into a storm drain. The release is contained and cleanup is in progress.	Storm Drain	WB I-80 just west of Blue Canyon	Alta
12/24/2015	Transformer oil (non-PCB)	18	Gal(s)	RP states that a pole mounted transformer was struck by lightning on 12/24/15 resulting in the release of approx. 18 gal of non-PCB transformer oil onto the ground and some of the release was washed into Bear River. The release is contained and cleanup is in progress.	Bear River	3390 Meadow Vista Rd	Meadow Vista
12/28/2015	Diesel	25 or less	Gal(s)	Caller states that due to a big rig accident, a release of diesel fuel occurred. A release of approx 25 gallons released from the fuel tank and possibly impacted Canyon Creek. Due to heavy water flow, RP is unable to determine if fuel positively released into the creek. Corresponding agencies have been notified, CalTrans is enroute for possible clean up. No drinking water impacted.	Canyon Creek	East of I-80, East of drum Forebay	Gold Run

Table 4-12 Cont'd
Cal OES Hazardous Materials Spill Reporting, Yuba/Bear River Watershed, 2011 - 2015

Incident Date	Material	Quantity	Unit	Description	Waterway Impacted	Spill Location	Spill City
12/31/2015	Motor oil	1.5 Tsp	N/A	Caller states that a third party waste quart container was found at the bed of Canyon Creek near the diversion dam is suspected to have released a small amount of the substance reported. As a result a small sheen was also noticed in the creek. Booms have been deployed and the release is contained. Clean up is in progress. RP states that there is no drinking water impacted.	Canyon Creek	Long -120.751522; Lat: 39.241426,	Alta

When a hazardous material spill or leak of a reportable quantity occurs, notification to emergency response agencies is required by state and federal law. In California, Cal OES Hazardous Materials Section coordinates statewide implementation of hazardous materials accident prevention and emergency response programs for all types of hazardous materials incidents and threats. In response to any hazardous materials emergency, the Section staff is called upon to provide state and local emergency managers with emergency coordination and technical assistance.

A sewage spill is required to be reported if 1,000 gallons or more are released, and any amount that reaches a water of the United States. An oil or petroleum product spill is required to be reported if 42 gallons or more are released. Any other hazardous material spill is required to be reported if there is a reasonable belief that the release poses a significant present or potential hazard to human health and safety, property, or the environment.

Notification must also be made to the Cal OES State Warning Center for the following:

- Discharges that may threaten or impact water quality.
- Discharges of any hazardous substances or sewage, into or on any waters of the state.
- Discharges or threatened discharges of oil in marine waters.
- Discharges of oil or petroleum products, into or on any waters of the state.
- Any spill or other release of one barrel or more of petroleum products at a tank facility.
- Hazardous Liquid Pipeline releases and every rupture, explosion or fire involving a pipeline.
- Any found or lost radioactive materials.

Other considerations for reporting to Cal OES State Warning Center include discharges such as:

- Biological agents;
- Infectious wastes;
- Industrial and Agricultural chemicals (pesticides, herbicides, fungicides, etc.);
- Explosives; or
- Air contaminants.

Hazardous Materials Incidents are Classified in the following descriptions, consistent with *NFPA 471: Recommended Practice for Responding to Hazardous Materials Incidents (1997 Edition)*:

- Level One Incident (Minor): An incident that can be easily handled using resources immediately available to first responders having jurisdiction. Significant human health and safety and/or environmental issues do not arise.

- Level Two Incident (Moderate): An incident that is beyond the capabilities of a local jurisdiction that may require the use of mutual aid, either for operational assistance or logistical support. A declaration of a local emergency may be issued, a Governor's Proclamation may be issued, and the local Emergency Operations Center (EOC) may be partially or fully activated. Human health and safety and/or the environment are affected.
- Level Three Incident (Major – Catastrophic): An incident that significantly exceeds local capabilities. Considerable environmental and/or public health impacts have occurred or are expected. A local emergency is usually declared; a Governor's Proclamation may be issued, along with a request for a Presidential Declaration; and the local EOC and the State Operations Center are fully activated.

When a hazardous material spill or leak occurs, it is the owner's or operator's responsibility to notify the local designated emergency response agency, which is called the Certified Unified Program Agency (CUPA), as well as the Cal OES. There are 3 CUPAs governing discharges that enter the watershed. They are responsible for the following local "unified programs":

- Hazardous Materials Release Response Plans and Inventories
- California Accidental Release Prevention Program
- Underground Storage Tank Program
- Aboveground Petroleum Storage Act Program
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs
- California International Fire Code: Hazardous Material Management Plans and Hazardous Material Inventory Statements
- Hazardous waste generator regulation, including most of the state's "tiered permit" requirements.
- California Accidental Release Prevention program.

Cal OES Oil by Rail

Historically oil has come into California for refining by marine vessels. California is the third-largest refining state in the US. Cal OES expects a significant increase in the quantity of oil being delivered in to California by rail. The oil is coming from increased drilling in Canada and North Dakota. Between 2012 and 2013 there was an increase of approximately five million barrels of oil delivered to California by rail. Cal OES is currently projecting that quantity to increase to 150 to 200 million barrels annually. The oil being shipped from Canada and North Dakota, specifically the Bakken Shale production area, is unique in that it is highly flammable "light" crude oil, known as Bakken Crude oil. There have been numerous rail accidents associated with the Bakken Shale that have been more devastating due to the flammable nature of the oil. This quality of the Bakken Crude oil has raised concern over the potential for increased risk of derailments, explosions, fires, accidental releases, and the potential for crimes and terrorist acts.

The US Department of Transportation issued an Emergency Order (DOT-OST-2014-0067) in May 2014 that requires transporters to provide notification to States if they intend to ship greater than 1,000,000 gallons of Bakken Shale through them. The transporters are required to disclose the number of trains, per week, per county. The Cal OES, Fire and Rescue Branch, Hazardous Materials Section manages California's Oil by Rail program and receives these notifications. Cal OES has identified all the possible oil by rail routes in the State and the location of the various types of certified Hazardous Materials teams that could respond to an incident. These are shown in **Figure 4-5**.

There is one transporter in the Yuba/Bear River watershed: UPRR. Cal OES then shares the notifications with the public and first responders by posting on its website. First responders are required to be prepared for any emergency incidents. To date, there have been a few notifications provided to Cal OES for the railway lines in Northern California. Notifications are not required for smaller loads (less than 1,000,000 gallons) or blended oils, so it is uncertain how accurate and effective the notification requirement is.

Cal OES State Warning Center

There is a 24-hour telephone number for the Cal OES State Warning Center. The Cal OES State Warning Center is a single point of notification for all state agencies, as well as federal and local agencies. When spill information is received, the Cal OES State Warning Center will assign a spill control number to the incident that can be used to track various activities associated with the incident.

At a minimum, the Cal OES State Warning Center is looking for this information:

- Who is making the notification and who is the responsible party, if different - name, address, and phone number;
- Where did the release occur? (exact location, address, and county)
- What was the material involved in the release/threatened release?
- What was the quantity released/threatened to be released?
- What are the potential hazards presented by this release/potential release, if known?
- How did the release happen?
- Whether or not a body of water is affected.
- Local agencies that are on-scene and/or notified.
- What containment and/or cleanup actions have been taken?

Figure 4-5
Cal OES Oil By Rail Routes and Hazardous Materials Teams

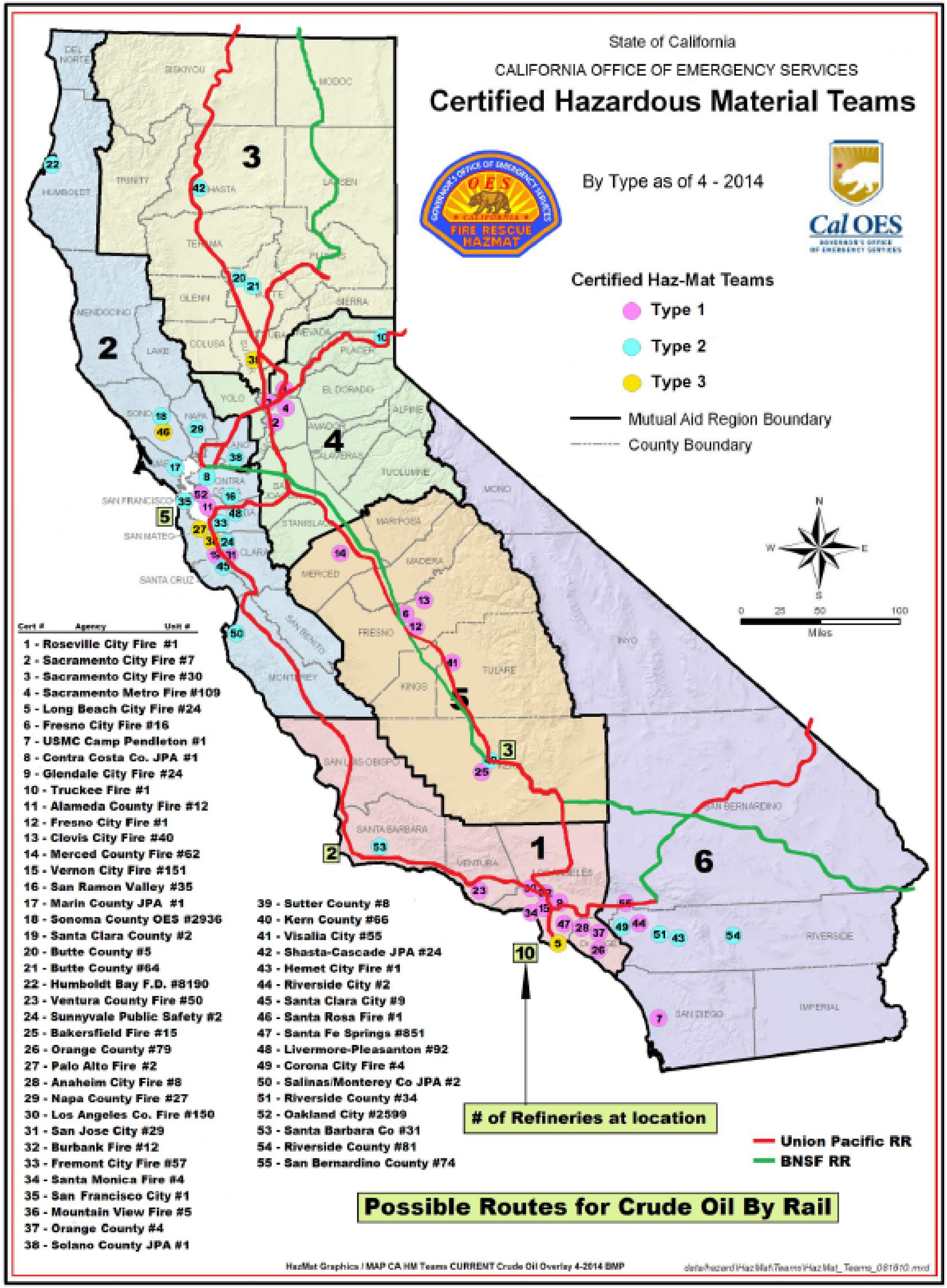


Figure 4-6 illustrates the decision-making process for determining emergency response notification requirements if an incident occurs. **Figure 4-7** illustrates the decision-making process for notification, and the list of agencies that are contacted by the Cal OES State Warning Center. It should be noted that in the event of a hazardous materials incident, the Cal OES State Warning Center can also assist responding agencies in contacting other response agencies during business hours and after-hours.

On July 1, 2014, the administration of the California Drinking Water Program was transferred from the Department of Public Health to the State Board. This transfer was done to align the state's drinking water and water quality programs to effectively protect water quality and the public health as it relates to water quality, while meeting current needs and future demands on water supplies. With regard to emergency notification the procedures have not changed, just a revision to the names of the programs being notified.

<u>State Board/Regional Board</u>

Notification Requirements for Cal OES Notification to the State Board/Regional Board: Immediate verbal notification is required by the Cal OES State Warning Center to the Regional Board of all hazardous materials spills that enter or threaten to enter in, or on, any waters of the state.

Follow-up Reports: A Damage Assessment Report or Remedial Action Plan may be required of the responsible party. The responsible party will also report accumulated petroleum and heavy metal concentrations in drainage systems to the Cal OES State Warning Center via written follow-up reports.

Capabilities and Limitations: Support functions include the following:

- Conduct water sampling, analysis, and monitoring activities to assist in hazardous materials release evaluation and mitigation.
- In cooperation with DTSC, designate sites for disposal of hazardous materials.
- Assist DDW in advising water users of potential adverse impacts of a spill.

Figure 4-6
Cal OES State Warning Center Notification Determination

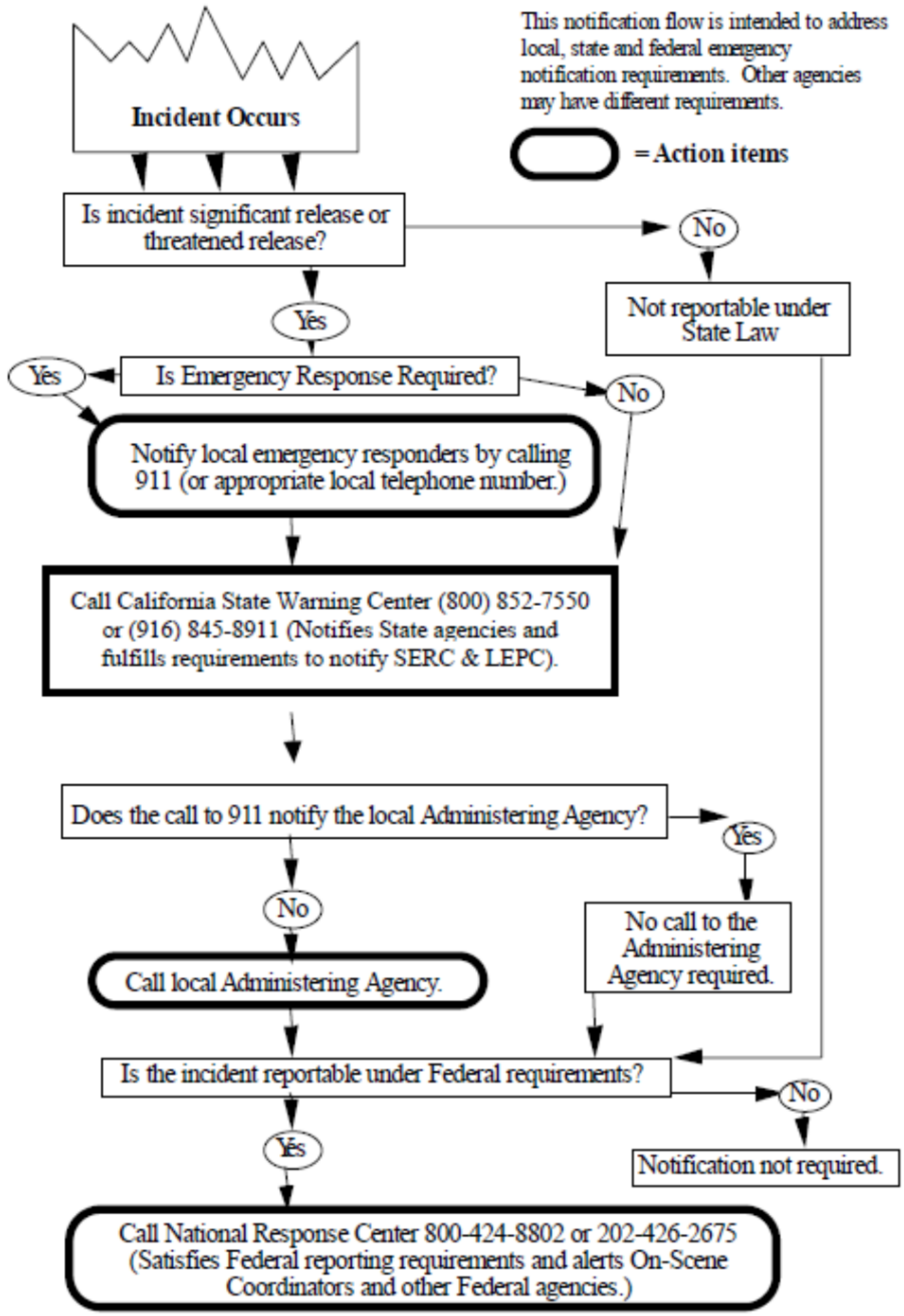


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Figure 4-7
Cal OES State Warning Center Notification Flow Decision Tree

Notification Flow Decision Tree

Spill notification to Cal EMA from industry or response agencies → **California State Warning Center**

1. Receive report and copy info to a "*Spill Report Form*"
2. Notification within Cal EMA → **Cal EMA** Region(s), Hazardous Materials Section, Fire & Rescue Branch, & Executive Duty Officer
3. Notify via RIMS, email, phone, and/or page the following agencies:

Local Agencies

- CUPA/AA/PAs
- County OES
- East Bay Regional Park
- UC Santa Barbara

State Agencies

- Air Resources Board
- California Highway Patrol
- Cal FIRE
- Cal OSHA
- California Department of Transportation
- California Coastal Commission
- California National Guard
- Emergency Medical Services Authority
- Department of Fish and Wildlife, Office of Spill Prevention & Response
- Department of Food & Agriculture
- Department of Public Health - District Office
- Department of Parks & Recreation
- Department of Pesticide Regulation
- Department of Toxic Substances Control
- Department of Water Resources
- Division of Oil, Gas, & Geothermal Resources
- Public Utilities Commission
- Regional Water Quality Control Board
- State Water Resources Control Board
- San Francisco Bay Conservation & Development Commission
- State Lands Commission
- Nevada State Emergency Operations Center

Federal Agencies

- National Response Center
- U. S. Coast Guard
- U. S. Environmental Protection Agency
- U. S. Fish and Wildlife Services
- U. S. Minerals Management Services
- Federal Emergency Management Agency
- U.S. Department of Health & Human Services
- U.S. Air Force
- U.S. Army
- U.S. Marines
- U.S. Navy

NOTE: *Agency notifications are made according to Warning Controller Procedures, which are based on current laws and regulations, pre-determined criterion, and agreements made between Cal EMA and the agencies that want to be notified.*

***** Not intended to be all inclusive or applicable for all incidents *****

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State Board, Division of Drinking Water

The DDW has statutory responsibility for the regulation of public water systems to ensure that drinking water is safe, wholesome, and potable. In the event of a hazardous materials spill or threatened release which affects a public water system or source of drinking water such as a lake, river, or aqueduct, the DDW Duty Officer is notified of the impact to the source. Generally, Cal OES makes this determination if Section 2.k. "Drinking Water Impacted" is reported as "Yes" by the notifying entity on the Hazardous Materials Spill Report. (Often, this is reported as "Unknown".) The DDW Duty Officer would then notify the DDW Duty Officer of the spill. The DDW Duty Officer then notifies the DDW District Engineer for the impacted source. The District Engineers have call down lists to assist with notifying DDW staff engineers and water utilities. District Engineers will work with the water utility to prevent contamination of the water system. The District Engineers will also issue recommendations to the public in coordination with the utility and local health department to prevent use of contaminated water.

Notification Requirements for Cal OES Notification to DDW: Immediate verbal notification is required for radioactive material incidents; releases involving a public water system or drinking water source; releases affecting a food, drug, medical device, cosmetic, or bottled water manufacturer or wholesaler; or significant releases affecting a large population or involving deaths, serious injuries, evacuations or in-place sheltering.

Response Information Management System (RIMS)

Cal OES developed the RIMS as part of the development of the State's Standardized Emergency Management System (SEMS). This was developed in response to the US Department of Homeland Security's National Incident Management System (NIMS). NIMS was developed so responders from different jurisdictions and disciplines can work together better to respond to natural disasters and emergencies, including acts of terrorism. NIMS benefits include:

- Unified approach to incident management;
- Standard command and management structures; and
- Emphasis on preparedness, mutual aid, and resource management.

The purpose of RIMS is to provide a single point for tracking the status and progress of hazardous materials spills statewide; this is the Spill/Release Reporting notification website. Only registered users can input data into the website, but anyone can access the website to review current or archived Cal OES cases. The current cases can be accessed at:

http://w3.calema.ca.gov/operational/malhaz.nsf/$defaultview

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Section 5** showed that none of the water treatment plants had detects of organic constituents.

The most significant wastewater constituents of interest to source water are microbial constituents, specifically *E. coli, Giardia,* and *Cryptosporidium*. During the study period, *E. coli* data was most readily available at the water treatment plant intakes. The *E. coli* levels were relatively low, but the most frequent and more significant *E. coli* peaks occurred during the winter months, as discussed in **Section 3**. Plots of coliform levels and local precipitation at the water treatment plant intakes show that high coliform levels are frequently associated with high precipitation, which are associated with high river flow events. There is a potential for wastewater discharges, from either the treatment plants or the collection systems, to impact source water coliform levels.

Source Water Protection Activities

Because the potential for spills exists, PCWA and NID have established their own voluntary spill notification program consisting of direct notification and inter-notification agreements, internal procedures for routing of spill information, and internal response procedures. Both agencies are provided direct notification from their respective County OES in the event that a canal or receiving water is impacted. Both agencies also coordinate with PG&E regarding source water quality. In addition, NID receives direct notification from the City of Nevada City in the event of a wastewater spill from the wastewater treatment plant.

On December 30, 2015 PCWA received numerous complaints from customers in their Alta system related to a musty fuel odor from the water. A visual inspection of the Forebay resulted in no unusual appearance or sheen, but samples were collected for analysis. Lab results received the following day were positive for low levels of oil and kerosene. By January 4, 2016 the water was still impaired. PG&E placed booms in the ditch upstream of the Forebay and PCWA staff initiated use of powdered activated carbon (PAC) to absorb the contaminant. PCWA continued sampling, coordinated with DDW, and prepared for bottled water and public notification. PG&E initiated remediation of the contamination on January 5, 2016, which was complicated by the presence of an ice layer over the Forebay. It was determined that the source of the contamination was a vehicular accident on Interstate 80 on December 28, 2015. The California Highway Patrol and California Department of Transportation responded to the event, but did not realize the drinking water was impacted and did not notify PCWA. Subsequent to this event, PCWA has enhanced coordination with the California Highway Patrol and California Department of Transportation for potential spills along Interstate 80.

WASTEWATER

Background

Wastewater is known to contain pathogenic microorganisms. Wastewater treatment plants remove and/or inactivate some, though not all, of these organisms through various treatment processes. Secondary treatment of domestic sewage is expected to remove 75 to 99 percent of enteric viruses[4], 85 to 99 percent of heterotrophic bacteria[5], and 92[2] percent of *Giardia* cysts.

Seasonal Patterns

Municipal wastewater treatment plants discharge treated effluent throughout the year. Unpermitted discharges from the wastewater treatment plants and collection systems can occur at any time due to blockages or breakages.

Related Constituents

Wastewater is a blend of sewage, washwater from showers, kitchens, etc., and any effluent from industrial facilities within the sewer collection system. Potential contaminants of concern in wastewater include microbial pathogens (such as bacteria, viruses, and protozoa), TOC, VOCs, synthetic organic compounds (SOCs), and nutrients. Industrial effluent discharges to the collection system are regulated by the wastewater treatment plants and must meet effluent limits set, including pretreatment if necessary.

Presence in the Watershed

There are three permitted NPDES wastewater treatment plants (WWTPs) in the Yuba/Bear Watershed, see **Table 4-13**. These are shown on the Watershed Map, **Figure 2-1**. Each of these facilities has a collection system associated with them that are also located within the watershed.

Table 4-13
Wastewater Treatment Plants in the Yuba/Bear River Watershed

County	Name of Facility	City	2006 Capacity (mgd)	2010 Capacity (mgd)
Nevada	Donner Summit PUD WWTP	Donner	0.52	0.52
Nevada	Cascade Shores WWTP	Nevada City	0.026	0.026
Nevada	Nevada City WWTP	Nevada City	0.69	0.69

[4] National Research Council, 1998. Issues in Potable Reuse: The Viability of Augmenting Drinking Water Supplies with Reclaimed Water. National Academy Press.
[5] Chauret, C. et al., 1999. Fate of *Cryptosporidum oocypts*, *Giardia cysts*, and microbial indicators during wastewater treatment and anaerobic sludge digestion. Canadian Journal of Microbiology, 45: 257-262.

In addition to the three permitted NPDES facilities there are other facilities with Waste Discharge Requirements (WDRs) for land disposal located in the watershed, as well as collection systems for the City of Grass Valley and Nevada County Sanitation District and individual on-site septic systems. The facilities located in close proximity to the lower watershed canals may have the potential to impact source water quality if there was a failure in the system. Failures from community systems would be reported through the spill notification systems, however spills from individual residences would only be reported by the owner. The counties do not inspect facilities regularly. It is likely that either NID or PCWA staff would notice such a discharge during routine canal maintenance and inspection. One of the community permitted facilities, Creekside Village Mobile Home Park located in Penn Valley, will be discussed in further detail below.

Donner Summit Public Utilities District Wastewater Treatment Plant

This wastewater treatment plant is located near Soda Springs, northwest of Lake Van Norden. The plant discharges to the South Fork of the Yuba River from October through July. Some winter flows are diverted for snow-making. The treated effluent is used for irrigation during the summer months (August and September). NPDES Permit Order No. R5-2009-0034 was replaced during the study period by Order No. R5-2015-0068. There was no change to the capacity of the facility, but discharge to the Yuba River was extended into July and there were revisions to effluent limits. The new permit also indicates that the discharger plans to increase the use of winter flows for snowmaking.

The treatment system at the Facility was upgraded during the study period and now consists of influent flow equalization, preliminary treatment, conventional activated sludge process, lime addition equipment to control pH and reduce salinity, biological treatment with membrane bioreactors plus filtration, and ultraviolet light (UV) disinfection. Biosolids treatment consists of two aerobic digesters and sludge drying beds. Sludge disposal is to a landfill. The permitted capacity remained the same at 0.52 mgd. The facility includes a 1.56 million gallon storage tank for effluent emergency storage if necessary.

Interim effluent limits were set under Order R5-2009-0034 and Pollution Prevention Programs are required for numerous constituents for which they are unable to comply with the new permit limits at this time, including; aluminum, ammonia, nitrate, dichlorobromoethane, copper, cyanide, silver zinc, aldrin, alpha-BHC, manganese, and mercury. Compliance with final effluent limits was required by April 2014, however a Cease and Desist Order (CDO) was issued in 2014 (R5-2014-0034) which extended the compliance period to allow for completion of plant upgrades. There were 205 detects of these constituents in the effluent during the study period, almost all of them within the interim effluent limits.

The Regional Board issued two ACL Orders to cover violations during the study period (R5-2014-0577 and R5-2015-0538). There were only four violations associated with these; two for manganese and two for ammonia.

Cascade Shores Wastewater Treatment Plant

This wastewater treatment plant is owned and operated by Nevada County Sanitation District No. 1. It is located in Cascade Shores, on the south side of Scotts Flat Reservoir, and discharges to Gas Canyon Creek, which is a tributary to Greenhorn Creek and eventually discharges to Rollins Reservoir. NPDES Permit Order No. R5-2008-0111 was amended by Order No. R5-2012-0004 and then replaced by Order No. R5-2015-0031. The amendment and new order provide the same permitted discharge capacity, revised some effluent limits, reduced the frequency of effluent sample collection, and identified the permittees plan to convert to land disposal in 2017. In addition, the Regional Board adopted Time Schedule Order (TSO) R5-2010-0909 to establish interim limits for copper and allowed for compliance by December 10, 2015. However, this could not be met so the Regional Board issued TSO R5-2015-0032 to further extend the interim copper limits through December 31, 2018 (when conversion to land application should be complete).

The treatment system at the facility was upgraded in 2010 and consists of combined grit screens at the headworks, an odor control unit, and an equalization tank. Secondary treatment consists of two parallel trains of anoxic moving bed bioreactors (MBBRs), aerobic MBBR, and dissolved air flotation units. Tertiary treatment consists of 12 ultrafiltration membrane filters, two inline ultraviolet light (UV) units, an outdoor re-aeration tank and an effluent meter. Excess sludge is transported to the Discharger's Lake Wildwood Wastewater Treatment Plant to be dewatered, then it is taken offsite for disposal at a landfill. The permitted capacity remained the same at 0.026 mgd.

There were 116 detects of these constituents in the effluent during the study period, almost all of them related to copper detects, which were within the interim limits.

The Regional Board issued two ACL Orders to cover violations during the study period (R5-2011-0573 and R5-2014-0506). There were nine violations during the study period associated with these; coliform, ammonia, and biochemical oxygen demand.

City of Nevada City Wastewater Treatment Plant

This wastewater treatment plant is owned and operated by the City of Nevada City. It discharges to Deer Creek, just west of Nevada City. The facility consisted of sequencing batch reactors followed by tertiary filters and chlorination and dechlorination. NPDES Permit Order No. R5-2008-0177 was replaced by Order No. R5-2012-0033 during the study period. Changes to the facility include the addition of lime to help the nitrification/denitrification process and revisions to the effluent limits.

The WWTP consists of screening, grit removal, lime addition, influent flow equalization and emergency storage, nitrification/denitrification, activated sludge, filtration, chlorination, and dechlorination. The waste activated sludge is stored in an aerated day tank, dewatered by a belt filter press, and hauled to Ostrom Road Landfill in Wheatland, CA.

There were 25 detects of various constituents in the effluent during the study period, which resulted in some violations of effluent limits. The Regional Board issued two ACL Orders to cover violations during the study period (R5-2013-0540 and R5-2016-0519). There were eight violations during the study period associated with these; six for total coliform, one for ammonia, and one for dichlorobromomethane.

Creekside Village Mobile Home Park

Squirrel Creek passes through Penn Valley where there are a significant number of septic systems and one community wastewater system, the Creekside Village Mobile Home Park (MHP). The Nevada County Sanitation District operates the Penn Valley WWTP, which does not discharge in the Yuba/Bear River watershed. The Creekside Village MHP is not currently connected to the public sewer, but Regional Board staff indicated that they may be encouraged to join the community collection system in the near future.

The wastewater facility for the Creekside Village MHP had an original permit from the Regional Board for disposal to land, from 1976. The WDRs were most recently renewed in 1998 (Order No. 98-010) and no modifications were made during the study period. The MHP is located along the south side of Squirrel Creek and the evaporative/percolation ponds (three) are located adjacent to the north side of Squirrel Creek. The WDRs indicate a system discharge of 40,000 gallons per day to the ponds. Discharge of wastes to surface water is specifically prohibited, including untreated, partially treated, and treated water. In lagoon limits are set for dissolved oxygen, pH, biochemical oxygen demand (BOD), and total settleable solids. The order has a companion Monitoring and Reporting Program (MRP) which indicates that dissolved oxygen and pH are monitored in the discharge weekly, while other constituents are monitored in the discharge monthly (BOD, nitrogen, total dissolved solids, and conductivity). There is no requirement to conduct any monitoring in the adjacent Squirrel Creek.

A new General Order was issued by the State Board for Small Domestic Wastewater Systems WDRs (2014-0153-DWQ) during the study period. This will apply to the Creekside Village MHP facility, which is overdue for a permit review and renewal. Regional Board staff indicate that this facility will need to either convert to the community collection system or be issued a new WDR Order with updated conditions. The General Order would be the template for a new WDR Order and is much more comprehensive and protective of water quality. A few of the key requirements included in the permit, which may help assess the impact of the ponds on Squirrel Creek, include:

- An evaluation of impacts on nearby surface water, including *E. coli* quarterly monitoring,
- A setback from a flowing stream of 150 feet for ponds,
- Sludge management plan, and
- Burrowing animal plan for ponds.

Regulation and Management

National Pollutant Discharge Elimination System

Direct discharges of wastewater to surface water are regulated by the Regional Board through the NPDES permit system. A discharge is regulated through requirements to meet effluent discharge limits and receiving water limits. Effluent limits are typically site specific, but usually include biochemical oxygen demand, total suspended solids, settleable matter, total coliform levels, and chlorine residual. Receiving waters are typically monitored upstream and downstream of the discharge for constituents such as pH, dissolved oxygen, ammonia, temperature, turbidity, and electrical conductivity. NPDES Permits issued by the Regional Board for wastewater treatment plant discharges contain standard provisions that prohibit the discharge of wastewater that has not been treated to the level required by the permit. The standard provisions also require that the discharger provide safeguards, such as alternate power supplies and emergency storage basins, to prevent discharges of untreated or partially treated wastewater in the event of an electrical power failure. Upon request of the Regional Board, a discharger must file a report on the measures to prevent and clean up spills.

In August 2008 the Regional Board issued Spill Reporting Procedures for wastewater treatment plant spills. This was issued to ensure consistency in notification procedures with the State Board Order for Sanitary Sewer Systems. This requires facilities to notify the Cal OES, the local health department, and the Regional Board within two hours of a spill or discharge. The spill notification must be certified within 24 hours, and a written report documenting the event must be submitted to the Regional Board within five days.

Sanitary Sewer Overflow Program

To provide a consistent, statewide regulatory approach to address sanitary sewer overflows (SSOs), the State Board adopted Statewide General WDRs for Sanitary Sewer Systems, Water Quality Order No. 2006-0003 (Sanitary Sewer Order) on May 2, 2006. The MRP for the Order was amended in 2008 to clarify deficiencies in timely notification and again in 2013 to further improve the program.

The Sanitary Sewer Order and its amendments require public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans (SSMPs) and report all SSOs to the State Board's online SSO database. SSOs in the Central Valley have been uploaded to the State Board's online CIWQS database since September 2007.

The Sanitary Sewer Order and its amendments require the owners and operators of sanitary sewer systems to take all feasible steps to eliminate SSOs and to develop and implement a system-specific SSMP. SSMPs must include provisions to provide proper operation and maintenance while considering risk management and cost. The SSMP must contain a spill response plan that establishes standard procedures for immediate response to an SSO in a manner designed to minimize water quality impacts and potential nuisance conditions. The SSMPs must be updated every five years.

Notification Requirements

When a spill of untreated or partially treated wastewater occurs, the owner or operator of the collection system or wastewater treatment plant is required to provide notice of the spill to the California State Warning Center when certain criteria are met, and they must provide updates if there are substantial changes to the spill report.

The Sanitary Sewer Order and NPDES permits contain the most stringent reporting requirements. Wastewater spills greater than 1,000 gallons, all wastewater spills that enter waters of the state (surface and groundwater), and spills that occur where public contact is likely, regardless of the volume, must be reported to the Regional Board by telephone as soon as notification is possible and will not substantially impede cleanup or other emergency measures. The notification must occur within 24 hours of detection of the spill. In addition to oral notification, for spills larger than 50,000 gallons a written report must be submitted to the Regional Board within 45 days of the spill.

A key requirement of the Sanitary Sewer Order is that SSOs must be entered into the State Board's SSO online database. The Central Valley region began reporting in September 2007. Under the initial Order, there were Category 1 and Category 2 spills. Wastewater spills greater than 1,000 gallons, all wastewater spills that enter waters of the state, and spills that occur where public contact is likely, regardless of the volume are classified as Category 1 SSOs. Category 1 SSOs were to be reported to the SSO database as soon as possible but no later than three business days after the SSO is detected. Category 2 spills were all other spills greater than 1,000 gallons. Under the 2013 MRP amendments, there are now three categories of SSOs: Category 1 – spills of any volume that reach surface water, Category 2 – spills greater than 1,000 gallons that don't reach surface water, Category 3 – spills less than 1,000 gallons that don't reach surface water.

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Section 5** showed that none of the water treatment plants had detects of inorganic or organic constituents.

There have been very few issues associated with operations of the NPDES permitted wastewater treatment plants in the watershed. A review of water quality data for Alta and Cascade Shores WTPs do not reflect any impact from the Donner Summit PUD WWTP. A review of the water quality data for the water treatment plants downstream of Rollins Reservoir, thus the Cascade Shores WWTP, show general trends of elevated levels of turbidity, TOC, and coliform during the wet weather season. This could be associated with many activities. Rollins Reservoir likely provides some buffering capacity on the magnitude of impact from the wastewater plant to downstream water treatment plants.

Only the Smartville WTP is located downstream of the Nevada City WWTP and the Creekside Village MHP pond system. The Smartville WTP has higher levels of *E. coli* than the other water treatment plants and peaks occur in the winter/spring months, as presented in **Section 3**. The Smartville WTP also shows significant increases in turbidity and TOC during the winter months, which could be associated with many activities in the watershed.

Source Water Protection Activities

Currently, there is little opportunity for source water protection activities related to wastewater. The treatment facilities are managed by the Regional Board. NID coordinates with City of Nevada City regarding potential discharges from the facility or collection system.

URBAN RUNOFF

Background

There is limited urban runoff to the Yuba/Bear River system, focused in the urban areas of Nevada City, Grass Valley, Penn Valley, and Auburn.

Seasonal Pattern

Urban runoff occurs on a year-round basis and includes wet and dry weather flows. Wet weather runoff resulting from seasonal storms is of relatively short duration and can have highly variable pollutant concentrations. Because of the high degree of imperviousness and the efficiency of the drainage systems, urban areas generally generate higher per acre volumes of runoff than undeveloped or agricultural lands. Dry weather runoff reaching surface waters is referred to as “non-stormwater discharges”; it results from activities such as lawn irrigation and washing activities including street, sidewalk, parking lot, building, and car washing.

Related Constituents

Urban runoff is one of several sources of microorganisms, turbidity, and TOC. Urban runoff can contain volatile organic compounds (VOCs) and synthetic organic compounds (SOCs). Urban runoff is generally associated with anthropogenic sources of increased runoff volume in urbanized land use areas. With higher volumes of runoff, some constituents can be present at higher than background concentrations. The relative impact of urban runoff depends on a number of watershed factors, as well as the timing of wet weather events.

Data on urban runoff discharges indicate that the runoff can have highly variable turbidity and organic carbon concentrations, is a source of indicator bacteria and potentially pathogens, and is a source of other constituents such as pesticides, metals, and organic compounds.

Presence in the Watershed

The State Board's CIWQS database was queried to identify the number of currently active stormwater permittees in the watershed in the various programs.

In the Yuba/Bear River watershed there is one NPDES Municipal Stormwater Phase I permits; the Statewide California Department of Transportation (Caltrans).

Under the new Municipal Phase II Permit, there are three city, county, or census designated places designated in the watershed. This includes; the City of Auburn, the City of Grass Valley, and Placer County/North Auburn. It should be noted that the City of Grass Valley has applied for waivers from the program due to hardship. The application was both rejected by the Regional Board and then appealed to the State Board. A waiver will exist until a final determination is made by the State Board.

Caltrans also has three individual NPDES permits under the State's Construction General NPDES Permit program in the watershed, all related to construction along Interstate 80. Under the Construction General Permit program there are 10 other sites that have filed a Notice of Intent (NOI) to comply with the Construction General Permit Order, ranging in size from less than one acre to 9.3 acres, as of August 2016. Due to the temporary nature of construction, this list varies over time. A list is provided in **Table 4-14**.

Finally, there are eight NPDES permits under the Industrial General Permit Order located throughout the watershed. The sites range from less than one acre to 125 acres. A list is provided in **Table 4-15**.

Table 4-14
Construction Stormwater Permittees In Watershed

Discharger	Facility Name	WDID
BriarPatch Coop	BriarPatch Parking Expansion	5S29W002641
HBT of Ridge Meadows LLC	Ridge Meadows	5S29C376326
Simon CRE Harley V LLC	Dollar General Rough and Ready	5S29W002469
Applied Engineering Consultants Inc	Town & Country Mini Storage	5S29C355484
Terra Alta Development	Deer Creek Park 2 Unit A	5S29C358560
Nevada Irrigation District	E George to Cascade Shore Transmission Main	5S29C376329
Nevada Irrigation District	Newtown Canal Encasement	5S29C376712
Nevada County Airport	Newtown Road Class II Bike Lane Project	5S29W002782
Nevada Irrigation District	Rock Creek Pipeline and Siphon	5S31C374770
Union Pacific Railroad	UPRR Roseville Subdivision Bridge	5S31C372669

Table 4-15
Industrial Stormwater Permittees In Watershed

Discharger	Facility Name	WDID
Hansen Brothers Ent	Hansen Bros Ent Greenhorn Creek	5S29I002778
Robinson Enterprises INC	Robinson Enterprises Inc.	5S29I010822
Morgan Advanced Ceramics Inc.	Morgan Advanced Ceramics Inc.	5S31I002506
Auburn City	Auburn City Airport	5S31I002840
Armstrong Technology Inc.	Armstrong Technology Inc.	5S31I026104
Placer County Dept Of Facility Services	Meadow Vista Transfer Station	5S31I005173
Placer Hills Union School District	Placer Hills Union School District	5S31I017900
Bear River Aggregates	Bear River Aggregates	5S31I023694

Regulation and Management

In 1972, The Federal Water Pollution Control Act (also referred to as the CWA) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful, unless the discharge is in compliance with an NPDES permit. The 1987 amendments to the CWA added section 402(p) which directs that stormwater discharges are point source discharges and establishes a framework for regulating municipal and industrial stormwater discharges under the NPDES program. On November 16, 1990, the USEPA promulgated final regulations that established the stormwater permit requirements.

NPDES permits are required for discharges from a municipal separate storm sewer system (MS4). The USEPA developed its stormwater regulation in two phases. The Phase I regulation was promulgated in 1990 for cities or contiguous unincorporated urban areas with populations greater than 100,000. The Phase II regulation was promulgated in 1999 for cities and other contiguous areas with populations less than 100,000. USEPA defined MS4 to include road systems owned by states which are in an area with a population greater than 100,000. MS4 permits do not establish numeric effluent limitations for stormwater, although the permits do include receiving water limits. Therefore, implementation of the stormwater management programs to the Maximum Extent Practicable (MEP) is considered compliance with the MS4 discharge permits and limits. Also, wasteload allocations can be included in permits to protect receiving waters through the Total Maximum Daily Load (TMDL) process required by the CWA.

The federal regulations also specified a requirement for stormwater permits from 10 categories of industry, as well as construction activities equal or greater than one acre.

Municipal Stormwater Program

Both the Phase I and Phase II stormwater regulations require municipalities to reduce urban runoff pollution to the MEP through implementation of control measures known as BMPs. Management programs must include public education, pollution prevention and good housekeeping for municipal operations, implementation of new development BMPs, erosion and sediment control measures at construction sites, and control of illicit discharges. Phase I and Phase II programs must also include control programs for select industrial/commercial sites. Both the Phase I and II regulations provide the regulated municipalities with the flexibility to make their own selection of BMPs in designing their own individual programs. Although the entire slate of program elements (new development BMPs, municipal activities [street sweeping], etc.) is designed to improve water quality, program elements of special interest to downstream drinking water agencies are the construction site element, illicit discharges element, new development element, and the public outreach element. Phase I permittees have individual NPDES permits, while Phase II permittees submit a NOI to comply with a Statewide General NPDES permit.

Caltrans

The entire watershed encompasses numerous state highways and roads that are regulated for stormwater discharge by the State Board. Caltrans District 3 is located within the watershed. Generally, road drainage is diverted locally to receiving waters.

In 1996, Caltrans requested that the State Board consider adopting a single NPDES permit for stormwater discharges from all Caltrans properties, facilities, and activities that would cover both the MS4 requirements and the statewide Construction General Permit requirements. The federal regulations allow for the issuance of system-wide MS4 NPDES permits. Caltrans stormwater was then regulated under State Board Order No. 99-06-DWQ, beginning July 1999. The permit does not establish numeric effluent limitations for stormwater. Therefore, this permit allows Caltrans to implement BMPs to comply with the requirements of this permit. Caltrans has a Storm Water Management Plan (SWMP) that it implements statewide.

USEPA Region 9 audited Caltrans' Stormwater Management Program in October 2009. As a result of that audit, the USEPA issued a Findings of Violation and Order for Compliance to Caltrans requesting substantial changes to its program in October 2010. In response, Caltrans prepared a revised 2003 SWMP (CTSW-RT-11-286.19.1) and submitted it to USEPA on March 1, 2011. Caltrans also received a renewal of its statewide NPDES permit on September 19, 2012. This Permit became effective in July 2013. Caltrans revised its program in 2013 to accommodate the requirements of the new Permit, and modified the measureable goals and reporting process accordingly.

The key components of the Caltrans SWMP, originally created in 2003 and updated in July 2012, include:

- Vegetation Control Program

- Storm Water System Management
- Accidental Spills
- Illicit Connection/Illegal Discharge Detection
- Characterization of Discharges
- Maintenance Facilities – Pollution Prevention Programs
- Training and Public Education – Employees, Contractors, General Public (Don't Trash California and Adopt-A-Highway)
- Region Specific Concerns

Caltrans has adopted the California Stormwater Quality Association approach to assessing program effectiveness, which has six outcome levels. Caltrans conducted an effectiveness assessment for each program element. District 3 has an Annual Report and Plan that they use to implement the SWMP. The FY 2011/2012 Annual Report states that Caltrans implemented the Stormwater Management Program effectively (Level 1) and increased awareness of program requirements among targeted audiences (Level 2), resulting in positive behavior change (Level 3) and decreased pollutant loads (Level 4).

A review of the State's Storm Water Multiple Application and Report Tracking System (SMARTS) database showed that there were no violations or enforcement actions issued by the Regional or State Board in the past five years for the Caltrans Phase I permit, but there were 14 enforcement actions and 15 violations for various Caltrans construction projects under the State's Construction General Permit Order.

Phase II MS4s

There are three current Phase II MS4 systems in the watershed, including the cities of Auburn and Grass Valley and Placer County/North Auburn. It should be noted that large portions of these urban areas do not drain in to the Yuba/Bear River water supply system for PCWA and NID.

In 2003, smaller urban areas came under a Statewide General Permit for Phase II stormwater permits (Water Quality Order No. 2003-0005-DWQ). Phase II permittees implement urban stormwater management programs similar to, but on a smaller scale than, the Phase I permittees. The Phase II program focuses on implementation of BMPs, including implementation of treatment BMPs in new development. A monitoring program was not required for most permittees. Areas that were required to monitor include those with high population, high growth rate, or a discharge to a sensitive water body. There was no required monitoring in the Yuba/Bear River watershed. Under this program, each of these entities was required to develop and implement a SWMP to manage the stormwater program. These entities implemented their SWMP using existing programs and ordinances (such as a grading ordinance) to the extent possible, but expanded the programs as necessary to cover all aspects of the SWMP. Each program element has specific control measures the entity identified for implementation, and those are largely efforts that were already on-going through various departments.

A SWMP has six key components;

- Public Education and Outreach: Ensure greater public support and knowledge of stormwater issues in the implementation of the SWMP.
- Public Participation and Involvement: Provide the public with a way to contribute an active role in the development of better stormwater management and become more informed on stormwater issues.
- Illicit Discharge Detection and Elimination: Intended to minimize discharges into the stormwater system that are not stormwater, and reduce and eliminate pollutants entering the stormwater system and any receiving waters.
- Construction Site Runoff Control: Minimize polluted stormwater from construction activities.
- Post-Construction Run-Off Control: Minimize impact to stormwater caused by development and redevelopment. Planning and design to minimize pollutants in any run-off.
- Pollution Prevention/Good Housekeeping: Reduction in the volume and type of stormwater and surface run-off that enters the stormwater system in the operation and maintenance of municipal activities.

The Statewide Phase II General Permit expired on May 1, 2008, and the State Board re-issued the permit until a new permit was adopted. This permit was revised in 2013 with Water Quality Order No. 2013-0001-DWQ, adopted on February 5, 2013 and effective July 1, 2013. The new Phase II MS4 Permit was effective during this study period. This permit generally has more extensive requirements than the previous permit, and a few significant items are:

- SWMPs will no longer be required; dischargers will use guidance documents developed by the Regional Board,
- Development of a program effectiveness evaluation,
- Requirements focus on water quality issues post-construction,
- Encourages the use of low impact development,
- Targets high priority waterbodies,
- Dischargers will use the SMARTS database for data management which will increase availability of public reports,
- Dischargers must submit boundary and outfall maps, and
- Water quality monitoring requirements for population greater than 50,000, waterbodies with a TMDL or a CWA Section 303(d) impairment listing with urban runoff listed as a source, and areas of special biological significance. There are none in the Yuba/Bear River watershed.

A review of the SMARTS database showed that there were no violations or enforcement orders issued in the past five years for any Phase II permittee in the Yuba/Bear River Watershed.

Construction Stormwater Program

The NPDES General Permit for Discharges of Storm Water Associated with Construction Activity is the Construction General Permit (Order 2009-0009-DWQ). This dictates that any development project that disturbs one or more acres of land will be subject to the requirements of this permit. Some of the construction activities subject to this permit include: clearing, grading, excavation, stockpiling, vertical structures, landscaping, and/or linear projects (i.e. wet and dry utilities). The permit provides an exclusion for projects that are considered regular maintenance activities, such as linear projects in already developed areas and relining of existing wet utility lines and/or roadway resurfacing projects.

The permit requires each project to assess its risk level to water quality based on the project's sediment discharge risk and the receiving water risk. The permit establishes three risk levels with different monitoring and sampling requirements. The permit also establishes numeric effluent parameters for discharges of risk levels 2 and 3; Numeric Action Levels and Numeric Effluent Limitations for pH and turbidity. The limitations for pH and turbidity at Risk Level 3 / Linear Underground/Overhead Project Type 3 construction sites contained in Order 2009-0009-DWQ are no longer in effect. These were removed on December 27, 2011 in accordance with a judgment by the Superior Court.

The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment.

In 2012 the State Board proposed amendments to the Construction General Permit. Those have not been finalized or adopted.

A review of the SMARTS databased showed that there were some violations and enforcement orders issued in the past five years in the Central Valley to the Construction Order permittees. It could not be readily determined how many of those were located in the Yuba/Bear River watershed. The majority of these were related to late submittal or deficient annual reporting. Also, there was some identification of deficient BMPs, notices of non-compliance, and notices of violation.

Industrial Stormwater Program

Federal regulations require that stormwater associated with industrial activity that discharges either directly to surface waters or indirectly through municipal separate storm sewers must be regulated by an NPDES permit. The regulations allow states to issue general permits or individual permits to regulate stormwater discharges. The State Board issued the first Statewide General Permit on November 19, 1991, and then amended it in 1992 and 1997 (Order No. 97-03-DWQ). In 2014 the State Board adopted an updated General Permit for Stormwater Associated with Industrial Activity (Order 2014-0057-DWQ).

The basis of this program is implementation of BMPs to prevent discharge of pollutants. The General Permit generally requires facility operators to:

- Eliminate unauthorized non-stormwater discharges;
- Develop and implement a SWPPP; and
- Perform monitoring of stormwater discharges and authorized non-stormwater discharges. This includes two events per year for total suspended solids (TSS), TOC, pH, and electrical conductivity. Additional parameters can be added based on the Standard Industry Code of the facility.

Significant changes in the new Industrial General Permit include:

- Electronic Reporting Requirements; requires Dischargers to submit and certify all reports electronically via the SMARTS database.
- Minimum BMPs: requires Dischargers to implement a set of minimum BMPs.
- Conditional Exclusion - No Exposure Certification; applies USEPA Phase II regulations regarding a conditional exclusion for facilities that have no exposure of industrial activities and materials to storm water.
- Notice of Non-Applicability: allows industrial facilities to submit a Technical Report claiming either they have designed their facility to contain storm water so that there is no discharge of storm water to waters of the United States or their facility is not hydrologically connected to waters of the United States.
- Training Expectations and Roles: requires that Dischargers have appropriately trained personnel implementing this General Permit's requirements at each facility.
- NALs and NAL Exceedances: contains two types of NAL exceedances: (1) an annual NAL and (2) an instantaneous maximum NAL. Instantaneous maximum NALs are only for total suspended solids and oil and grease.
- Exceedence Response Actions: requires Dischargers to develop and implement ERAs, when an annual NAL or instantaneous maximum NAL exceedance occurs during a reporting year.
- CWA section 303(d) Impairment and TMDLs: requires a Discharger to monitor additional parameters if the discharge(s) from its facility contributes pollutants to receiving waters that are listed as impaired for those pollutants.
- Design Storm Standards for Treatment Control BMPs: includes design storm standards for Dischargers implementing treatment control BMPs.
- Qualifying Storm Event: defines a QSE as a precipitation event that produces a discharge for at least one drainage area and is preceded by 48 hours with no discharge from any drainage area.

- Sampling Protocols: requires Dischargers to collect samples during scheduled facility operating hours from each drainage location within four hours of either the start of the discharge or the start of scheduled facility operating hours if the QSE occurred in the previous twelve hours.
- Compliance Groups: allows the formation of Compliance Groups and Compliance Group Leaders. Dischargers participating in a Compliance Group are required to sample twice a year at each facility.
- Discharges to Ocean Waters: Dischargers with ocean-discharging outfalls subject to model monitoring provisions of the California Ocean Plan shall develop and implement a monitoring plan in compliance with the monitoring requirements established pursuant to Water Code section 13383.

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Section 5** showed that none of the water treatment plants had detects of organic constituents.

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that most of the water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season. This could be associated with storm runoff periods from the urban areas.

Microbial constituents, specifically *E. coli, Giardia,* and *Cryptosporidium,* are also a potential concern from urban runoff. During the study period, *E. coli* data was most readily available at the water treatment plant intakes. The *E. coli* levels were relatively low, but the most frequent and more significant *E. coli* peaks occurred during the winter months, as discussed in **Section 3**. Plots of coliform levels and local precipitation at the water treatment plant intakes show that high coliform levels are frequently associated with high precipitation, which are associated with high river flow events. There is a potential for urban runoff discharges to impact source water coliform levels. Also, the Regional Board Safe to Swim Studies for the Deer Creek Watershed showed very high peaks at the Deer Creek below South Pine Street site in Nevada City would could be contributed to by urban runoff.

Source Water Protection Activities

Currently, there is little opportunity for source water protection activities related to urban runoff. The urban areas are required to implement Stormwater Management Plans to protect source water quality. PCWA and NID coordinate with the County OESs regarding potential discharges from the drainage systems.

MINING

Overall, the relative risk for the Yuba/Bear River drinking water supply from mining, both active and historic, is low due to regulation and management. There were extensive amounts of historic mining activity in the watershed, both the upper and lower watershed, while the current mining activities are very limited.

Background

Mining can include both metallic and non-metallic resources, can be either surface or underground, and can be either active or historic. Mines are potential contaminant sources for the drinking water supply since they discharge waste flows to receiving waters. This can include adit or tunnel drainage and stormwater runoff from the facility.

The Lava Cap Mine, which is a Superfund Site, is located in the watershed. Superfund is the name given to the environmental program that the USEPA established to address abandoned hazardous waste sites. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The funding under this Act allows the USEPA to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for USEPA-led cleanups. The Superfund cleanup process is complex and involves many steps to assess sites, place them on the National Priorities List, and establish and implement appropriate cleanup plans. This is a long-term cleanup process.

Seasonal Patterns

The timing of discharge from mines varies depending on the type, operation, and regulatory status of the mine. Most mines have at least some amount of consistent flow throughout the year.

Related Constituents

The constituents discharged are dependent on the type of mining conducted, but water quality impacts associated with mining generally includes; sediment, acidity, low dissolved oxygen, high heavy metals, and mercury (generally not at levels of human health concern).

Presence in the Watershed

Mining can occur on both private and public lands in the watershed. USFS manages mining on federal lands, such as Tahoe National Forest, and the California Department of Conservation (DOC) manages mining on state and private lands. USEPA and Regional Board regulate discharge from closed and abandoned mines, such as the Lava Cap Mine. Surface mines are regulated under the Surface Mining and Reclamation Act of 1975 (SMARA) and have mine identifications, which are managed by Counties.

Both metallic and non-metallic mining occurs, and has occurred in the watershed since the 1840s. Metallic mining is primarily gold, which can be mined through lode, placer, or hydraulic methods. Non-metallic primarily includes sand, gravel, and decorative rocks, which are typically surface-mined.

Mines can be classified as either; active, idle, closed, or abandoned by the respective regulatory and management agencies. Historic mines that are either closed or abandoned are remediated by DOC and USFS if they are a danger to people or the environment.

Gold Mining

The Yuba/Bear River watershed was an important part of the California Gold Rush. Historically, there have been thousands of gold mining claims in the watershed. Currently, there are no active gold mining operations in the watershed. The DOC, Division of Mines and Geology published a map California Historic Gold Mines, see **Figure 4-8**. It can be seen that the density of historic gold mines in the watershed is intense.

Casual mining using metal detectors and hands/pans is allowed throughout the watershed. Suction dredging in waterbodies is not allowed in California.

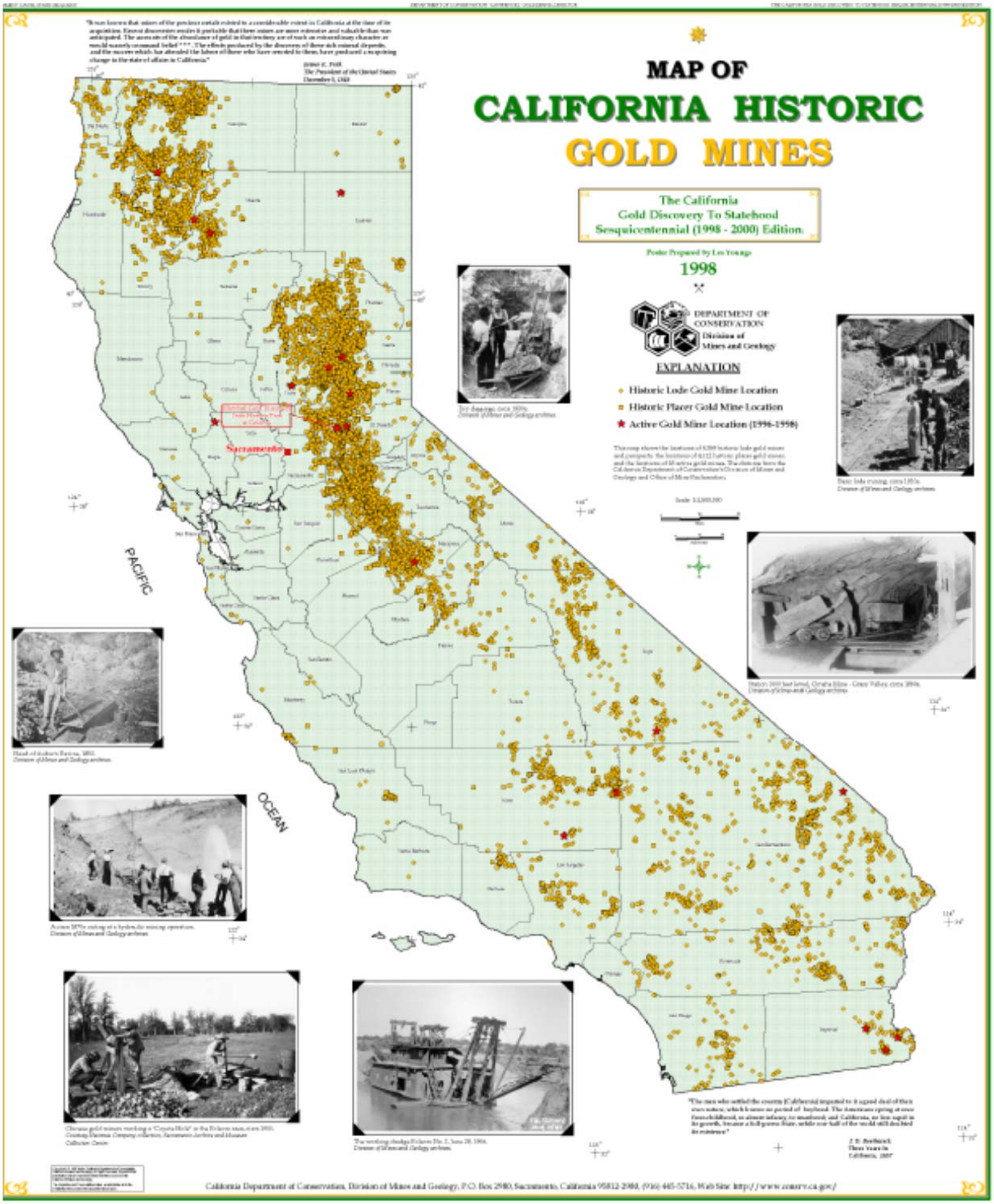
SMARA Mining

The DOC regulates and manages surface mines in California. A review of their interactive mapping tool resulted in the identification of ten surface mines in the watershed. **Table 4-16** presents the mines, as well as their current status and product. Only four mines are active, and they all provide sand and gravel products. Three of the four also have industrial stormwater permits for runoff (excluding Sierra Boulder).

Table 4-16
SMARA Regulated Surface Mines in the Yuba/Bear River Watershed

Mine ID	Mine Name	Mine Status	Product
91-29-0006	HBE - GREENHORN GRAVEL PLANT	Active	Sand and Gravel
91-29-0007	HBE - BEAR RIVER PLANT - NEVADA COUNTY	Active	Stone
91-29-0012	LAKE COMBIE FACILITY	Idle	Sand and Gravel
91-29-0015	SECRET TOWN	Idle	Sand and Gravel
91-29-0016	MEADOW LAKE GOLD MINE	Closed	Gold
91-29-0019	LIBERTY HILL MINE	Idle	Gold
91-29-0022	SIERRA BOULDER	Active	Decorative Rock
91-31-0004	BEAR RIVER AGG. - MEADOW VISTA QUARRY	Active	Sand and Gravel
91-31-0011	BEAR RIVER GRAVEL PLANT - PLACER COUNTY	Closed	Sand and Gravel
91-31-0015	ROLLINS LAKE	Closed	Shale

Figure 4-8
DOC California Historic Gold Mines



US Bureau of Land Management (USBLM)

The USBLM operates the LR2000 Database that records all mineral patents and mining claims in the watershed. A query of this database was conducted to identify case recordations related to mineral patents for placer and lode mining in the watershed counties; Nevada, Placer, and Sierra. No mineral patents were authorized for operation in the watershed, but there were three pending patents that have not been acted upon. A query was also conducted on the unpatented mining claims in the watershed. Thousands of cases have been opened in the watershed counties, but almost all of those cases have been closed or withdrawn. No active or pending mining claims were identified in the watershed, but one mining claim was approved to be sent to patent in 1992. It is located in Nevada County (T16NR9E Section 8 Subdivision NE - Willow Valley Road, NC – Along Deer Creek (CAMC 45223)).

Lava Cap Mine

The Lava Cap Mine site occupies approximately 33-acres in western Nevada County. The site includes the mining area where ore was processed to recover gold, and areas where tailings which originated at the mine have been washed downstream and deposited over time. Gold and silver mining occurred from 1861 through 1918. The site was inactive until 1934. At that time, a flotation plant was installed to process ore and then a cyanide plant was installed to process concentrates. The facility was closed in 1943 due to World War II.

The site was issued a Cleanup and Abatement Order (CAO) from the Regional Board in 1979 to clean up mine tailings and prevent mine drainage to Little Clipper Creek, which is a tributary to Lost Lake which is operated by NID. Water can be released into Greenhorn Creek and subsequently to Rollins Reservoir and the Bear River. A dam and several detention basins were put in place. In 1997, a major storm caused the dam to collapse and mine tailings were deposited in Little Clipper Creek.

Regulation and Management

Mining activities are regulated by several agencies in the watershed, depending on type and location. Current active surface mines covering large areas are required to obtain coverage for stormwater discharges under the Industrial Stormwater Permit General Order (discussed previously in the Urban Runoff subsection). All surface mines must obtain a surface mining use permit from their county under SMARA. Any mining in the Tahoe National Forest must meet federal management requirements. Casual mining in waterbodies is prohibited to use suction dredging, as per the California Department of Fish and Wildlife. The Lava Cap Mine must meet all USEPA Superfund requirements.

SMARA Regulation

SMARA provides a comprehensive surface mining and reclamation policy with the regulation of surface mining operations to assure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. California Public

Resources Code Section 2207 provides annual reporting requirements for all mines in the state, under which the State Mining and Geology Board is also granted authority and obligations. SMARA is administered and enforced locally, usually by county engineering or planning departments.

In 1991, following significant revisions to SMARA, the DOC Office of Mine Reclamation was created to provide a measure of oversight for local governments as they administer SMARA. To accomplish this goal, the Office of Mine Reclamation may provide comments to lead agencies on a mining operation's reclamation plan and financial assurance and may initiate compliance actions that encourage SMARA compliance. Since the primary focus is on existing mining operations and the return of those mined lands to a usable and safe condition, issues relating to abandoned legacy mines are addressed through the DOC Abandoned Mine Lands program.

For mines to meet the SMARA regulations, their operations must meet all of the following conditions:

- The operation has an approved reclamation plan,
- The operation has an approved financial assurance,
- The operation has filed its annual report,
- The operation has paid its reporting fee, and
- The operation has had its annual inspection by the lead agency which reflects the operation is in full compliance with the law.

On April 18, 2016, Governor Brown signed Senate Bill 209 and Assembly Bill 1142 into law and thereby enacted significant changes to SMARA. These reforms will affect how the State Mining and Geology Board, the DOC, local lead agencies, and surface mine operators oversee, implement and comply with SMARA.

Federal Management

The USFS and the USBLM work together to manage mineral resources on the National Forests. The USBLM has primary responsibility for development and enforcement of mineral rights regulations and requirements. The USFS uses the USBLM to record all mining claims and patents on National Forests.

The USFS Handbook includes a section on Minerals and Geology, with a Chapter on Mining Claims. The USFS requires anyone proposing to conduct a mining operation to submit a Notice of Intent (NOI) for a proposed mining operation to the local USFS District Ranger. The NOI must provide sufficient information, related to location, nature of operations, access, and transport, to determine if the level of proposed disturbance will require a Plan of Operations and a detailed environmental analysis. The District Ranger will, within 15 days of receipt of the NOI, evaluate the NOI and notify the operator whether or not a Plan of Operations is required.

If a Plan of Operations is required, form FS-2800 must be completed. This includes identification of potential impacts to water quality:

"State how applicable state and federal water quality standards will be met. Describe measures or management practices to be used to minimize water quality impacts and meet applicable standards.

1. State whether water is to be used in the operation, and describe the quantity, source, methods and design of diversions, storage, use, disposal, and treatment facilities. Include assumptions for sizing water conveyance or storage facilities.
2. Describe methods to control erosion and surface water runoff from all disturbed areas, including waste and tailings dumps.
3. Describe proposed surface water and groundwater quality monitoring, if required, to demonstrate compliance with federal or state water quality standards.
4. Describe the measures to be used to minimize potential water quality impacts during seasonal closures, or for a temporary cessation of operations.
5. If land application is proposed for waste water disposal, the location and operation of the land application system must be described. Also describe how vegetation, soil, and surface and groundwater quality will be protected if land application is used."

The USFS has an abandoned mine unit to address remediation of dangerous sites. They often work with the DOC and counties in implementing remediation. The DOC provided a list of joint remediation projects in the watershed counties from 2011 through 2015, see **Table 4-17**.

Table 4-17
DOC Remediated Abandoned Mine Site in Watershed Counties, 2011 - 2015

COUNTY	CLOSURE_TY	PARTNERS	FY	Agency
Sierra	Debrs Remvll, Bat Ga	USFS--Tahoe	10-11	USFS
Sierra	Adit backfill Debrs	USFS--Tahoe	10-11	USFS
Sierra	Shaft/adit backfill	USFS--Tahoe	10-11	USFS
Placer	Culvert Gate	USFS--El Dorado	11-12	USFS
Sierra	PUF/Debris Removal	USFS--Plumas	11-12	USFS
Placer	PUF/Concrete plug	Placer County	11-12	BLM
Placer	Culvert Gate	USFS--Tahoe	11-12	USFS
Placer	Culvert Gate	USFS--Tahoe	11-12	USFS
Sierra	PUF	USFS--Plumas	12-13	USFS
Sierra	PUF	USFS--Plumas	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	Culvert Gate	USFS--Tahoe	12-13	USFS
Sierra	PUF	USFS--Tahoe	12-13	USFS

California Department of Fish and Wildlife

California has prohibited the use of any motorized vacuum or suction dredge equipment as part of a mining operation in any river, stream, or lake in California. This moratorium was in place through June 30, 2016. Under existing state law the California Department of Fish and Wildlife (DFW) is also currently prohibited from issuing any permits for suction dredging in California under the Fish and Game Code.

The ongoing statutory moratorium established by Fish and Game Code section 5653.1 prohibits some, but not all forms of mining in and near California rivers, streams, and lakes. Individuals engaged or interested in otherwise lawful instream mining should be aware that other environmental laws may apply to these various other mining practices. Fish and Game Code section 5650, for example, prohibits the placement of materials deleterious to fish, including sand and gravel from outside of the current water level, into the river or stream. Further, Fish and Game Code section 1602 requires that any person notify DFW before substantially diverting or obstructing the natural flow of, or substantially changing or using any material from the bed, channel or bank of any river, stream or lake.

Under new state law effective January 1, 2016, Senate Bill 637 amends Fish and Game Code section 5653 and adds section 13172.5 to the Water Code.

SB 637 amends Fish and Game Code section 5653 as follows:

- Prohibits DFW from issuing any suction dredging permits absent a complete application which must include, among other things, a copy of any water quality permit or other authorization required by the State Board or Regional Board, or the U.S. Army Corps of Engineers, or a written determination by such agency that no water quality permit or other such authorization is necessary;
- Conditions DFW issuance of permits on regulations implementing the section that must ensure the use of vacuum or suction dredge equipment will not cause any significant effects to fish and wildlife, as opposed to prior law which conditioned the issuance of permits on regulations ensuring suction dredging would not be deleterious to fish;
- Provides DFW with authority to adjust permit fees to an amount sufficient to cover all reasonable costs incurred by DFW to regulate suction dredging as provided by the Fish and Game Code;
- Directs DFW to work with the State Board and the Regional Boards regarding potential violations of requirements, conditions, or prohibitions governing the use of vacuum or suction dredge equipment; and
- Defines for the first time by statute what it means to use vacuum or suction dredge equipment, otherwise known as suction dredging, as the use of a mechanized or motorized system for removing or assisting in the removal of, or the processing of, material from the bed, bank, or channel of a river, stream, or lake in order to recover minerals; but also clarifying the definition does not apply to, prohibit, or otherwise restrict non-motorized recreational mining activities, including panning for gold.

In general, Water Code section 13172.5, added by SB 637:

- Defines the use of vacuum or suction dredge equipment, otherwise known as suction dredging, in the same terms as described above and now provided in Fish and Game Code section 5653;
- Provides the State Board or the appropriate Regional Board may take one or more of three specified actions related to suction dredging to protect water quality, including (1) the adoption of waste discharge requirements or a waiver of such requirements; (2) specifying certain conditions or areas where the discharge of waste or other adverse impacts on beneficial uses of the waters of the state from the use of vacuum or suction dredge equipment is prohibited; or (3) prohibit any particular use of, or methods of using, vacuum or suction dredge equipment, or any portion thereof, to extract minerals based on a determination generally that doing so will cause or contribute to an exceedance of applicable water quality objectives or unreasonably impact beneficial uses; and
- Directs the State Board or the appropriate Regional Board to solicit public input as detailed and to hold at least one noticed public hearing before taking any action as provided.

Superfund Regulation

In 1999 the Lava Cap Mine site was listed as a Superfund Site, and funding was made available for remediation. The key contaminant in the surface discharge is arsenic. There are four Operable Units (OU) at the site; OU1 - Mine Area, OU2 – Groundwater, OU3 - Lost Lake Area, OU4 - Mine Area Residences.

The first Five-Year Review of the site was published in September 2011. The purpose of the Review is to determine whether the remedial actions implemented at the site are protective of human health and the environment. In addition, the Review summarizes remaining issues and identifies follow-up actions to address them. Records of Decision (RODs) have been signed for OU1 (including the tailings and adit water in the mine area and the mine residences) and OU2 (groundwater).

The ROD for OU1 is being implemented as two distinct remedies; 1) excavation of tailings and tailings consolidation, vegetative covers, a tailings and pile cap, a rock buttress, and drainage channels and 2) treatment of adit water emanating from the mine area (still in design – expected by 2019). This also includes institutional controls to minimize potential future exposure to remaining contaminated materials. The remedy for OU4 is also included in this ROD and consisted of demolition of mine residences followed by removal of contaminated debris and soils.

The remedy for OU2 is in the remedial design phase and the remedy for OU3 is currently in the remedial investigation/feasibility phase (an ROD will be forthcoming). The Review addressed the remedies that have been implemented at the site, which are the soil remedies for OU1 and OU4.

The Review found that the remedies for OU1 and OU4 were implemented in accordance with the requirements of the ROD. The remedies are functioning as designed. The remedies are protective of human health and the environment in the short term, but are not protective in the long term, because land use covenants, specified by the OU1 ROD, have not yet been implemented. The land use covenants have been prepared and are ready to be recorded, but the property owner has not yet agreed to record them. In addition, the planned institutional controls do not address two areas where wastes were left in place. It may be necessary to expand the area where institutional controls are implemented to include these two areas to prevent disturbance of and/or exposure to the wastes left in place.

Follow-up actions include implementing OU2 ROD, finalizing OU3 ROD, and developing strategies for addressing these issues related to filing land use covenants for OU1 and OU4 RODs.

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Section 5** showed that none of the water treatment plants had detects of inorganic or organic constituents.

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that most of the water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season. This could be associated with storm runoff periods from the mines.

Source Water Protection Activities

There is minimal opportunity for stakeholder involvement in mining activities. NID operates Lost Lake and could control the flow into Greenhorn Creek if necessary.

CANNABIS CULTIVATION

Background

Cannabis (or marijuana) cultivation is a new topic to the watershed sanitary surveys, driven by the increased presence of outdoor cultivation in the watershed and the potential for contribution of solids, fertilizers, and pesticides to source water from this activity. This subsection focuses on outdoor cultivation since it has the highest potential to impact source water quality.

Medical marijuana use was approved in California in 1996 under Proposition 215, which amended Health and Safety Code (HSC), Section 11362.5. The intent of this regulation was to allow individuals to grow small amounts of marijuana for their personal medical use. There was no approval of recreational use or commercial grow. Unfortunately, lack of specificity in the rule led to misuse and confusion and an increase in the illegal cultivation of cannabis.

Senate Bill 420 was passed in 2003 to clarify the provisions and intent of Proposition 215 and establish that the California Department of Public Health would issue medical marijuana use identification cards, by adding new HSC Sections 11362.7-11362.83.

Assembly Bills 243 and 266 and Senate Bill 643 were all passed in October 2015, known collectively as the Medical Marijuana Regulation and Safety Act (MMRSA) to further regulate the process/procedures of medical marijuana cultivation, manufacturing, dispensing, distribution, transportation. This expanded and added new HSC Sections, as well as Water Code Section 13276. MMRSA established the California Bureau of Medical Cannabis Regulation in the Department of Consumer Affairs (to license distributors, dispensaries, and transportation) and it is expected to be in place by January 2018. MMRSA identified the California Department of Food and Agriculture as the licensor of cultivators (through County Agricultural Commissioners) and it is expected to be in place by January 2018. Finally, MMRSA identified the State Board as responsible for developing guidelines for the California Department of Food and Agriculture on the diversion and use of water for cannabis cultivation. Ten grades of cultivator licenses were established in the regulations, based on location (indoor or outdoor), light sensitivity, and grow size. The regulations also required counties to pass ordinances by March 1, 2016 if they wanted to establish local controls over MMRSA items. All three watershed counties passed ordinances to establish local control.

In November 2016, California voters approved Proposition 64 that approves recreational use of marijuana for adults over 21 year of age. This also included taxes on cultivation and retail sales of marijuana.

Seasonal Patterns

Outdoor cannabis is cultivated in the watershed similar to other agricultural crops. Cannabis can be grown on either natural soil or in pots of pre-made or commercial soil. To generate optimum quantities of tetrahydrocannabinol (THC)-containing resin, the plant needs fertile soil and long hours of daylight. This means THC production for outdoor growth occurs optimally anywhere within 35° of the equator, which includes the Yuba/Bear River watershed.

Growers typically plant seeds in mid-April, late May, or early June to provide plants a full four to nine months of growth. Plants require large amounts of water during the growth phase. Harvest is usually between mid-September and early October.

Related Constituents

Potential source water quality impacts caused by growers that engage in activities that can negatively impact receiving waters, include: grading, terracing, dam, and road construction, causing erosion and sediment deposition in streams; illegal use of rodenticides, fungicides, herbicides and insecticides; use of soil amendments and fertilizers in situations where run off to surface waters may occur; discarding of trash and haphazard management of human waste; substandard storage of hazardous materials such as diesel and gasoline; and unauthorized diversion of water from streams.

Pesticides must be approved by USEPA and the California Department of Pesticide Regulation for use on a specific crop like cannabis. None are currently approved since there is a federal ban on marijuana use. MMRSA charged the California Department of Pesticide Regulation with identifying pesticides for use on cannabis and the associated safe levels on harvested marijuana leaf, but the Department cannot do this since it conflicts with federal statutes. Pesticides registered for use on "unspecified green plants" can be used on cannabis. Home or illegal use of pesticides does not require a cultivator license from the California Department of Food and Agriculture, only commercial cultivators require a County Agricultural Commissioner to issue an operator identification (if allowed by local ordinances).

Sierra County Sheriff indicated that the pesticides they most frequently find associated with illegal cannabis cultivation are Round Up (glyphosate) and Carbofuran.

Presence in the Watershed

Cannabis cultivation can only legally occur on private lands, it is illegal and prohibited to cultivate on public lands, such as the Tahoe National Forest. However, USFS and county law enforcement confirm that there are numerous illegal commercial grow operations within the National Forests. Essentially, cannabis cultivation can occur anywhere in the watershed where water and sunlight are available.

In 2015, the Nevada County Sheriff Narcotics Task Force eradicated over 5,000 marijuana plants and seized 371 pounds of processed marijuana.

Regulation and Management

Regional Board

The Regional Board passed NPDES General Order No. R5-2015-0113 for Waste Discharges Associated with Cannabis Cultivation. This permit is designed for outdoor grow operations that are greater than 1,000 square feet. Applicants can submit a NOI under the General Order to comply with its terms. There are currently no NOIs submitted for Placer County and only a small number of NOIs that have been submitted in Nevada and Sierra counties. As county ordinances are put in place to limit outdoor grow sizes to less than 1,000 square feet this General Order will become non-applicable.

The NPDES permit has three regulatory tiers; based on land slope, grow size, and proximity to water body. The permit requires implementation of BMPs, inspections, management plans, and monitoring depending on the tier of the applicant. It provides a list of pesticides (no organics, all biofungicides or simple oils) that are acceptable to be used on cannabis cultivation.

USFS

Since it is illegal to cultivate cannabis on public lands, the USFS does not have any management structure to prevent or minimize impacts of outdoor cultivation. All response efforts are law enforcement abatement efforts. The USFS Patrol Captain works with county sheriffs and the US Drug Enforcement Agency.

In the National Forest the primary type of outdoor cannabis cultivator is a drug-trafficking organization. In the Tahoe National Forest, these grow operations occur and are primarily illegal commercial operations conducted by Hispanic and Hmong gangs. Typically, these grow operations are identified either by recreationalists or helicopter fly-overs conducted in the spring and early summer. They are usually located in an isolated canyon with southern exposure. Once law enforcement finds the grow operation, the plants are eradicated, any individuals present are taken into custody, and the scope of site contamination is assessed. Generally, these sites are contaminated with a variety of pesticides, fertilizers, and other waste that must be remediated.

Nevada County

In 2007, the Nevada County District Attorney published Guidelines for Medical Marijuana Use so that medical patients could avoid conflict with law enforcement. There were no other specific County ordinances or regulations during the study period to address cannabis cultivation.

In response to the MMRSA, the Nevada County Board of Supervisors passed a resolution in January 2016 that banned outdoor cultivation, commercial cultivation, and other commercial cannabis activities. It also limited indoor cultivation to twelve plants in permitted structures that are not intended for human occupancy. In June 2016 voters repealed the resolution by defeating Measure W, which became effective September 2016. In August 2016, Ordinance 2416 was enacted as an interim urgency order for medical marijuana cultivation, taking effect January 1, 2017 which lifts the outdoor ban, establishes zoning and regulations, sets grow sizes, and identifies civil penalties. In the meanwhile, the County is working on permanent, long-term regulations that will address both medical and recreational use of marijuana.

The Nevada County Sheriff Narcotics Task Force addresses abatement of illegal cannabis cultivation. Some of the primary concerns they have are the impact of outdoor cultivation on nearby neighbors, environmental impact, proximity to schools, grows on parcels with no residence, increased illegal activity at grow sites, and exposure to minors.

Placer County

Placer County had no specific ordinances or regulations during the study period to address cannabis cultivation. In January 2016 the Board of passed an interim ordinance for cultivation in response to MMRSA, including several key provisions: medical marijuana only and commercial growth as only a potential future zoning.

In November 2016 the Board of Supervisors approved preparation of an ordinance related to cannabis cultivation. This ordinance will be scheduled for the December 2016 meeting and may take effect by January 6, 2017. This is two-phased effort by the county to enact comprehensive cannabis regulation, focusing immediately on allowing limited personal cannabis cultivation and banning commercial cannabis activities. There may be limited commercial cultivation of medical cannabis in the future.

The new ordinance is consistent with the Proposition 215, MMRSA, and Proposition 64. It allows cultivation of up to six non-medical plants on 50 square feet or cultivation of 50 square feet of medical cannabis for personal use, but bans all commercial activity related to cannabis including cultivation, processing, manufacturing, delivery, and distribution. Cultivation, both indoors and outdoors, will only be allowed on parcels where the private residence of the authorized grower is located.

County staff will prepare a draft zoning text amendment to outline additional detailed requirements for outdoor cultivation. Staff anticipate the amendments will limit outdoor cultivation to an area of no more than 50 square feet; establish a 100-foot setback from property lines and require planting closer to the grower's residence than to a neighbor's; require grows to be fenced; and prohibit outdoor cultivation within 600 feet of a school, church, park, library, fairgrounds or youth-oriented facility.

The Placer County Sheriff Special Ops/Marijuana Eradication Team addresses both indoor and outdoor illegal cultivators. Similar to other county law enforcement they are required to abate unlawful cannabis cultivation.

Sierra County

In July 2014 Sierra County passed Ordinance 1055 related to cannabis cultivation, including several key provisions: medical marijuana only, personal use only, no commercial grows, limit of 18 plants per person (maximum of 72 plants per property limit), must be property owner or have notarized letter from property owner, not within 100 feet of a school, no lights outdoors, six foot opaque fence around outdoor operations, and misdemeanor penalty if violate ordinance. In April 2016, Ordinance 1071 was passed which was more restrictive, but it was repealed by Ordinance 1073. In November 2016, voters approved Measure B which bans commercial cultivation of marijuana, regulates outdoor cultivation and indoor cultivation of medical marijuana for qualified patients and primary caregivers only, limiting cultivation per parcel to 10 plants for one qualified caregiver or patient and 20 plants for two or more qualified caregivers or patients, and regulates the location and conditions under which marijuana may be grown within Sierra County. The County will likely need to expand or modify this Ordinance to account for Proposition 64.

The Sierra County Sheriff addresses illegal cultivators. There is only a small portion of the watershed, upstream of Jackson Meadows Reservoir, located in Sierra County. The Sheriff confirmed that there is little cannabis cultivation in that region. Some concerns are related to illegal commercial activities on public lands, which result in clear cutting of trees, illegal grading, and leaving trash/contaminants behind.

City of Grass Valley

The City of Grass Valley has modified its Development Code to prohibit the cultivation, dispensing, and delivery of marijuana. Currently, they have a Marijuana Regulation Ad Hoc Committee to plan for future regulations to address Proposition 64 and consider allowing some activities.

City of Nevada City

The City of Nevada City has modified its Municipal Code to prohibit outdoor cultivation of cannabis, but allow indoor cultivation up to 25 square feet, and ban cannabis dispensaries. Currently, the Planning Commission is considering an Ordinance to allow for one medical marijuana dispensary within City limits.

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Section 5** showed that none of the water treatment plants had detects of inorganic or organic constituents.

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC shows that most of the water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season, however some peaks can occur during the summer and fall months. Increases in the presence of algae in the source waters may be contributed to by increased nutrients applied on cannabis in the watershed.

Source Water Protection Activities

Cannabis cultivation is a relatively new, and rapidly changing, activity in the watershed. PCWA and NID have included this topic in the 2017 Update to better understand potential vulnerabilities associated with the activity and potential impacts on water quality.

The purpose of this section is to evaluate the existing water treatment plants using Yuba and Bear River water for compliance with existing drinking water regulations, and identify potential treatment concerns related to future drinking water regulations (if applicable). For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the report.

There are fifteen existing intakes and associated water treatment plants (WTP) within the study area. The Placer County Water Agency (PCWA) plants include: Alta, Monte Vista, Colfax, Applegate, Bowman, Auburn, Foothill, and Sunset. Nevada Irrigation District (NID) plants include: Cascade Shores, Elizabeth George, Loma Rica, Lake of the Pines, North Auburn, Lake Wildwood, and Smartville. Each of these is discussed herein within the context of current and future regulatory compliance and potential treatment issues beginning with the most upstream diversion point and then moving downstream for each agency.

Tables 5-1 and **5-2** provide a summary of design parameters for each of PCWA's and NID's water treatment plants, respectively.

Highlights of Selected Existing Drinking Water Regulations

National Interim Primary Drinking Water Regulations and Phase I, II, and V Regulations. Set Maximum Contaminant Levels (MCLs) for many inorganic chemicals, synthetic organic compounds (SOCs), and volatile organic compounds (VOCs).

Surface Water Treatment Rule (SWTR). Set minimum 3 and 4- log reduction requirements for *Giardia* and viruses, respectively. Set turbidity requirements, which have since been tightened.

Interim or Long Term 1 Enhanced Surface Water Treatment Rule (ESWTR) and Filter Backwash Rule. Set minimum 2-log reduction requirement for *Cryptosporidium*. Requires continuous monitoring of individual filter effluents (IFE) and combined filter effluent (CFE). Tightened treated water turbidity requirements: CFE < 0.3 nephelometric turbidity units (NTU) in 95 percent of samples, and not to exceed 1 NTU longer than 1 hour. Set IFE reporting and evaluation requirements. Requires recycling of all return flows to the headworks.

Stage 1 Disinfectants/Disinfection By-Products Rule (D/DBPR). Set a treatment technology for DBP precursor removal (enhanced coagulation) based on source water total organic carbon (TOC) levels. Varying levels of removal are required if the source water concentrations are > 2 mg/L. Sets MCLs for total trihalomethanes (TTHMs) and haloacetic acids (HAA5) at 80/60 micrograms per liter (µg/L), respectively in distribution system as system-wide running annual average (RAA).

Long Term 2 ESWTR. Requires *Cryptosporidium*, or *Escherichia coli* (*E. coli)* source water monitoring depending on system size. Source water bin classification to be dependent on monitoring results. If average *Cryptosporidium* value is greater than 0.075 oocysts per liter, bin classification will require additional action (which could be additional log reductions or other actions, including source water protection). Also requires disinfection profiling and benchmarking if monitoring for *Cryptosporidium*. Second round of source water monitoring to be conducted again, six years after initial bin classification.

Stage 2 D/DBPR. Requires compliance with distribution system MCLs for TTHM and HAA5 to be based on locational running annual average (LRAA). In Stage 2 compliance is based on LRAA of 80/60 µg/L. Initial Distribution System Evaluations were completed to identify long term monitoring locations.

Table 5-1
Placer County Water Agency Water Treatment Plants - Design Information

WTP	Design Flow (gpm)	Average Flow (gpm)	Type of Plant	Flash-Mix Type	Pre-oxidant Used	Coagulant and Coagulant Aid Used	Flocculator Type	Floc. DT (min.)	Sed. DT (min.)	Filter Type	Filtration Rate (gpm/ft^2)	Primary Disinfectant
Alta	360	217	Direct Filtration	Static Mixer	Sodium Hypochlorite	Poly Aluminum Chlorohydrate (PACL) with soda ash	Adsorption clarifier	N/A	N/A	3 Vertical dual media pressure filters	5.1	Sodium Hypochlorite
Monte Vista	86	35-40	Direct Filtration	Static Mixer	Sodium Hypochlorite	Poly Aluminum Chlorohydrate (PACL) with soda ash	Adsorption clarifier	N/A	N/A	1 Vertical dual media pressure filter	3	Sodium Hypochlorite
Colfax	1.58 MGD	0.57 MGD	Conventional	Mechanical	Sodium Hypochlorite	Liquid aluminum sulfate	5 stage tapered hydraulic energy flocculation basin	23.2	360	2 Horizontal dual media pressure filters	3.8	Sodium Hypochlorite
Applegate	87	7	Microfiltration	N/A	None	None	N/A	N/A	N/A	N/A	N/A	Sodium Hypochlorite
Bowman	5 MGD	3.6 MGD	Conventional	Mechanical	Sodium Hypochlorite	Liquid aluminum sulfate and Non-Ionic	Three paddle wheel zones	20.4	20	2 dual media gravity filters	5.0	Sodium Hypochlorite
Bowman Package	2 MGD	2 MGD	Microfloc package units	Static Mixer	Sodium Hypochlorite	Poly Aluminum Chlorohydrate (PACL)	Adsorption clarifier	N/A	N/A	4 Tri-media filters	5.0	Sodium Hypochlorite

Table 5-1 Cont'd
Placer County Water Agency Water Treatment Plants - Design Information

WTP	Design Flow (gpm)	Average Flow (gpm)	Type of Plant	Flash-Mix Type	Pre-oxidant Used	Coagulant and Coagulant Aid Used	Flocculator Type	Floc. DT (min.)	Sed. DT (min.)	Filter Type	Filtration Rate (gpm/ft^2)	Primary Disinfectant
Auburn	8 MGD	2.16 MGD	Actifloc/ Conventional	Static Mixer	Sodium Hypochlorite	Poly Aluminum Chlorohydrate (PACL) and Non-Ionic	Ballasted Sedimentation			4 dual media gravity filters	5.0	Sodium Hypochlorite
Foothill 1	40 MGD	25.9 MGD	Actiflo/ Conventional	Induction in line +vertical turbine propeller	Sodium Hypochlorite	Liquid alum or PACL, NIP polymer or PACL	Actiflo	2 min	8 min	9 dual media gravity filters	10	Sodium Hypochlorite
Foothill 2	18.26 MGD (direct) 15 MGD (conv.)	15.1 MGD	Conventional or Direct (depending on flow rate)	Mechanical Mixer	Sodium Hypochlorite	Liquid alum or PACL, NIP polymer or PACL	3 stage tapered variable speed energy flocculator	30	120	4 dual media gravity filters	6.0	Sodium Hypochlorite
Sunset	8 MGD	4.32 MGD	Conventional	Mechanical Mixer And Static Mixer	Sodium Hypochlorite	Liquid aluminum sulfate and NIP polymer	Single paddle energy zone	25	160	2 dual media gravity filters	4.6	Sodium Hypochlorite

gpm - gallons per minute DT = Detention Time gpm/ft^2 = gallons per minute per square foot

Table 5-2
Nevada Irrigation District Water Treatment Plants - Design Information

WTP	Design Flow (mgd)	Average Flow (mgd)	Type of Plant	Flash-Mix Type	Pre-oxidant Used	Coagulant and Coagulant Aid Used	Flocculator Type	Floc. DT (min.)	Sed. DT (min.)	Filter Type	Filtration Rate (gpm/ft2)	Primary Disinfectant
Cascade Shores	0.34	0.11	Direct Filtration	N/A	Sodium Hypochlorite	Alum with Soda Ash	Baffled Contact Tank	17 @ max flow	N/A	4 dual media vertical pressure filters	3	Sodium Hypochlorite
Elizabeth George	18	4.0	Conventional	Adjustable Mechanical Flash Mixer	Sodium Hypochlorite	Alum with Hydrated Lime	Horizontal Paddle	20 @ max flow	52 min	2 cluster-type (4 cells each) dual media gravity filter	6.0	Sodium Hypochlorite
Loma Rica	8.3	3	Conventional	Adjustable Mechanical Flash Mixer	Sodium Hypochlorite	Alum and lime for pH adjustment	Horizontal Paddle	30min	4.5 hours	4 dual media pressure filters	6	Sodium Hypochlorite
Lake of the Pines	5	1.3	Conventional	Adjustable Mechanical Flash Mixer	Sodium Hypochlorite	Alum with hydrated Lime	Pulsator-Upflow Clarifier	Floc and Sed in same basin	46 min	2 tri media gravity filters	6	Sodium Hypochlorite
Lake Wildwood	4	1.5	Conventional	Partial Mechanical Mixer	Sodium Hypochlorite	Alum with hydrated lime	– Circular steel upflow Clarifier.	Floc and Sed in same basin	2.3 hours	4 dual media filters	6	Sodium Hypochlorite
North Auburn	6	2.5	Conventional	Adjustable Mechanical Flash Mixer	Sodium Hypochlorite	Alum with Sodium Hydroxide	Upflow Clarifier	Floc and Sed in same basin	91	2 dual media gravity filters	6	Sodium Hypochlorite
Smartville	0.085	0.037	Conventional	Inline static mixer	None	100% Clarion Soda Ash	Contact Tank	13.5 min	78	2 dual media pressure filters	1.5	Sodium Hypochlorite

PLACER COUNTY WATER AGENCY WATER TREATMENT PLANTS

Alta Water Treatment Plant

System Description

The raw water intake location for the Alta WTP is located in the Alta Forebay, a small impoundment at the end of Pacific Gas and Electric's (PG&E) Towle Canal. The Alta WTP is located on the ridge between the Bear River and the North Fork of the American River along Interstate 80 in Placer County about 30 miles northeast of Auburn. Alta has been classified as a direct filtration plant by the State Water Resources Control Board, Division of Drinking Water (DDW). The plant design flow is 360 gallons per minute (gpm), with average flows at 217 gpm.

The influent water is pre-oxidized with sodium hypochlorite, and then polyaluminum chlorohydrate and soda ash are added as coagulant and coagulant aid, respectively. Soda ash is added for alkalinity adjustment. Chemicals are mixed by a static mixer, and the coagulated water enters an adsorption clarifier (contact flocculator). The clarified water, which has a maximum turbidity of 0.45 nephelometric turbidity units (NTU), is then filtered through three vertical dual media pressure filters. The filter loading rate is 5.1 gallons per minute/square foot (gpm/sf).

The filters are backwashed based on uniform filter run volumes (UFRV). Backwash water is recycled after settling in a 24,000-gallon tank, and recycle rates are kept below 10 percent of total plant flow. The plant has filter-to-waste capability after backwash and plant start-up. The filtered water is disinfected with sodium hypochlorite, and stored in one of two 100,000-gallon tank to meet contact time (CT) requirements. The average residual leaving the plant is 0.64 to 1.0 milligrams per liter (mg/L).

Highlight of Changes Since 2012 Update

During the study period facility improvements were made to prevent off-site discharges (2011 and 2012), improve disinfection contact time (CT) monitoring (2012), replace/upgrade instrumentation (2012 and 2013), and replace all three filters and upgrade filter air scour (2013).

Significant Potential Contaminating Activities

The Alta WTP is located furthest upstream in the watershed. It diverts water from the Alta Forebay. In the upper watershed above Lake Spaulding, recreational use is heavy. More significant is the local drainage received into the Towle Canal and Alta Forebay from Canyon Creek. It is possible for runoff from Interstate 80 to enter the receiving water, making spills a potential concern.

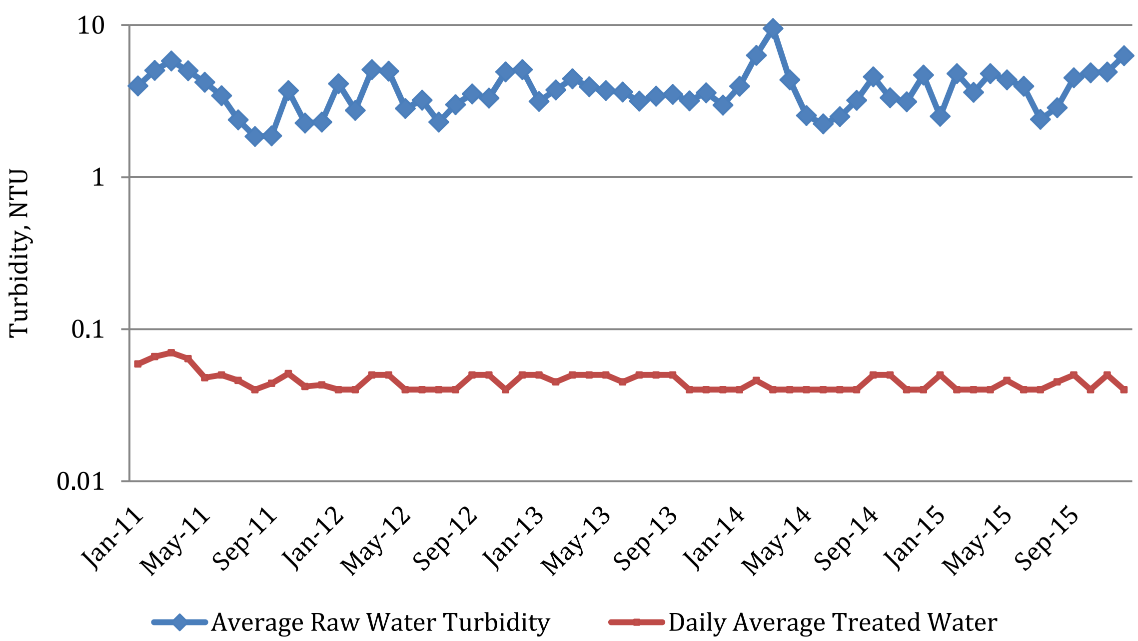
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Alta WTP for the period of study was 3.8 NTU, and on average the treatment process decreased this to 0.05 NTU, which equates to an average removal of solids of 98.7 percent. **Figure 5-1** shows a timeseries plot of raw and treated turbidities. Alta WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of daily samples, where the daily average is an average of all 4-hour (hr) samples taken in a 24 hour period.

Figure 5-1
Alta WTP – Raw and Treated Water Turbidity, 2011-2015



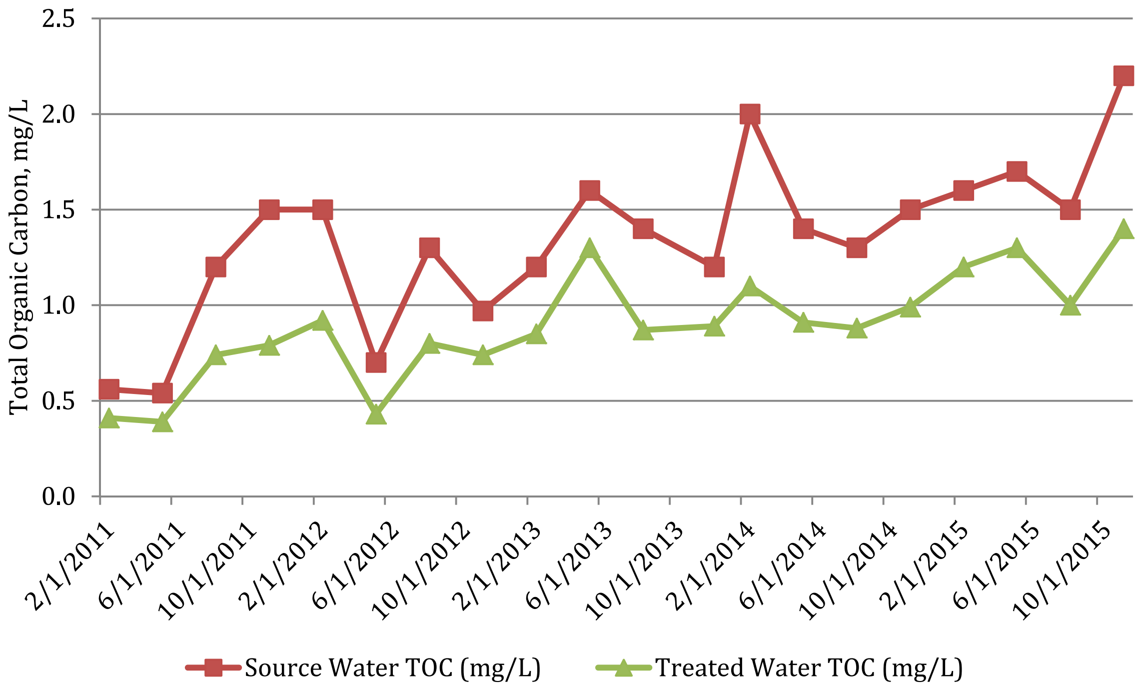
Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

PCWA monitors alkalinity and total organic carbon (TOC) levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Alta WTP were 1.3 mg/L and 0.9 mg/L, respectively, equating to 32.8 percent average removal. Since all of the TOC running annual averages (RAA) for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Alta WTP. **Figure 5-2** shows a timeseries plot of raw and treated water TOC at Alta WTP. TOC levels in the raw water are generally below 2.0 mg/L, but did show an increasing trend during the study period.

Figure 5-2
Alta WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both total trihalomethanes (TTHM) and haloacetic acids (HAA5) data for the Alta WTP distribution system. PCWA sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP Rule monitoring, from January 2011 to August 2013. The Alta TTHM RAAs ranged from 29.0 to 43.8 micrograms per liter (µg/L), with an average value of 36.5 µg/L. The HAA5 RAAs ranged from 14.5 to 25.5 µg/L, with an average value of 20.2 µg/L. Over the reporting period, TTHM and HAA5 RAAs were below the maximum contaminant levels (MCLs) of 80 and 60 µg/L, respectively, per the Stage 1 Disinfectants/Disinfection By-Products Rule (D/DBPR).

Stage 2 D/DBP Rule Compliance Period

PCWA began Stage 2 D/DBP monitoring in December 2013. PCWA is continuing to use the Stage 1 monitoring location for compliance monitoring under Stage 2 D/DBPR. Although two locations are required to be monitored, Section 141.605 of the Stage 2 D/DBPR allows that Subpart H systems less than 3,300 population and on quarterly monitoring, may use one site with a dual sample (both TTHM and HAA5) if the peak concentration of DBPs are expected to occur at the same time. TTHM LRAAs ranged from 34.2 to 57 μg/L and HAA5 LRAAs ranged from 11.1 to 24.8 μg/L. Based on available data over the reporting period, TTHM and HAA5 LRAAs were below the respective MCLs per the Stage 2 D/DBPR.

<u>Other Detectable Title 22 Constituents of Interest</u>

As reported in the 2016 Consumer Confidence Report (CCR), lead was detected in the distribution system in 2014. However, the lead 90th percentile was below the Action Level of 15 μg/L, with ten samples collected. None of the samples collected exceeded the lead Action Level. Low levels of total xylenes are reported in the 2012 to 2016 CCRs, ranging from ND to 1.6 μg/L, well below the MCL for total xylenes of 1,750 μg/L. These detects are thought to be associated with coatings applied to the inside of the storage tank.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3,** 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Alta WTP under the SWTR. Under the initial round of source water monitoring as part of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), Alta WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Alta WTP is classified as a direct filtration plant, and currently receives reduction credit for 2.0-log *Giardia,* 1.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with sodium hypochlorite provides 1.0-log credit for *Giardia* and 3.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Alta WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Alta WTP for all required Title 22 compliance constituents. **Table 5-3** lists the existing drinking water regulations and a compliance evaluation for these standards at the Alta WTP. The Alta WTP is currently in compliance with existing regulations.

Table 5-3
Regulatory Compliance Evaluation
Placer County Water Agency – Alta WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at Stage 1 D/DBPR site complies with drinking water standards (<80/60 μg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Monte Vista Water Treatment Plant

System Description

The raw water intake location for the Monte Vista WTP is located off the Cedar Creek Canal at station 128+60, approximately 2.4 miles downstream from Lake Alta. Monte Vista has been classified as a direct filtration plant by DDW. The plant design flow is 86 gpm, with average flows at 35 to 40 gpm.

The influent water is pre-oxidized with sodium hypochlorite, and polyaluminum chlorohydrate and soda ash are added as coagulant and coagulant aid, respectively. Soda ash is added for alkalinity adjustment. Chemicals are mixed by a static mixer, and the coagulated water enters an adsorption clarifier (contact flocculator). The clarified water is then filtered through one vertical dual media pressure filter. The filter loading rate is three gpm/sf.

The filters are backwashed based on UFRV. Backwash water is recycled after settling in a 5,700-gallon tank. The plant has filter to waste capability after backwash or plant start-up. The filtered water is disinfected with sodium hypochlorite, and stored in a 60,000-gallon tank to meet CT requirements. The average residual leaving the plant is 0.6 to 1.1 mg/L.

Highlight of Changes Since 2012 Update

During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring (2012).

Significant Potential Contaminating Activities

The Monte Vista WTP is located downstream from the Alta Forebay and Lake Alta. Similar to the Alta WTP, recreational use in the upper watershed above Lake Spaulding and the possibility for spills entering the receiving water for Lake Alta and Alta Forebay are of concern.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at Monte Vista WTP for the period of study was 4.1 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.0 percent. **Figure 5-3** shows a timeseries plot of raw and treated water turbidities. Monte Vista WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

<u>Microbiological Constituent</u>

There were no positive coliform samples in the distribution system during the period of study.

<u>Disinfection By-Products</u>

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Monte Vista WTP were 1.3 mg/L and 0.9 mg/L, respectively, equating to 31.9 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Monte Vista WTP. **Figure 5-4** shows a timeseries plot of raw and treated water TOC at Monte Vista WTP. TOC levels in the raw water were generally below 2.0 mg/L. It appears that TOC levels in both source and treated water have been higher after spring 2013.

Figure 5-3
Monte Vista WTP – Raw and Treated Water Turbidity, 2011-2015

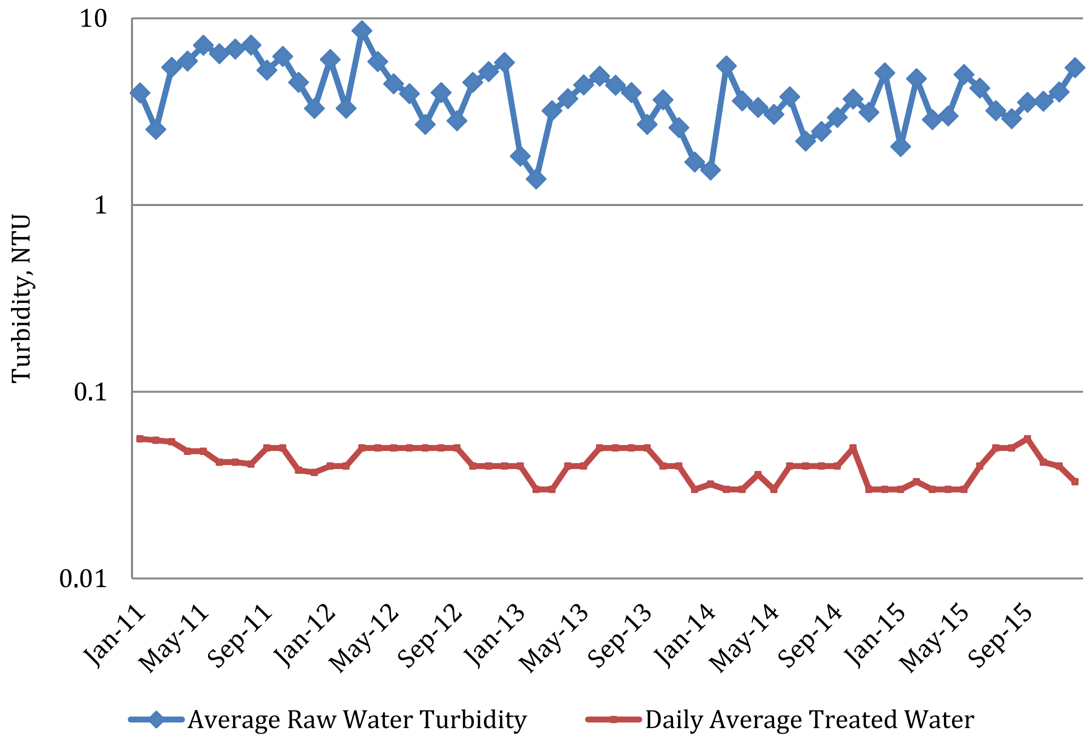
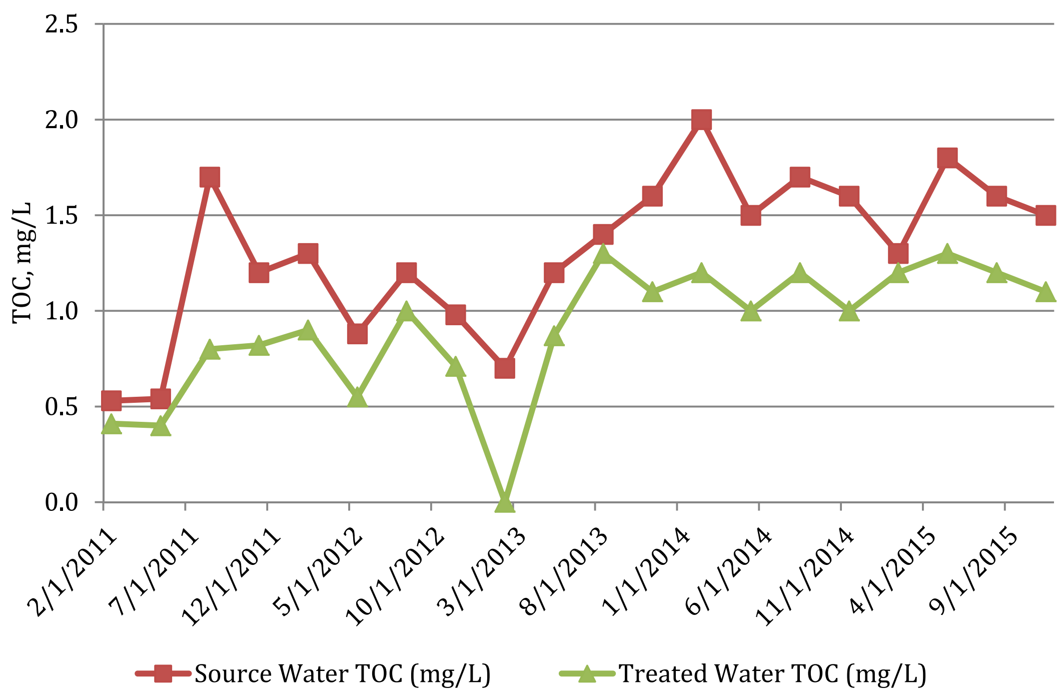


Figure 5-4
Monte Vista WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both TTHM and HAA5 data for the Monte Vista WTP distribution system. For Monte Vista WTP, PCWA monitored annually for TTHM and HAA5 at one site in the distribution system in 2011, 2012, and 2013. The TTHM RAA ranged from 41 to 49 μg/L. The HAA5 RAA ranged from 18 to 26 μg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

PCWA was directed by DDW to continue to collect TTHMs and HAA5 as currently required for Stage 1 D/DBPR under the Stage 2 D/DBPR. However, PCWA submitted an official Stage 2 D/DBP monitoring plan in September 2013. Therefore Stage 2 DBP samples were collected in August 2014 and August 2015. Based on available data over the reporting period, TTHM and HAA5 LRAAs were below the respective MCLs per the Stage 2 D/DBPR.

<u>Other Detectable Title 22 Constituents of Interest</u>

Based on a review of the 2012 to 2016 CCRs, there are no other detectable Title 22 constituents of interest.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Monte Vista WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Monte Vista WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Monte Vista WTP is classified as a direct filtration plant, and currently receives reduction credit for 2.0-log *Giardia,* 1.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with sodium hypochlorite provides 1.0-log credit for *Giardia* and 3.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Monte Vista WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Monte Vista WTP for all required Title 22 compliance constituents. **Table 5-4** lists the existing drinking water regulations and a compliance evaluation for these standards at the Monte Vista WTP. The Monte Vista WTP is currently in compliance with existing regulations.

Table 5-4
Regulatory Compliance Evaluation
Placer County Water Agency – Monte Vista WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at Stage 1 D/DBPR site complies with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Colfax Water Treatment Plant

System Description

The raw water intake location for the Colfax WTP is located off the Boardman Canal at station 704+62, approximately 14.2 miles downstream from Lake Alta. Colfax is a conventional water treatment plant. The plant design flow is 1.58 million gallons per day (mgd), with average flows at 0.57 mgd.

The influent water is pre-oxidized with sodium hypochlorite and alum is the primary coagulant. Powdered activated carbon is fed only when conditions warrant its use. Chemicals are mixed by a hydraulic jump and a mechanical flash mixer. The coagulated water enters a five stage tapered hydraulic energy flocculation basin, with a detention time of 23.3 minutes and then into a serpentine sedimentation basin with a detention time of six hours. The clarified water is then filtered through two vertical dual media pressure filters. The filter loading rate is 3.8 gpm/sf. Polyaluminum chloride is used as a filter aid in the winter, and a non-ionic polymer is used in the summer.

The filters are backwashed on an as needed basis. Backwash water is recycled to rapid mix after settling in a backwash pond. The plant has filter to waste capability after backwash or plant start-up. The filtered water is disinfected with sodium hypochlorite, and stored in two tanks, one at 0.3 million gallons (mg) and one at 1.0 mg, to meet CT requirements. The average residual leaving the plant is 1.0 mg/L.

Highlight of Changes Since 2012 Update

During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring (2011 and 2012).

Significant Potential Contaminating Activities

The Colfax WTP diverts off the Boardman Canal upstream of Colfax. There is limited development and access to the Canal downstream of the Monte Vista WTP. There is one residence in proximity of the intake.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at Colfax WTP for the period of study was 6.9 NTU, and on average the treatment process decreased this to 0.06 NTU, which equates to an average removal of solids of 99.1 percent. **Figure 5-5** shows a timeseries plot of raw and treated water turbidities. Colfax WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

<u>Microbiological Constituent</u>

There were no positive coliform samples in the distribution system during the period of study.

<u>Disinfection By-Products</u>

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Colfax WTP were 1.3 mg/L and 0.9 mg/L, respectively, equating to 30.6 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Colfax WTP. **Figure 5-6** shows a timeseries plot of raw and treated water TOC at Colfax WTP. TOC levels in the raw water were generally below 2.0 mg/L. Similar to the Alta WTP, source and treated water TOC levels appear to be increasing over the study period.

Figure 5-5
Colfax WTP – Raw and Treated Water Turbidity, 2011-2015

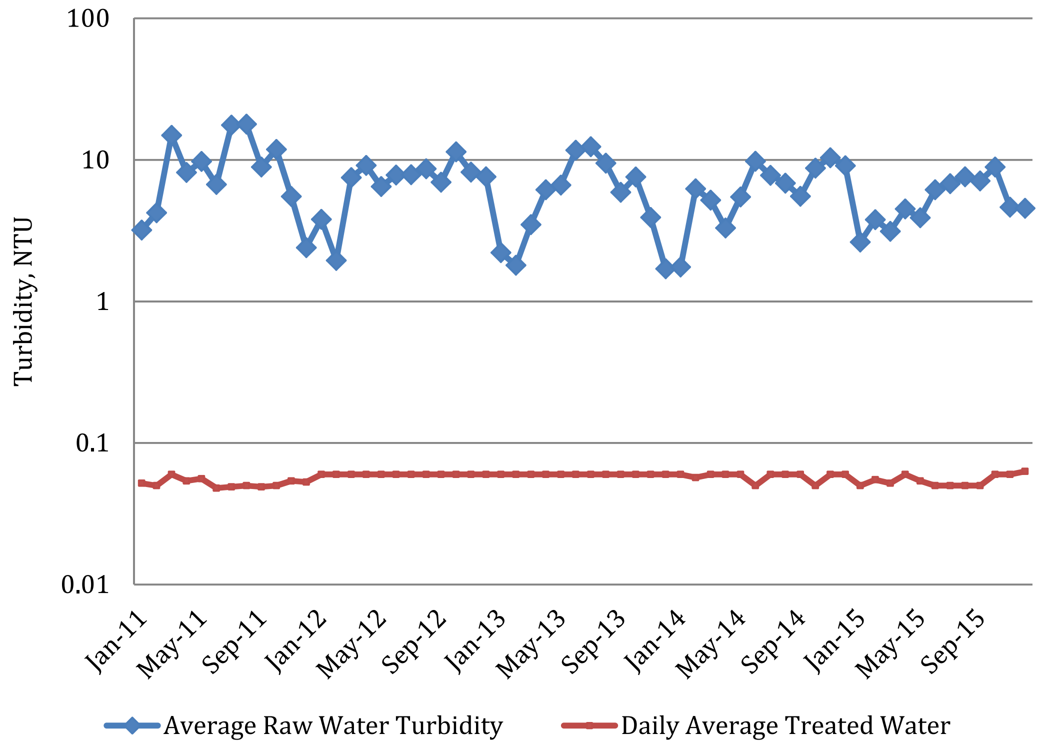
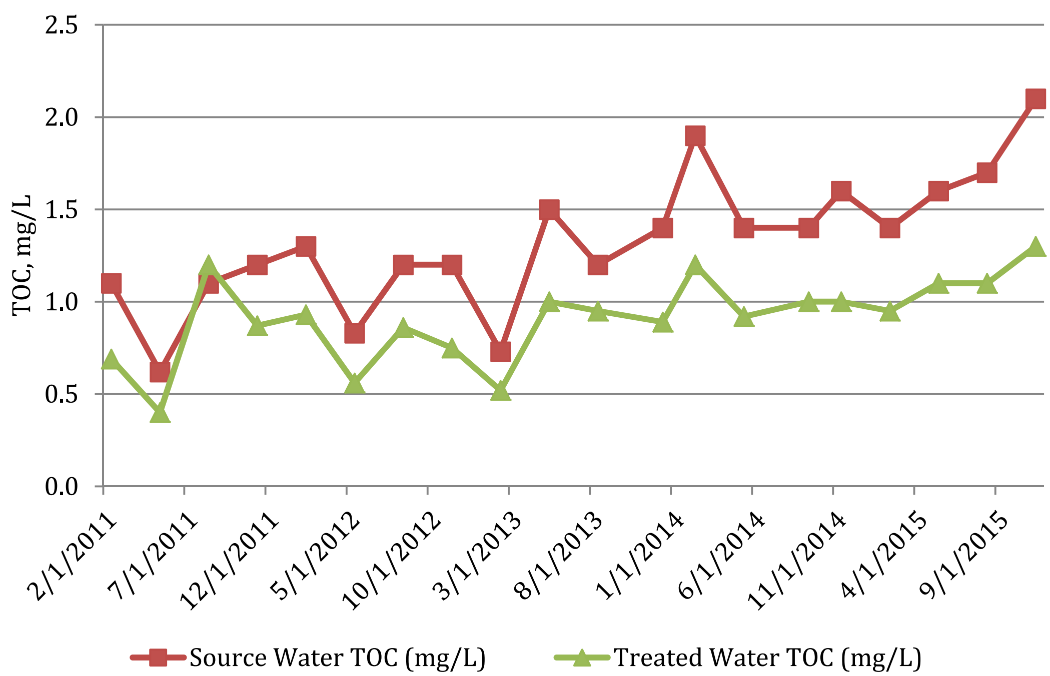


Figure 5-6
Colfax WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both TTHM and HAA5 data for the Colfax WTP distribution system. PCWA sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP monitoring, from January 2011 to November 2012. The TTHM RAA ranged from 54.0 to 63.3 µg/L, with an average value of 58.6 µg/L. One individual TTHM sample collected in the third quarter of 2011 was 81 µg/L. The HAA5 RAA ranged from 35.5 to 39.5 µg/L, with an average value of 37.2 µg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

PCWA began Stage 2 D/DBP monitoring in February 2013. PCWA is continuing to use the Stage 1 monitoring location for compliance monitoring under Stage 2 D/DBPR. TTHM LRAAs ranged from 45 to 73.2 µg/L and HAA5 LRAAs ranged from 28.2 to 33.5 µg/L. However, individual TTHM samples collected in the second and third quarter of 2014 were 87 and 88 µg/L, respectively. Based on available data over the reporting period, TTHM and HAA5 LRAAs are below the respective MCLs per the Stage 2 D/DBPR.

<u>Other Detectable Title 22 Constituents of Interest</u>

As reported in the 2012 CCR, lead was detected in the distribution system in 2011. The lead 90th percentile was 15 µg/L, at the Action Level of 15 µg/L, with ten samples collected. One sample exceeded the lead Action Level. Sampling conducted in 2014 resulted in no detectable results of lead.

Low levels of total xylenes are reported in the 2012 to 2015 CCRs, ranging from ND to 0.89 µg/L, well below the MCL for total xylenes of 1,750 µg/L. These detects are thought to be associated with coatings applied to the inside of the storage tank.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Colfax WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Colfax WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Colfax WTP is classified as a conventional filtration plant, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with sodium hypochlorite provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 Enhanced SWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Colfax WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Colfax WTP for all required Title 22 compliance constituents. **Table 5-5** lists the existing drinking water regulations and a compliance evaluation for these standards at the Colfax WTP. The Colfax WTP is currently in compliance with existing regulations.

Table 5-5
Regulatory Compliance Evaluation
Placer County Water Agency – Colfax WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at Stage 1 D/DBPR site complies with drinking water standards (<80/60 μg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Applegate Water Treatment Plant

System Description

The raw water intake location for the Applegate WTP is located off the Boardman Canal downstream of Pinecrest Road. Applegate is a microfiltration membrane plant. The plant design flow is 87 gpm, with average flows at 7 gpm.

No pre-oxidation or coagulants are needed. The influent water enters two Memcor microfiltration units, with six membrane modules each. The loading rate is approximately 0.05 gpm/sf. The membranes are backwashed with compressed air to remove particulate matter off the membrane every 20 minutes. The backwash water goes to a 200-gallon backwash waste tank and is not recycled. After about 1,000 hours of run time, a maintenance wash using caustic soda and citric acid is performed.

The filtered water is disinfected with UV light first, to aid in the reduction of chlorine demand and therefore reduce disinfection by-products, and then sodium hypochlorite serves as the primary and residual disinfectant. The water is then stored in a 60,000-gallon tank to meet CT requirements. The average chlorine residual leaving the plant is 0.5 to 0.75 mg/L.

Highlight of Changes Since 2012 Update

During the study period facility improvements were made to replace/upgrade instrumentation to prevent off-site discharges and improve CT monitoring (2012).

Significant Potential Contaminating Activities

The Applegate WTP diverts off the Boardman Canal at Applegate. There is low density rural development between Colfax and Applegate.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Applegate WTP for the period of study was 8.2 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.5 percent. **Figure 5-7** shows a timeseries plot of raw and treated water turbidities. Applegate WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated waters quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Applegate WTP were 1.5 mg/L and 1.2 mg/L, respectively, equating to 15.7 percent average removal. Membrane filtration plants are not required to comply with the enhanced coagulation requirements. **Figure 5-8** shows a timeseries plot of raw and treated water TOC at Applegate WTP. TOC levels in the raw water were generally at or below 2.0 mg/L, with one sample measured at 2.5 mg/L. There are no seasonal trends in either the raw or treated TOC data. Similar to the upstream WTPs, there is an increasing trend of TOC in both the source and treated water during the study period.

Figure 5-7
Applegate WTP – Raw and Treated Water Turbidity, 2011-2015

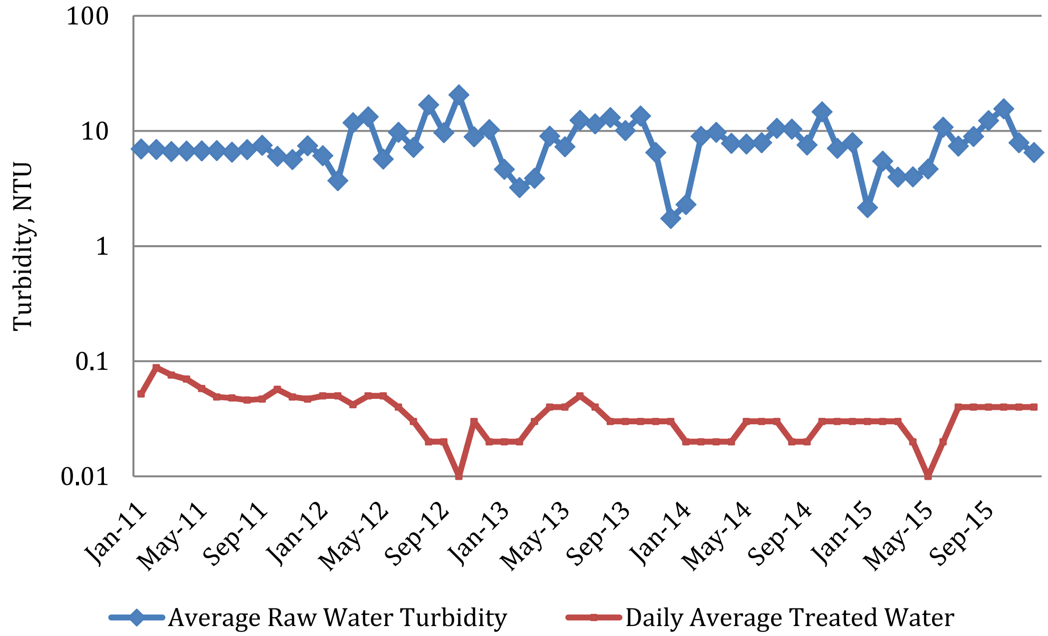
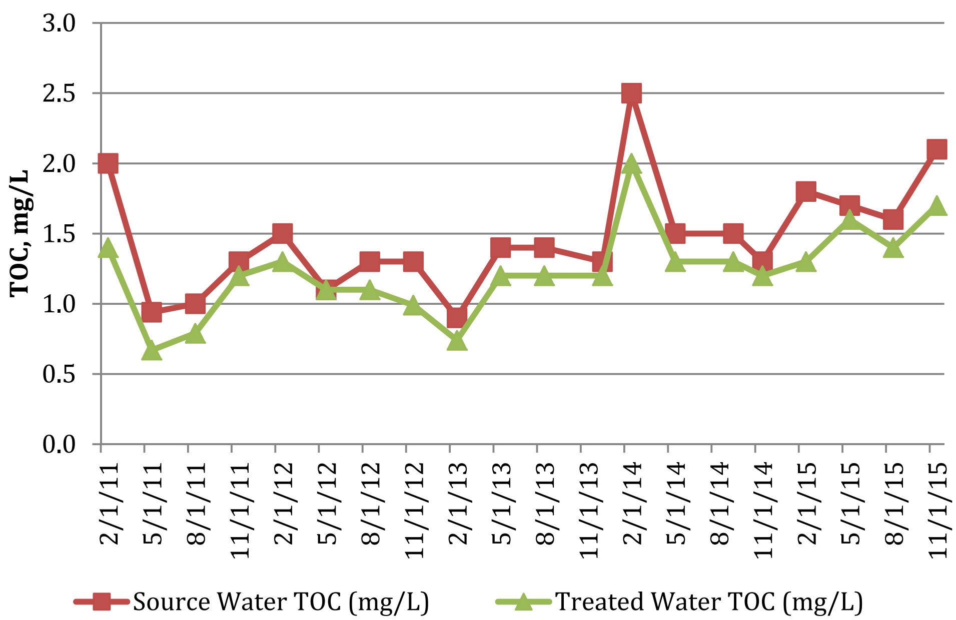


Figure 5-8
Applegate WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both TTHM and HAA5 data for the Applegate WTP distribution system. PCWA monitored annually for TTHM and HAA5 at one site in the distribution system, but began monitoring quarterly in August 2010. Over the reporting period, Stage 1 D/DBP Rule monitoring was conducted from January 2011 to August 2013. The TTHM RAA ranged from 45.0 to 65.5 μg/L, with an average value of 58.2 μg/L. One individual TTHM sample collected in the third quarter of 2011 was 80 μg/L. The HAA5 RAA ranged from 24.8 to 38.0 μg/L, with an average value of 32.2 μg/L. Over the reporting period, TTHM and HAA5 RAAs were below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

PCWA began Stage 2 D/DBP monitoring in December 2013. PCWA was also directed by DDW to continue to collect TTHMs and HAA5 as currently required for Stage 1 D/DBPR for Stage 2 D/DBPR. TTHM LRAAs ranged from 59 to 71.2 μg/L and HAA5 LRAAs ranged from 33.8 to 43 μg/L. TTHM and HAA5 LRAAs are below the respective MCLs per the Stage 2 D/DBPR. However, individual TTHM samples collected in the first and second quarter of 2014 were both 90 μg/L. Applegate exceeded the Operational Evaluation Limit (OEL) from the Stage 2 D/DBP Rule in the second quarter of 2014. A limited scope OEL report was submitted in August 2014. Additionally, a tank mixer was installed in May 2014.

<u>Other Detectable Title 22 Constituents of Interest</u>

As reported in the 2014 CCR, lead was detected in the distribution system in 2013. However, the lead 90th percentile was below the Action Level of 15 μg/L, with five samples collected. One sample exceeded the lead Action Level.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Applegate WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Colfax WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Applegate WTP is classified as an alternative treatment technology, and currently receives reduction credit as a conventional plant for 4.0-log *Giardia,* 4.0-log *Cryptosporidium*, and 0.5-log viruses at 110 liter per hour per square meter, for physical removal. Applegate WTP is not currently receiving inactivation credit for the UV system, which is currently operated to reduce DBPs. Disinfection with sodium hypochlorite provides 0.5-log credit for *Giardia* and 3.5-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Applegate WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Applegate WTP for all required Title 22 compliance constituents. **Table 5-6** lists the existing drinking water regulations and a compliance evaluation for these standards at the Applegate WTP. The Applegate WTP is currently in compliance with existing regulations.

Table 5-6
Regulatory Compliance Evaluation
Placer County Water Agency – Applegate WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. Not required to implement enhanced coagulation for TOC removal. TTHM/HAA5 RAA at Stage 1 D/DBPR site complies with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Bowman Water Treatment Plant

System Description

The raw water intake location for the Bowman WTP is located off the Bowman Canal. Water is diverted from the Bear River Canal into an inverted siphon to Bowman Canal and passes through a PG&E staging area, above Halsey Forebay. The Bowman WTP consists of two separate treatment trains; Bowman WTP and Bowman Package WTP. They have common source and treated water quality results.

The Bowman WTP is a conventional water treatment plant. The plant design flow is 5.0 mgd, with average flows at 3.6 mgd. The influent water is pre-chlorinated and alum and nonionic polymer are added as the primary coagulant and coagulant aid, respectively. Chemicals are mixed by a vertical turbine propeller. The coagulated water enters a three staged paddle wheel flocculation basin, with a detention time of 20.4 minutes and then into a sedimentation basin with a detention time of 20 minutes. The clarified water is then filtered through two dual media gravity filters. The filter loading rate is 5 gpm/sf. Non-ionic polymer is used as a filter aid as needed.

The filters are backwashed on an as needed basis, but production is usually limited to 24 hours. Backwash water and filter to waste flows to two reclaim settling ponds in series. Decant water from the second pond is returned to the plant, ahead of coagulation. The plant has filter to waste capability after backwash or plant start-up. The filtered water is disinfected with chlorine and stored in two clearwells, one at 1 mg and one at 10 mg, to meet CT requirements. The average residual leaving the plant is 1.0 mg/L.

The Bowman Package WTP consists of four-0.5 mgd CPC Microfloc package units. The plant design flow is 2.0 mgd, with an average flow of 2.0 mgd. The plant typically operates from April through October. The influent water is pre-oxidated with sodium hypochlorite and polyaluminum chloride is the primary coagulant. The coagulated water enters an adsorption clarifier which serves as both flocculation and sedimentation. The clarified water is then filtered through four dual media filters. The filter loading rate is 5.0 gpm/sf at 350 gpm per filter, and non-ionic polymer is used as a filter aid.

The filters are backwashed on an as needed basis, but production is usually limited to 24 hours. Backwash water and filter to waste flows to two reclaim settling ponds in series. Decant water from the second pond is returned to the plant, ahead of coagulation. The plant has filter to waste capability after backwash or plant start-up. The filtered water is disinfected with sodium hypochlorite and stored in two clearwells, one at 1 mg and one at 10 mg, to meet CT requirements. The average residual leaving the plant is approximately 0.9 mg/L.

Highlight of Changes Since 2012 Update

During the study period a new backwash sludge processing system was installed (2012) and the disinfectant was converted from chlorine gas to sodium hypochlorite (March 2014).

Significant Potential Contaminating Activities

The Bowman WTP receives water from the Bear River Canal upstream of Halsey Forebay. The water in the Bear River Canal comes from Rollins Lake, which is subject to significant recreation as well as a wastewater discharge. The Canal also crosses under Highway 174 and other local roads that could be a source for spills.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Bowman WTP for the period of study was 4.8 NTU, and on average the treatment process decreased this to 0.02 NTU, which equates to an average removal of solids of 99.5 percent. **Figure 5-9** shows a timeseries plot of raw and treated water turbidities. Bowman WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Bowman WTP were 1.3 mg/L and 1.0 mg/L, respectively, equating to 25.4 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Bowman WTP. **Figure 5-10** shows a timeseries plot of raw and treated water TOC at Bowman WTP. TOC levels in the raw water were always below 2.0 mg/L. There are no seasonal trends in either the raw or treated TOC data. Similar to the other PCWA WTPs, there is an increasing trend of TOC in both the source and treated water during the study period.

Figure 5-9
Bowman WTP – Raw and Treated Water Turbidity, 2011-2015

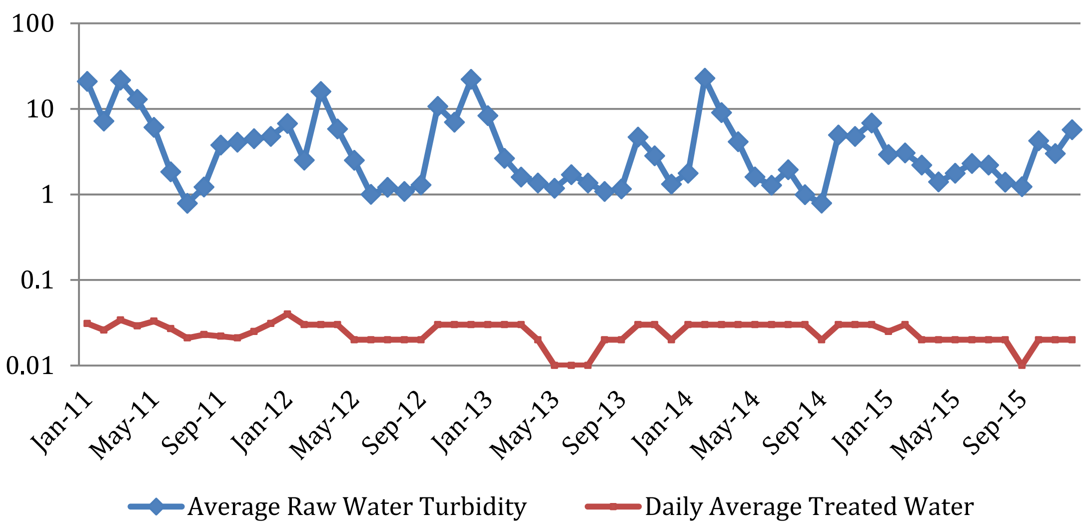
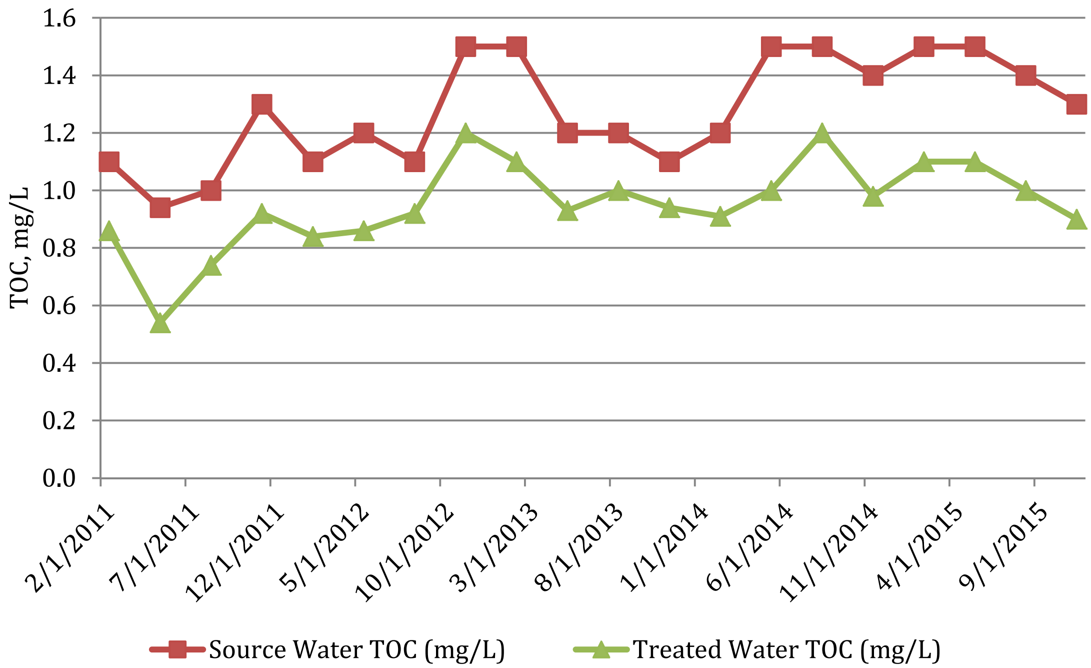


Figure 5-10
Bowman WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both TTHM and HAA5 data for the Auburn/Bowman distribution system. PCWA samples four sites in the Auburn/Bowman distribution system on a quarterly basis which represents the Bowman WTP, which is operated year-round, and also samples an additional four sites when the Auburn WTP is in operation. Over the reporting period, monitoring for Stage 1 D/DBPR monitoring was conducted from January 2011 to August 2013. The Auburn/Bowman TTHM RAA ranged from 50.3 to 68.2 µg/L, with an average RAA of 59.7 µg/L. The Vintage Way site had individual TTHM samples at 86, 90, 92, and 110 µg/L for the second quarter 2012, third quarter 2012, fourth quarter 2012, and second quarter 2013, respectively. The Auburn/Bowman HAA5 RAA ranged from 35.6 to 43.1 µg/L, with an average RAA of 39.0 µg/L. During the first quarter of 2013, five out of eight sites had had HAA5 levels greater than 60 µg/L. Over the reporting period, TTHM and HAA5 RAAs were below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

PCWA began monitoring the four Stage 2 D/DBP monitoring sites in November 2013. TTHM LRAAs ranged from 50.5 to 73.5 µg/L and HAA5 LRAAs ranged from 16 to 42.7 µg/L. As shown in **Figure 5-11,** TTHM LRAAs for Landis Circle and Sunrise Ridge increased from 2013 to 2015. Additionally, **Figure 5-12** shows that HAA5 LRAAs increased from 2013 to 2015 at the Sunrise Ridge site. However, based on available data over the reporting period, TTHM and HAA5 LRAAs are below the respective MCLs per the Stage 2 D/DBPR. Individual

TTHM samples collected in the first and second quarter of 2015 at the Landis Circle site were 88 and 81 μg/L, respectively. This site exceeded the TTHM OEL in the third quarter of 2015. The Landis Circle site is normally a dead end, but PCWA has revised operations to increase flushing and circulation at the site to reduce water age. The Sunrise Ridge site is located at the end of a loop, so water age can be higher at this location also. One individual HAA5 sample at Westwood Drive in the second quarter of 2015 was measured at 62 μg/L.

Figure 5-11
LRAA TTHMs at Auburn Bowman Distribution System, Stage 2 D/DBP Data, 2013 - 2015

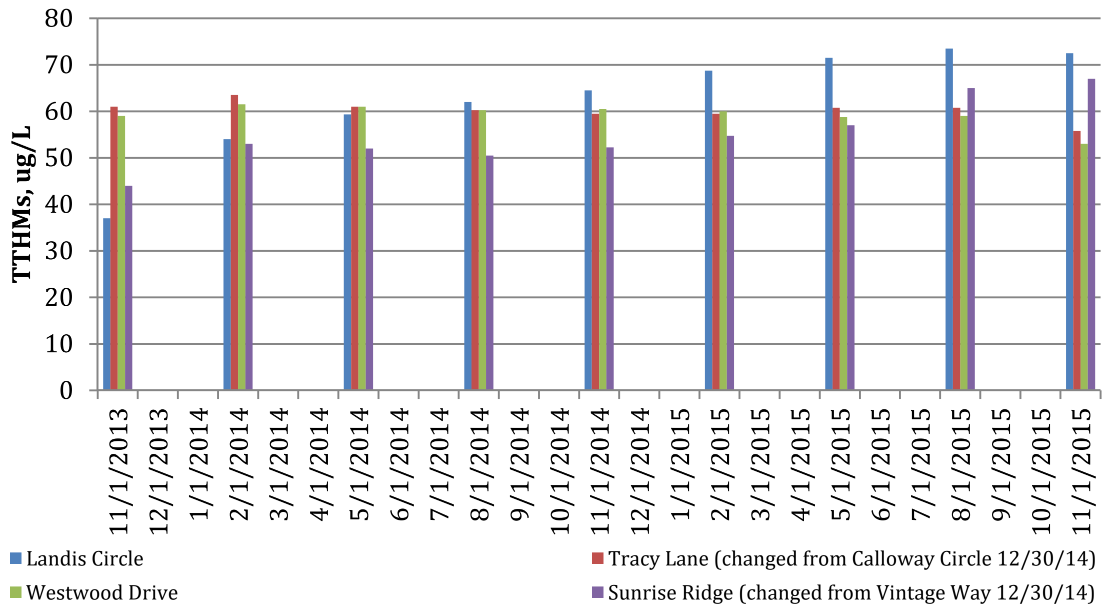
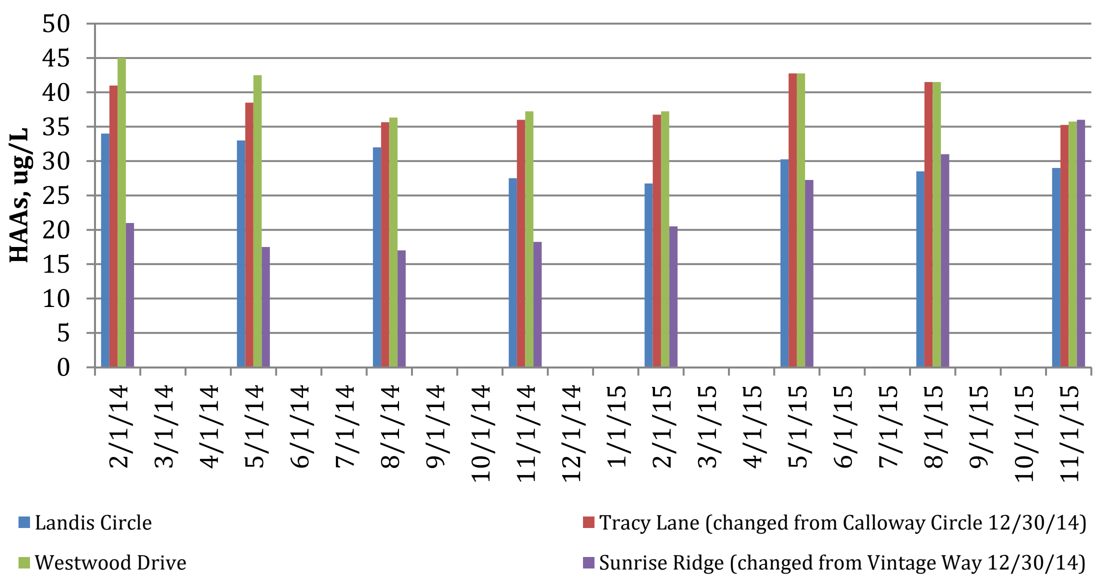


Figure 5-12
LRAA HAAs at Auburn Bowman Distribution System, Stage 2 D/DBP Data, 2013 - 2015



Other Detectable Title 22 Constituents of Interest

The 2015 CCR reported manganese ranged from non-detect (ND) to 210 µg/L, with an average of 70 µg/L. The secondary MCL for manganese is 50 µg/L.

Detectable Unregulated Constituents

The four quarters of Unregulated Contaminant Monitoring Rule 3 (UCMR 3) sampling was conducted in September 2013, December 2013, March 2014, and June 2014. All perfluorinated compounds and organics at the entry point to the distribution system and the maximum residence time were non-detectable. Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-7**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the Public Health Goal (PHG) at 0.02 µg/L was exceeded.

Table 5-7
Detectable UCMR3 Monitoring Results for Bowman WTP, 2013-2014

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, µg/L	Result at Maximum Residence Time, µg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.035 – 0.14	0.046 – 0.13
Vanadium	DDW Notification Level – 50 ug/L	ND	ND
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	29 - 33	30 – 34
Chlorate	DDW Notification Level – 800 ug/L	ND - 380	ND - 370

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli and Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Bowman WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Bowman WTP was designated as Bin 2 and requires 2-log reduction of *Cryptosporidium* plus an additional 1-log action.

The Bowman WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. The Bowman WTP meets the superior treated water turbidity element of the Microbial Toolbox in the LT2ESWTR, which grants 1-log additional action. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

The second round of LT2ESWTR sampling was initiated in October 2015. Based on the monitoring results to date, the Bowman WTP is likely to be classified in Bin 1. The Bowman WTP is currently classified as Bin 2.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Bowman WTP for all required Title 22 compliance constituents. **Table 5-8** lists the existing drinking water regulations and a compliance evaluation for these standards at the Bowman WTP. The Bowman Package WTP is currently in compliance with existing regulations.

Table 5-8
Regulatory Compliance Evaluation
Placer County Water Agency – Bowman WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAAs at D/DBPR sites comply with drinking water standards (< 80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Initiated second round of source water monitoring for *Cryptosporidium* in October 2015. Results to date indicate a potential Bin 1 classification. Currently classified as Bin 2. Due to Bin 2 classification, more stringent turbidity requirements were been placed on CFE and individual filter effluents to receive 1.0-log action credit.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Auburn Water Treatment Plant

System Description

The raw water intake location for the Auburn WTP is located off the Bear River Canal, whose source of supply is Rollins Lake. During PG&E outage, the plant receives water from the Upper Boardman Canal. Auburn is a conventional water treatment plant. The plant design flow is 8.0 mgd, with average flows at 2.16 mgd. The plant typically operates from April through October.

Raw water is delivered to the wet well of the raw water pump station at the Auburn WTP. After flowing through the wet well and a self-cleaning bar screen, the water is pumped to four Actifloc pre-treatment and filtration treatment process units. The modular Actifloc treatment train units consist of static mixing, coagulation-sedimentation, and filtration. Chemicals used in the clarification and disinfection process are injected ahead of the flash mixing chamber. During routine treatment the water is injected with a primary coagulant, generally polyaluminum chlorohydrate and non-ionic polymer as a coagulant aid, prior to entering the rapid mix chamber. Powdered activated carbon can be added if needed. Sodium hypochlorite is also added for pre-chlorination at this point, post-coagulant.

Following the flash mixing chamber the water overflows to the coagulation and maturation chamber. Polymer and microsand are added to this chamber and are mixed with a turbine mixer. From here, the water overflows into the settling chamber. Tube settlers, installed at a 30 degree angle, allow the "ballasted" floc to settle to the bottom of the chamber and from there it is pumped to hydrocyclones. The hydrocyclones are designed to separate the microsand from sludge, allowing the microsand to be recycled back to the injection tank and the sludge to be discharged.

Each of the four triple media gravity filters has a surface area of 275 square feet. The filter media consists of 18 inches of anthracite coal, 9 inches of silica sand, and 3 inches of garnet sand. The multimedia sits above a dual parallel lateral type underdrain system. The filters are designed for a nominal filtration rate of 5 gpm/sf. Post-chlorination is applied prior to the water flowing into the 500,000 gallon~~s~~ clear well.

Highlight of Changes Since 2012 Update

There were no significant changes to the intake and treatment facilities for the Auburn WTP during the past five years.

Significant Potential Contaminating Activities

The Auburn WTP receives water from the Boardman Canal near the Interstate 80 Foresthill exit. The water in the Boardman Canal comes from the Bear River Canal, which comes from Rollins Lake, which is subject to significant recreation as well as a wastewater discharge. The Canal downstream crosses under Highway 174, Interstate 80, railroad tracks, and other local roads which could be a source for spills. Just upstream of the diversion location for the Auburn WTP there is residential development as well as the California Department of Forestry and Fire Protection station, including a heliport.

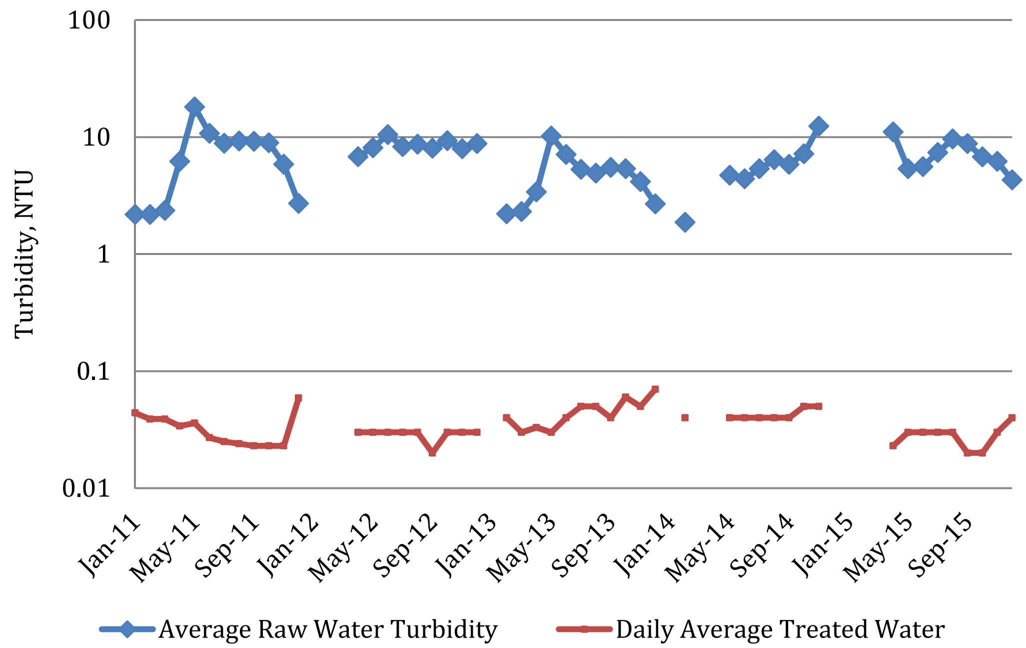
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Auburn WTP for the period of study was 6.7 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.4 percent. **Figure 5-13** shows a timeseries plot of raw and treated water turbidities. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Figure 5-13
Auburn WTP – Raw and Treated Water Turbidity, 2011-2015



Microbiological Constituent

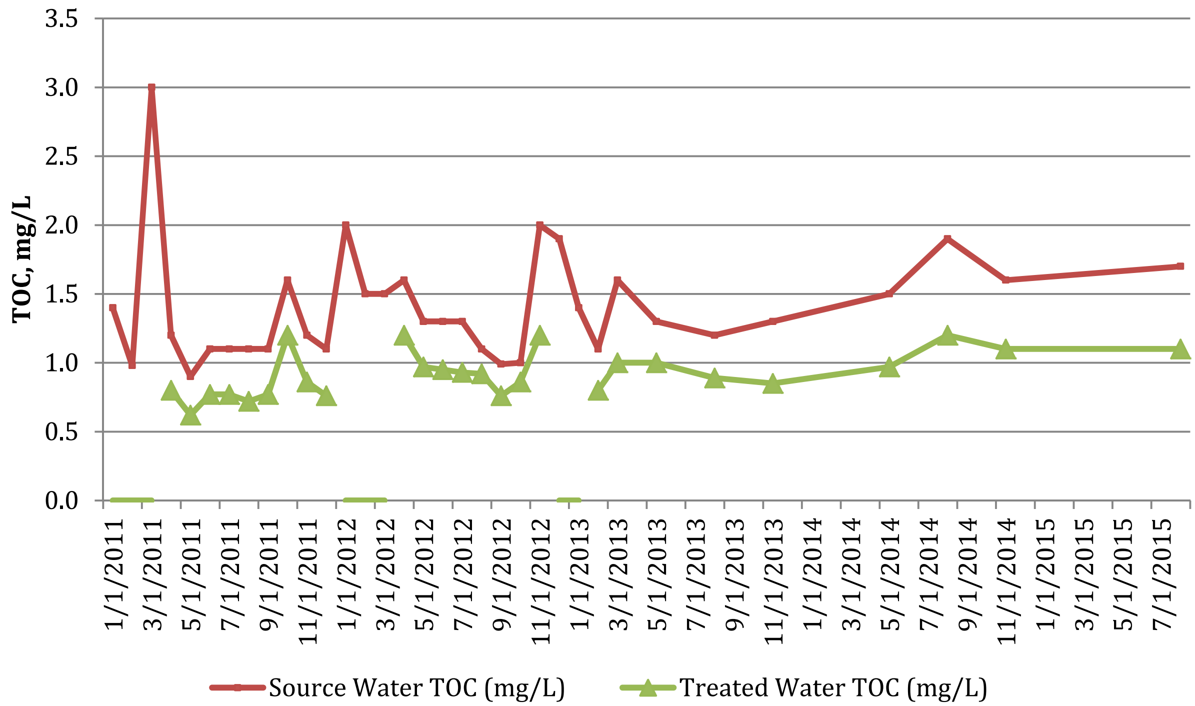
There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water monthly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Auburn WTP were 1.4 mg/L and 0.9 mg/L, respectively, equating to 29.2 percent average removal. For source and treated waters with a RAA less than 2.0 mg/L, no TOC removal calculation is required. **Figure 5-14** shows a timeseries plot of raw and treated water TOC at Auburn WTP. TOC levels in the raw water are generally at or less than 2.0 mg/L. The highest raw water TOC value of 3.0 mg/L occurred in March 2011. Similar to the other PCWA WTPs, there appears to be a slight increasing trend for both source and treated TOC during the study period.

Since the Bowman WTP and Auburn WTP share the same distribution system, TTHM and HAA5 data is discussed in the section above for Bowman WTP.

Figure 5-14
Auburn WTP, Total Organic Carbon, 2011-2015



<u>Other Detectable Title 22 Constituents of Interest</u>

The 2015 CCR reported manganese ranged from ND to 210 μg/L, with an average of 70 μg/L. The secondary MCL for manganese is 50 μg/L.

<u>Detectable Unregulated Constituents</u>

The four quarters of UCMR 3 sampling was conducted in September 2013, December 2013, March 2014, and June 2014. All perfluorinated compounds and organics at the entry point to the distribution system and the maximum residence time were non-detectable. Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-9**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the PHG for hexavalent chromium at 0.02 μg/L was exceeded.

Table 5-9
Detectable UCMR3 Monitoring Results for Auburn WTP, 2013-2014

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, µg/L	Result at Maximum Residence Time, µg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.036 – 0.074	0.049 – 0.085
Vanadium	DDW Notification Level – 50 ug/L	ND	ND – 0.25
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	33 – 40	31 - 38
Chlorate	DDW Notification Level – 800 ug/L	160 - 610	80 - 370

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli and Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Auburn WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Auburn WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Auburn WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR

The second round of LT2ESWTR sampling was initiated in October 2015. Based on the monitoring results to date, the Auburn WTP is likely to be classified in Bin 1. The Auburn WTP is currently classified as Bin 1.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Auburn WTP for all required Title 22 compliance constituents. **Table 5-10** lists the existing drinking water regulations and a compliance evaluation for these standards at the Auburn WTP. The Auburn WTP is currently in compliance with existing regulations.

Table 5-10
Regulatory Compliance Evaluation
Placer County Water Agency – Auburn WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAAs at D/DBPR sites comply with drinking water standards (< 80/60 μg/L, respectively).
Long Term 2 ESWTR	Microbial	Initiated second round of source water monitoring for *Cryptosporidium* in October 2015. Results to date indicate a Bin 1 classification.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Foothill 1 Water Treatment Plant

System Description

The raw water intake location for the Foothill 1 WTP is located off PG&E's South Canal near Powerhouse Road. The plant can also be fed from the Boardman Canal at station 903+00 or from the American River during PG&E canal maintenance. Foothill 1 WTP is a ballasted clarification water treatment plant. The plant design flow is 40 mgd, with average flows at about 25.9 mgd.

The influent water is pre-chlorinated and either alum or polyaluminum chloride are used as the primary coagulant. Nonionic polymer is also used as coagulant aid. Powdered activated carbon is used seasonally as needed for tastes and odors. Chemicals are mixed by a mechanical in pipe induction mixer, and a mixing time of about two seconds. The coagulated water then enters a four chamber Actiflo microsand ballasted separation process consisting of a coagulation, injection, maturation and separation chamber, with a detention time of 15 minutes, and then into contact basins. The clarified water is then filtered through nine dual media gravity filters. The filter loading rate is 100 gpm/sf. Filter aid is used as needed.

The filters are backwashed at least every three days, sometimes daily. The plant has filter to waste capability after backwash or plant start-up. Washwater and filter to waste flow to separate reclaim settling basins, where the decant is handled by a separate reclaimed pumping system and is returned ahead of coagulation. The filtered water is disinfected with chlorine and stored in a storage system, consisting of one-1 mg and one-10 mg storage basins, to meet CT requirements. The average residual leaving the plant is 0.5 to 0.75 mg/L.

Highlight of Changes Since 2012 Update

During the study period there was a third screening unit installed at the grit structure to improve solids and algae removal (2011), the disinfectant was converted from chlorine gas to sodium hypochlorite (March 2012), and instrumentation was replaced/upgraded to prevent off-site discharges and improve CT monitoring (2012).

Significant Potential Contaminating Activities

The Foothill 1 WTP receives water from PG&E's South Canal, which is fed by the Wise Canal from Rock Creek Reservoir, which is fed with water from the Bear River Canal. The water in the Bear River Canal comes from Rollins Lake, which is subject to significant recreation as well as a wastewater discharge. The canals downstream cross under Highway 174, Interstate 80, railroad tracks, and other local roads which could be a source for spills. Rock Creek Reservoir also receives local drainage from Rock Creek that includes high-density rural development, commercial, light industrial areas, and a portion of the Auburn Airport.

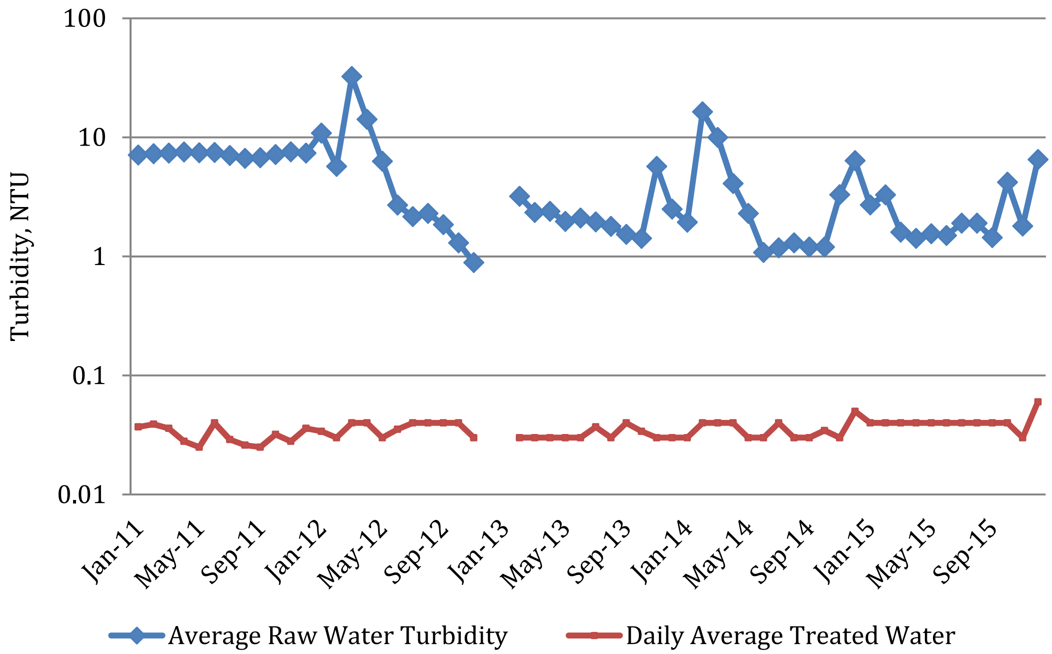
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at the Foothill 1 WTP for the period of study was 4.8 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.2 percent. **Figure 5-15** shows a timeseries plot of raw and treated turbidities. Foothill 1 WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Figure 5-15
Foothill 1 WTP – Raw and Treated Water Turbidity, 2011-2015



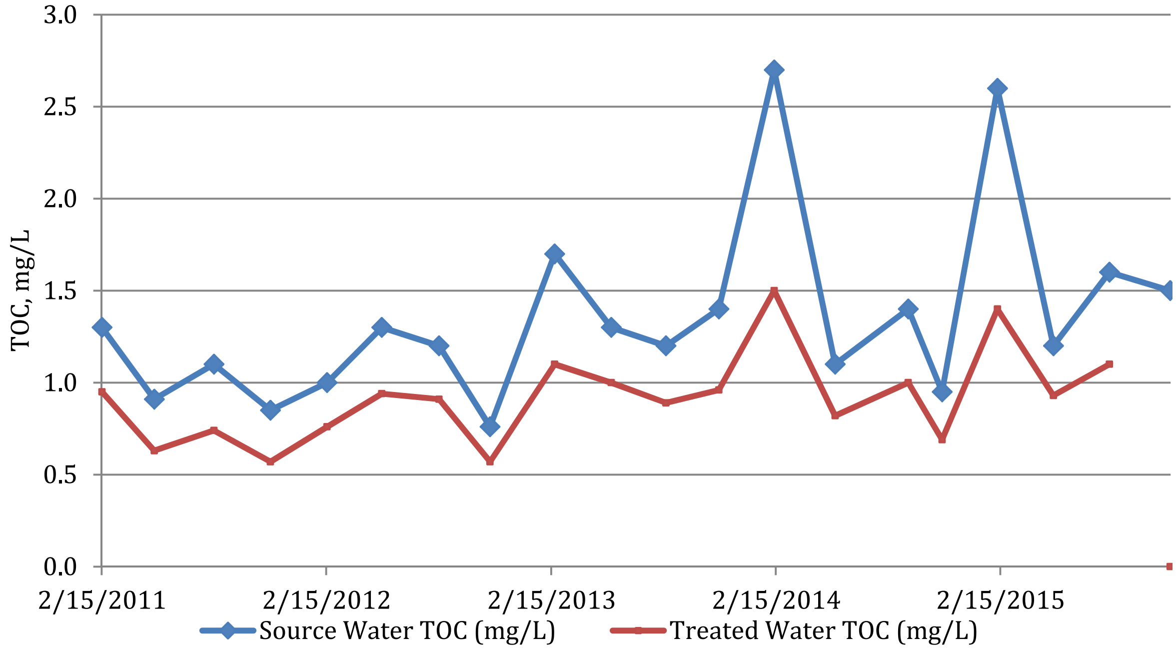
Microbiological Constituent

There were two positive total coliform samples in the distribution system as reported in the 2013 CCR. However, this is not in violation of the Total Coliform Rule since it was less than five percent of the total number of samples collected.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Foothill 40 mgd WTP were 1.4 mg/L and 0.9 mg/L, respectively, equating to 29.8 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Foothill 40 mgd WTP. **Figure 5-16** shows a timeseries plot of raw and treated water TOC at Foothill 40 mgd WTP. TOC levels in the raw water are generally below 2.0 mg/L; with the highest recorded levels at 2.7 mg/L in February 2014 and 2.6 mg/L in February 2015. Similar to the other PCWA WTPs, there was a slight increasing trend in both source and treated water TOC during the study period.

Figure 5-16
Foothill 1 WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

PCWA has collected both TTHM and HAA5 data for the Foothill/Sunset distribution system. PCWA sampled four sites in the Foothill/Sunset distribution system on a quarterly basis which represents both Foothill 1 and 2 WTPs that are operated year-round, and samples an additional four sites when the Sunset WTP is in operation. Over the reporting period, monitoring for Stage 1 D/DBPR monitoring was conducted from January 2011 to November 2011. The Foothill/Sunset TTHM RAA ranged from 44.7 to 56.8 µg/L, with an average RAA of 52 µg/L. One individual TTHM sample collected at site 4 (Cincinnati Ave.) in the third quarter of 2011 was 81 µg/L. After this incident, tank operation was adjusted to keep the water level lower and a tank mixer was added. The Foothill/Sunset HAA5 RAA ranged from 31.9 to 35 µg/L, with an average RAA of 33.7 µg/L. Over the reporting period, TTHM and HAA5 RAAs were below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

PCWA began monitoring the eight Stage 2 D/DBP monitoring sites in February 2012. TTHM LRAAs ranged from 34 to 67.8 µg/L and HAA5 LRAAs ranged from 16 to 40 µg/L as shown in **Figures 5-17** and **5-18**, respectively. Individual TTHM samples collected in the third quarter of 2012 at the Cincinnati site were 98 µg/L and 83 µg/L at the Claudio site in the third quarter of 2015. Based on available data over the reporting period, TTHM and HAA5 LRAAs are below the respective MCLs per the Stage 2 D/DBPR.

Figure 5-17
LRAA TTHMs at Foothill Sunset System, Stage 2 D/DBP Data, 2012 - 2015

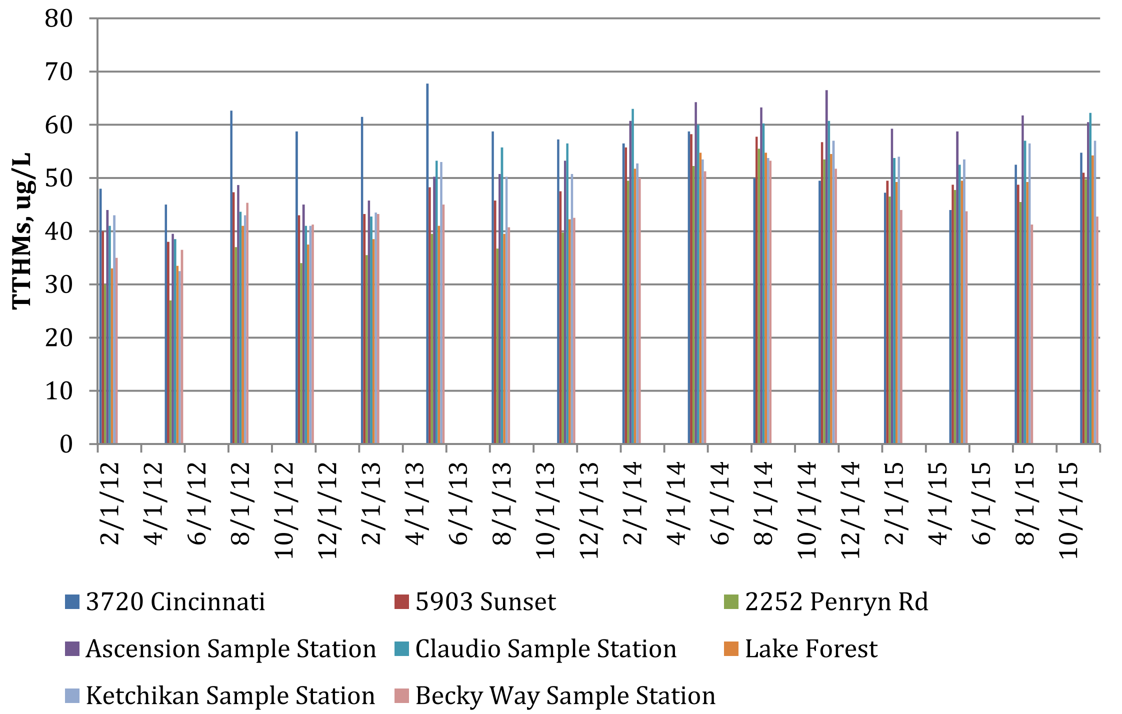
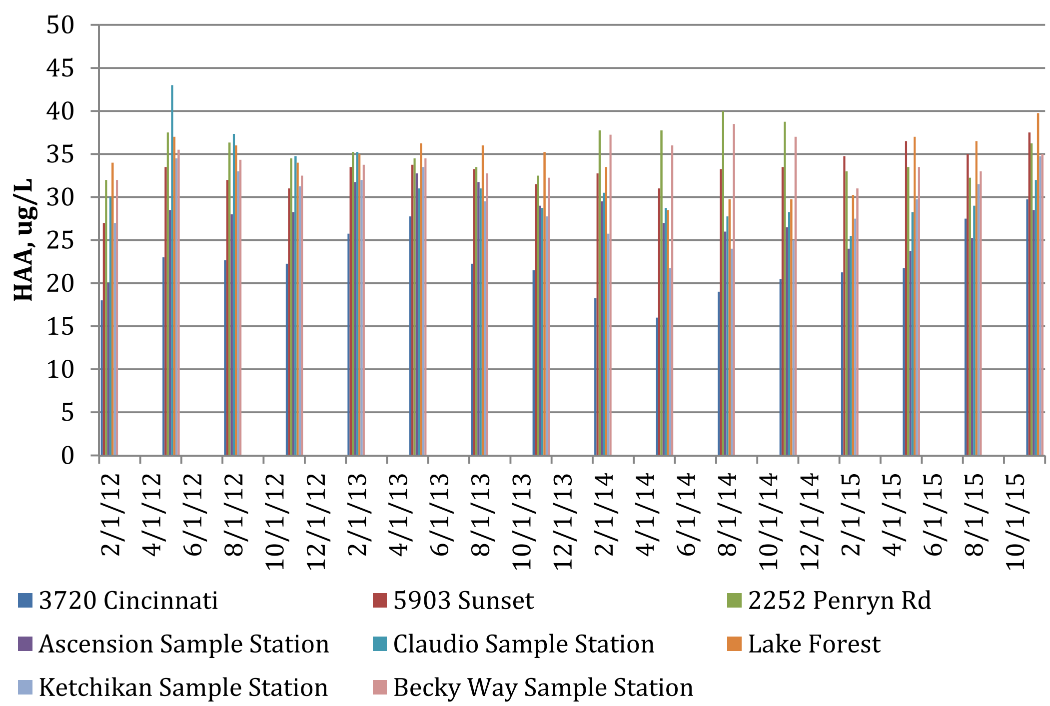


Figure 5-18
LRAA HAAs at Foothill Sunset System, Stage 2 D/DBP Data, 2012 - 2015



Other Detectable Title 22 Constituents of Interest

A review of the CCRs indicates that there were no other Title 22 detections of interest in the surface water at the Foothill WTP.

Detectable Unregulated Constituents

The four quarters of UCMR 3 sampling was conducted in March 2014, June 2014, September 2014, and December 2014. All perfluorinated compounds and organics at the entry point to the distribution system and the maximum residence time were non-detectable. Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-11**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the PHG for hexavalent chromium, 0.02 μg/L, was exceeded.

Table 5-11
Detectable UCMR3 Monitoring Results for Foothill WTP, 2013-2014

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, μg/L	Result at Maximum Residence Time Site 1 (Midas Ave,), μg/L	Result at Maximum Residence Time Site 2 (Cincinnati Ave,), μg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.049 – 0.13	0.051 – 0.1	0.068 – 0.15
Vanadium	DDW Notification Level – 50 ug/L	ND -0.22	ND – 0.38	ND – 1.2
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	32 – 38	33 – 49	36- 46
Chlorate	DDW Notification Level – 800 ug/L	140 – 450	120 – 360	120 - 270

***Giardia/Virus/Cryptosporidium* Reduction Requirements**

Based on the *E. coli* and *Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for Foothill 1WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Foothill 1 WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Foothill 1 WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

The second round of LT2ESWTR sampling was initiated in October 2015. Based on the monitoring results to date, the Foothill 1 WTP is likely to be classified in Bin 1. The Foothill 1 WTP is currently classified as Bin 1.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Foothill 1 WTP for all required Title 22 compliance constituents. **Table 5-12** lists the existing drinking water regulations and a compliance evaluation for these standards at the Foothill 1 WTP. The Foothill 1 WTP is currently in compliance with existing regulations.

Table 5-12
Regulatory Compliance Evaluation
Placer County Water Agency – Foothill 1 WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards for combined filter effluent and individual filter effluent met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAAs at D/DBPR sites comply with drinking water standards (< 80/60 μg/L, respectively).
Long Term 2 ESWTR	Microbial	Initiated second round of source water monitoring for *Cryptosporidium* in October 2015. Results to date indicate a Bin 1 classification.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Foothill 2 Water Treatment Plant

System Description

The raw water intake location for the Foothill 2 WTP is the same as Foothill 1 WTP, located off PG&E's South Canal. The plant can also be fed from the Boardman Canal at station 903+00 or off the American River during South Canal maintenance. Foothill 2 WTP is a conventional water treatment plant. The plant design flow is 15.0 mgd under conventional treatment and can be operated at flows up to 18.26 mgd but is classified as direct filtration, with average flows at 15.1 mgd.

The influent water is pre-chlorinated and either alum or polyaluminum chloride are used as the primary coagulant. Nonionic polymer and powdered activated carbon are also used as coagulant aids. Chemicals are mixed by a mechanical mixer that has two speed settings, and a mixing time of about 15 seconds. The coagulated water then enters a three stage tapered energy flocculator, with a detention time of 30 minutes, and then into sedimentation basins with a detention time of 120 minutes. The clarified water is then filtered through four dual media gravity filters. The filter loading rate is six gpm/sf. Filter aid is used as needed.

The filters are backwashed at least every three days, sometimes daily. The plant has filter to waste capability after backwash or plant start-up. Washwater and filter to waste flow to separate reclaim settling basins, where the decant is handled by a separate reclaimed pumping system and is returned ahead of coagulation. The filtered water is disinfected with chlorine, and stored in 1.0 mg and 10 mg storage basins to meet CT requirements. The average residual leaving the plant is 0.5 to 0.75 mg/L.

Highlight of Changes Since 2012 Update

During the study period there was a third screening unit installed at the grit structure to improve solids and algae removal (2011), the disinfectant was converted from chlorine gas to sodium hypochlorite (March 2012), instrumentation was replaced/upgraded to prevent off-site discharges and improve CT monitoring (2012), and the filter underdrain and media was replaced (2011).

Significant Potential Contaminating Activities

Please see previous discussion for Foothill 1 WTP on page 5-35.

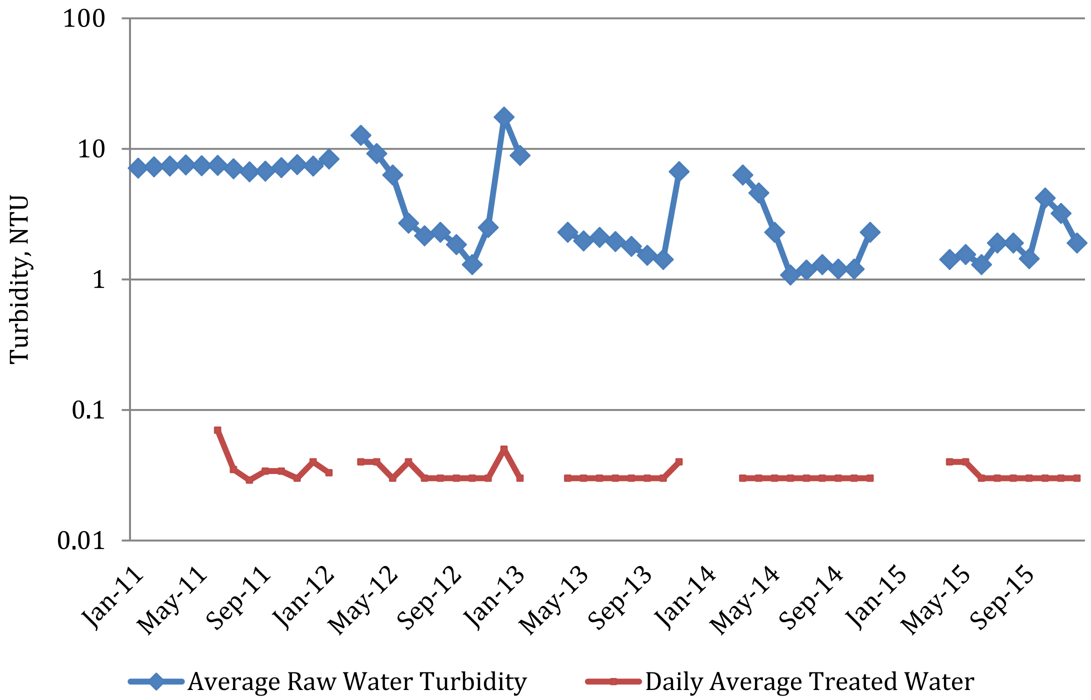
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at the Foothill 2 WTP for the period of study was 4.5 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average removal of solids of 99.3 percent. **Figure 5-19** shows a timeseries plot of raw and treated turbidities. The Foothill 2 WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Figure 5-19
Foothill 1 WTP – Raw and Treated Water Turbidity, 2011-2015



Microbiological Constituent

Please see previous discussion for Foothill 1 WTP on page 5-36.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at the Foothill 2 WTP were 1.2 mg/L and 0.9 mg/L, respectively, equating to 29.4 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Foothill 2 WTP. **Figure 5-20** shows a timeseries plot of raw and treated water TOC at the Foothill 2 WTP. TOC levels in the raw water were always below 2.0 mg/L.

Since the Foothill 2 WTP and the Foothill 1 WTP share the same distribution system, TTHM and HAA5 data is discussed in the section above for Foothill 1 WTP.

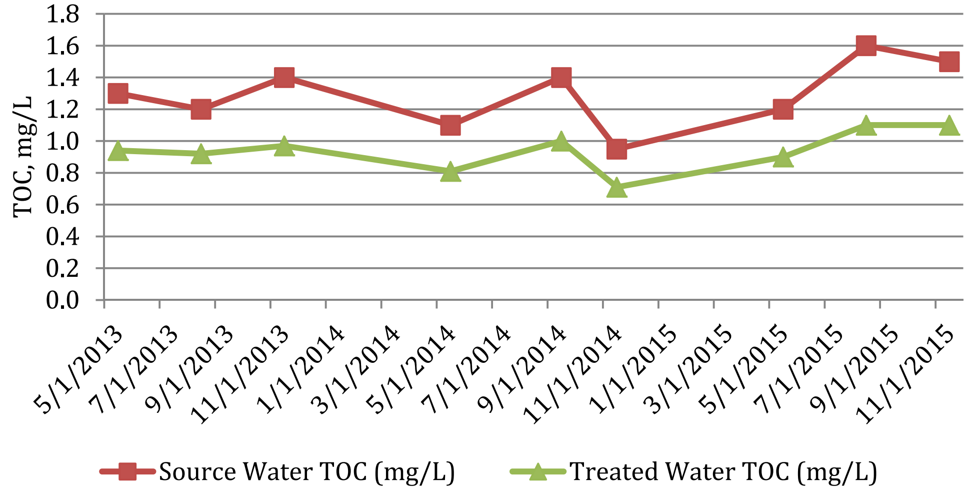
Other Detectable Title 22 Constituents of Interest

Please see previous discussion above for Foothill 1 WTP on page 5-40.

Detectable Unregulated Constituents

Please see previous discussion above for Foothill 1 WTP on page 5-39.

Figure 5-20
Foothill 2 WTP, Total Organic Carbon, 2011-2015



Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* and *Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Foothill 2 WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Foothill 2 WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Foothill 2 WTP is classified as a conventional filtration WTP for flows up to 15 mgd, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. For flows over 15 mgd, and up to 18.26 mgd, the Foothill 2 WTP is classified as a direct filtration WTP and receives reduction credit for 2.0-log *Giardia,* 1.0-log viruses, and 2-log *Cryptosporidium*. Disinfection with chlorine in conventional mode provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses, and in direct mode provides 1.0-log credit for *Giardia* and 3.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

The second round of LT2ESWTR sampling was initiated in October 2015. Based on the monitoring results to date, the Foothill 2 WTP is likely to be classified in Bin 1. The Foothill 2 WTP is currently classified as Bin 1.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Foothill 2 WTP for all required Title 22 compliance constituents. **Table 5-13** lists the existing drinking water regulations and a compliance evaluation for these standards at the Foothill 2 WTP. The Foothill 2 WTP is currently in compliance with existing regulations.

Table 5-13
Regulatory Compliance Evaluation
Placer County Water Agency – Foothill 2 WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards for combined filter effluent and individual filter effluent met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAAs at D/DBPR sites comply with drinking water standards (< 80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Initiated second round of source water monitoring for *Cryptosporidium* in October 2015. Results to date indicate a Bin 1 classification.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Sunset Water Treatment Plant

System Description

The raw water intake location for the Sunset WTP is located within Whitney Reservoir. The source of supply is the Caperton Canal, which is fed by PG&Es South Canal. Sunset WTP is a conventional water treatment plant. The plant design flow is 8.0 mgd, with average flows at 4.32 mgd.

The influent water is pre-oxidized with sodium hypochlorite, and alum and nonionic polymer are the primary coagulant and coagulant aid, respectively. Chemicals are mixed by a static mixer and a "blender" type-mixing blade. The coagulated water enters two single staged paddle wheel flocculation basins, with a detention time of 25 minutes and then into two sedimentation basins with a detention time of 160 minutes at five mgd. The clarified water is then filtered through two dual media gravity filters. The filter loading rate is 4.6 gpm/sf. Non-ionic polymer is used as a filter aid as needed.

The filters are backwashed based on an as needed basis, but production is usually limited to 24 hours. The plant has filter to waste capability after backwash or plant start-up. Washwater and filter to waste flow to a reclaim settling basin, where the decant is returned ahead of coagulation. The filtered water is disinfected with sodium hypochlorite and stored in a 2.5 mg tank to meet CT requirements. The average residual leaving the plant is 1.0 to 3.0 mg/L.

Highlight of Changes Since 2012 Update

During the study period all the filter media was replaced and the filter air scour system was replaced (2013).

Significant Potential Contaminating Activities

The Sunset WTP receives water from the Caperton Canal, which is fed by PG&E's South Canal, which is fed by the Wise Canal from Rock Creek Reservoir, which is fed with water from the Bear River Canal. The water in the Bear River Canal comes from Rollins Lake, which is subject to significant recreation as well as a wastewater discharge. The canals downstream cross under Highways 174 and 193, Interstate 80, railroad tracks, and other local roads which could be a source for spills. Rock Creek Reservoir also receives local drainage from Rock Creek that includes high-density rural development, commercial, light industrial areas, and a portion of the Auburn Airport.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Sunset WTP for the period of study was 1.6 NTU, and on average the treatment process decreased this to 0.02 NTU, which equates to an average removal of solids of 98.7 percent. **Figure 5-21** shows a timeseries plot of raw and treated turbidities. Sunset WTP meets all current turbidity standards. It should be noted that the raw water turbidities plotted are a monthly average of daily grab samples. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Microbiological Constituent

Please see previous discussion for Foothill 1 WTP on page 5-36.

Disinfection By-Products

PCWA monitors alkalinity and TOC levels in its raw water quarterly and TOC levels in its treated water quarterly (when operational) in order to determine TOC removal compliance. The average raw and treated water TOC levels at Sunset WTP were 1.6 mg/L and 1.0 mg/L, respectively, equating to 32 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Sunset WTP. **Figure 5-22** shows a timeseries plot of raw and treated water TOC at Sunset WTP. The highest raw water TOC was 5.1 mg/L in September 2014.

Since the Foothill WTP and Sunset WTP share the same distribution system, TTHM and HAA5 data is discussed in the section above for Foothill WTP.

Figure 5-21
Sunset WTP – Raw and Treated Water Turbidity, 2011-2015

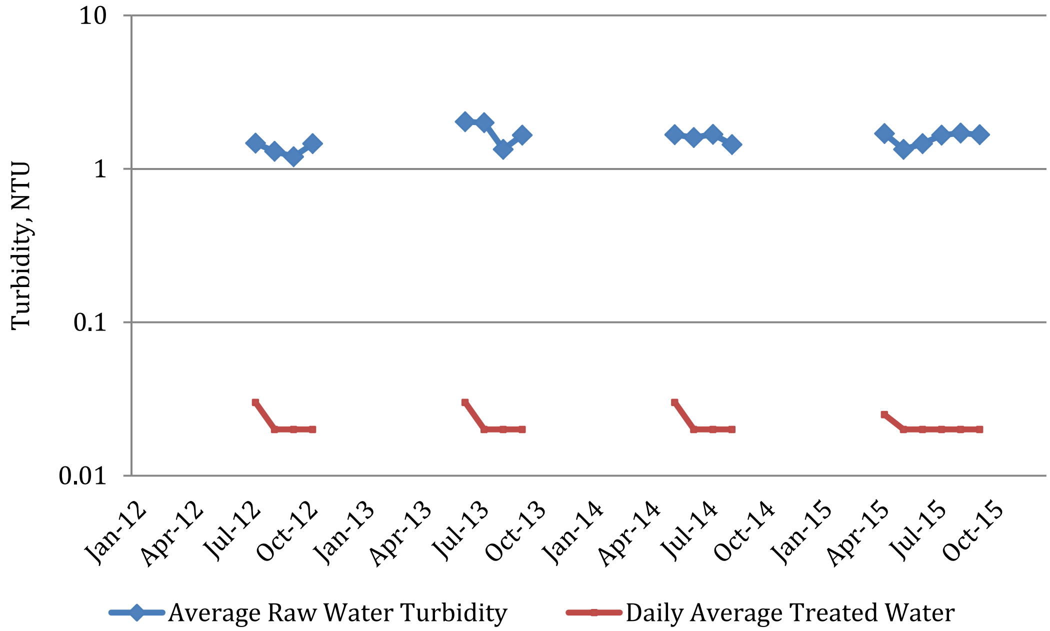
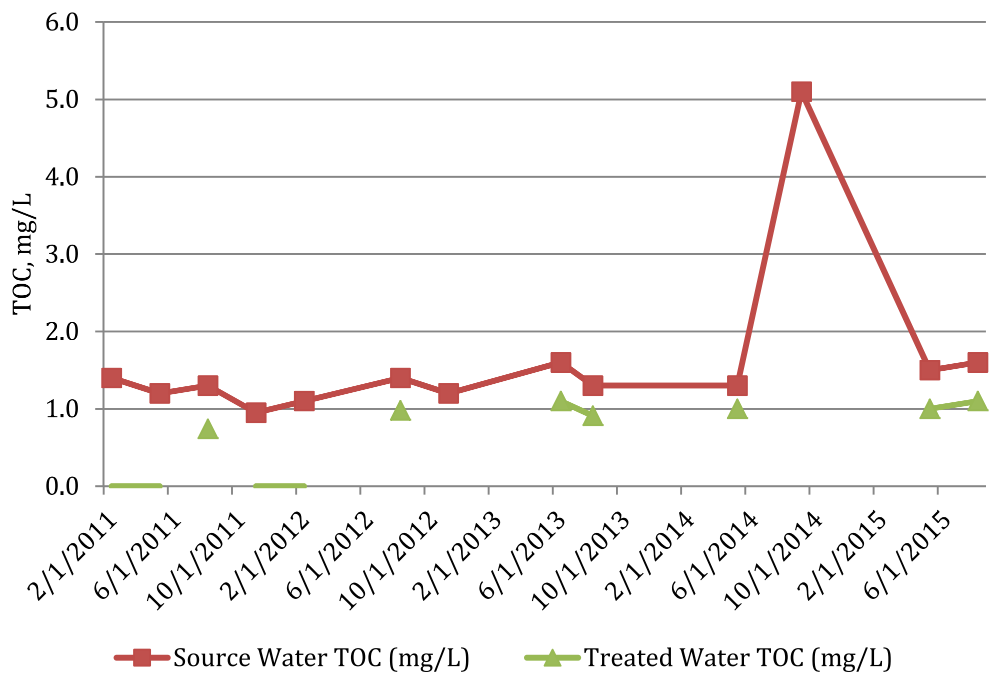


Figure 5-22
Sunset WTP, Total Organic Carbon, 2011-2015



Other Detectable Title 22 Constituents of Interest

There were no detectable levels of IOCs, VOCs, or SOCs in the treated water for the Sunset WTP during the reporting period.

Detectable Unregulated Constituents

The two quarters of UCMR 3 sampling was conducted at the entry point to the distribution system in June 2014 and September 2014. Since the Foothill WTP and Sunset WTP share the same distribution system, the maximum residence time samples are discussed under the Foothill 1 WTP. All perfluorinated compounds and organics at the entry point to the distribution system for the Sunset WTP were non-detectable. Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-14**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the PHG for hexavalent chromium at 0.02 μg/L was exceeded.

Table 5-14
Detectable UCMR3 Monitoring Results for Sunset WTP, 2014

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, μg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.049 – 0.062
Vanadium	DDW Notification Level – 50 ug/L	ND – 0.41
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	32 – 48
Chlorate	DDW Notification Level – 800 ug/L	300 – 480

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* and *Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for Sunset WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Sunset WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Sunset WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with sodium hypochlorite provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

The second round of LT2ESWTR sampling was initiated in October 2015. Based on the monitoring results to date, the Sunset WTP is likely to be classified in Bin 1. The Sunset WTP is currently classified as Bin 1.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Sunset WTP for all required Title 22 compliance constituents. **Table 5-15** lists the existing drinking water regulations and a compliance evaluation for these standards at the Sunset WTP. The Sunset WTP is currently in compliance with existing regulations.

Table 5-15
Regulatory Compliance Evaluation
Placer County Water Agency – Sunset WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards for combined filter effluent and individual filter effluent met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAAs at D/DBPR sites comply with drinking water standards (< 80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Initiated second round of source water monitoring for *Cryptosporidium* in October 2015. Results to date indicate a Bin 1 classification.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

NEVADA IRRIGATION DISTRICT WATER TREATMENT PLANTS

Cascade Shores Water Treatment Plant

System Description

The raw water for the Cascade Shores WTP is diverted off of Deer Creek. The source of supply is the Banner Cascade Pipeline. Cascade Shores is a direct filtration water treatment plant, and the plant design flow is 0.34 mgd, with average flows at 0.11 mgd.

The influent water is pre-chlorinated, and alum with soda ash is the primary coagulant. The coagulated water enters a contact tank flocculator, which has 17 minutes detention time at 240 gpm. There is no sedimentation basin. The water is then filtered through four dual media vertical pressure filters. The filter loading rate is three gpm/sf at 500 gpm.

The filters are backwashed one to three times per week. Backwash water is sent to a reclaimed basin and after settling, the decant is returned to the raw water system downstream of the plant; washwater is not recycled. The plant has filter to waste capability after backwash until the filter turbidity is below 0.3 NTU. The filtered water is stored in a clearwell to meet CT requirements. The average residual leaving the plant is 0.6 mg/L.

Highlight of Changes Since 2012 Update

During the study period a new System Control and Data Acquisition (SCADA) system was installed at the WTP (2015). The WTP is now fully supplied by the Banner Cascade Pipeline as well.

Significant Potential Contaminating Activities

The Cascade Shores WTP is located furthest upstream for the NID water treatment plants. Similar to the Alta WTP, the upper watershed has recreational use above Lake Spaulding and could be a source of contamination. Just upstream of the Deer Creek diversion is a PG&E powerhouse.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at Cascade Shores WTP for the period of study was 1.5 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average removal of solids of 97.9 percent. **Figure 5-23** shows a timeseries plot of raw and treated turbidities. Cascade Shores WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

<u>Microbiological Constituent</u>

There were no positive coliform samples in the distribution system during the period of study.

<u>Disinfection By-Products</u>

In 2004, NID began monitoring for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Cascade Shores WTP were 1.4 mg/L and 1.1 mg/L, respectively, equating to 24 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Cascade Shores WTP. **Figure 5-24** shows a timeseries plot of raw and treated water TOC at Cascade Shores WTP. TOC levels in the raw water were always below 2.0 mg/L, but did show a slight increasing trend during the study period.

Figure 5-23
Cascade Shores WTP – Raw and Treated Water Turbidity, 2011-2015

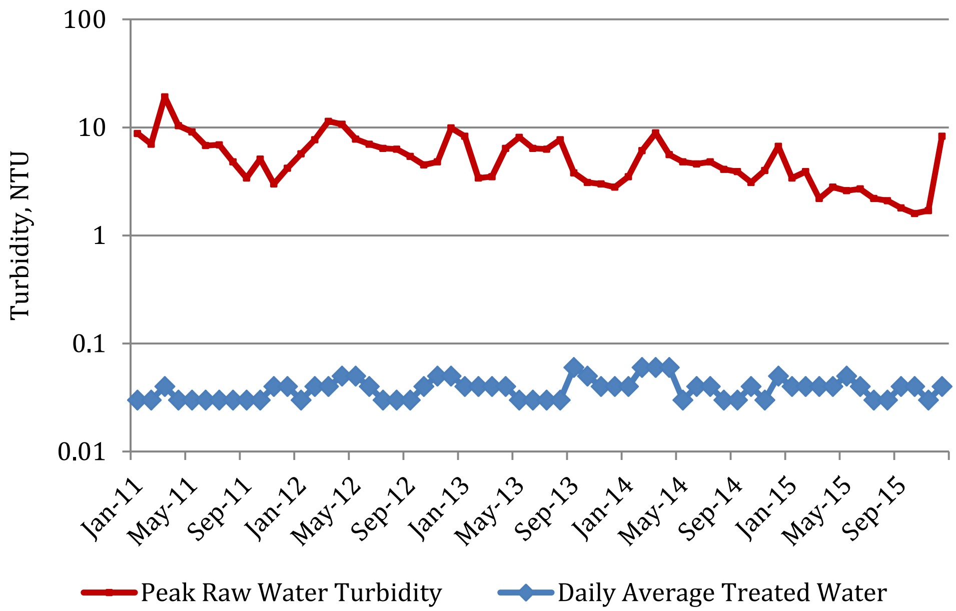
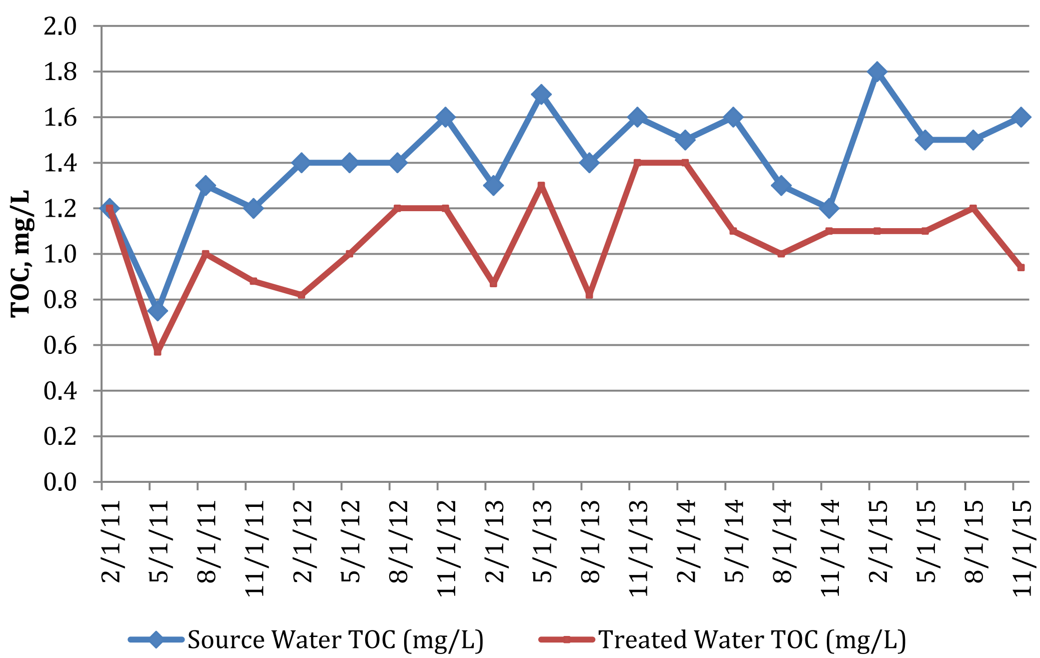


Figure 5-24
Cascade Shores WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

NID has collected both TTHM and HAA5 data for the Cascade Shores distribution system. NID sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP Rule monitoring, from January 2011 to November 2012. Cascade Shores TTHM RAAs ranged from 28.2 to 41.8 μg/L, with an average value of 35.3 μg/L. The HAA5 RAAs ranged from 31.5 to 42.8 μg/L, with an average value of 37.7 μg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

NID converted to two Stage 2 D/DBP Rule monitoring sites in February 2013. One of the sites is the existing Stage 1 site (16844 Pasquale Rd), and one site is new. TTHM locational running annual averages (LRAA) from February 2013 to December 2015 ranged from 34.8 to 54.5 μg/L, with the 16844 Pasquale Rd. site having the highest LRAA of 54.5 μg/L. All LRAAs were well below the primary MCL of 80 μg/L.

HAA5 LRAAs ranged from 29 to 44.5 μg/L, with the 16844 Pasquale Rd. site having the highest LRAA of 44.5 μg/L. All LRAAs were well below the primary MCL of 60 μg/L. Individual HAA5 samples were measured at 64 and 67 μg/L at the Pasquale Rd. and Summit Ridge sites in the second quarter of 2014.

<u>Other Detectable Title 22 Constituents of Interest</u>

There were no detectable Title 22 constituents of interest reported in the Cascade Shores CCRs over the reporting period.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Cascade Shores WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Cascade Shores WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Cascade Shores WTP is classified as a direct filtration WTP, and currently receives reduction credit for 2.0-log *Giardia,* 1.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 1.0-log credit for *Giardia* and 3.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Cascade Shores WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Cascade Shores WTP for all required Title 22 compliance constituents. **Table 5-16** lists the existing drinking water regulations and a compliance evaluation for these standards at the Cascade Shores WTP. The Cascade Shores WTP is currently in compliance with existing regulations.

Table 5-16
Regulatory Compliance Evaluation
Nevada Irrigation District – Cascade Shores WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at D/DBPR Stage 1 site complies with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Elizabeth George Water Treatment Plant

System Description

The raw water intake location for the Elizabeth George WTP is diverted off of Deer Creek, via the Banner Cascade Pipeline. Elizabeth George is a conventional water treatment plant, and the plant design flow is now increased to 18 mgd, previously 10 mgd, with average flows at 4 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and lime is used for pH adjustment. Chemicals are mixed with an adjustable mechanical flash mixer. The coagulated water goes to a horizontal paddle flocculation basin with a detention time of 20 minutes, and then to a sedimentation basin with a detention time of 52 minutes. The clarified water is then filtered through two cluster-type (4 cells each) dual media gravity filter. The filter loading rate is 6.0 gpm/sf.

The filters are backwashed based on time, pressure differential, or turbidity. Backwash water is sent to new backwash water settling and reclamation basins with sludge removal systems and after settling, the decant is now returned to the plant headworks. The plant has filter to waste capability for normally 10 minutes after backwash. The filtered water is disinfected with chlorine and stored to meet CT requirements. The average residual leaving the plant is 0.5 mg/L.

Highlight of Changes Since 2012 Update

During the study period no changes were made to the WTP, but new treated water storage tanks were added to the distribution system and upgrades were made to existing storage tanks (2011). NID completed the Banner Cascade Pipeline that now provides the source water supply via the Loma Rica Reservoir to the WTP (June 2013).

Significant Potential Contaminating Activities

Since completion of the Banner Cascade Pipeline, which begins at the Deer Creek diversion, there have been reductions in the risks of potential contaminating activities to the plant. Similar to the Cascade Shores WTP, the upper watershed has recreational use above Lake Spaulding and could be a source of contamination. Just upstream of the Deer Creek diversion is a PG&E powerhouse.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

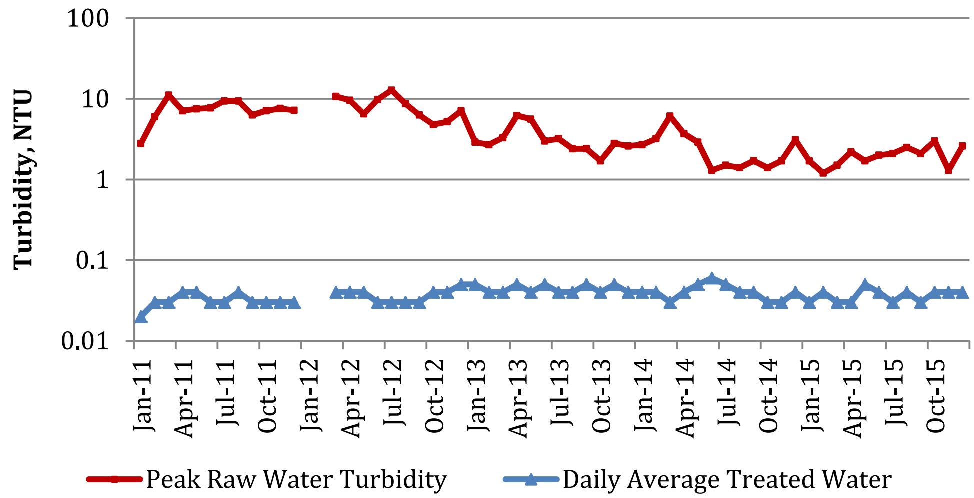
<u>Turbidity</u>

The average raw water turbidity at Elizabeth George WTP for the period of study was 4.6 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.1 percent. **Figure 5-25** shows a timeseries plot of raw and treated water turbidities. Elizabeth George WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

<u>Microbiological Constituent</u>

In both 2014 and 2015, there was one positive total coliform sample in the distribution system. However, these were not in violation of the Total Coliform Rule since they were less than five percent of the total number of samples collected.

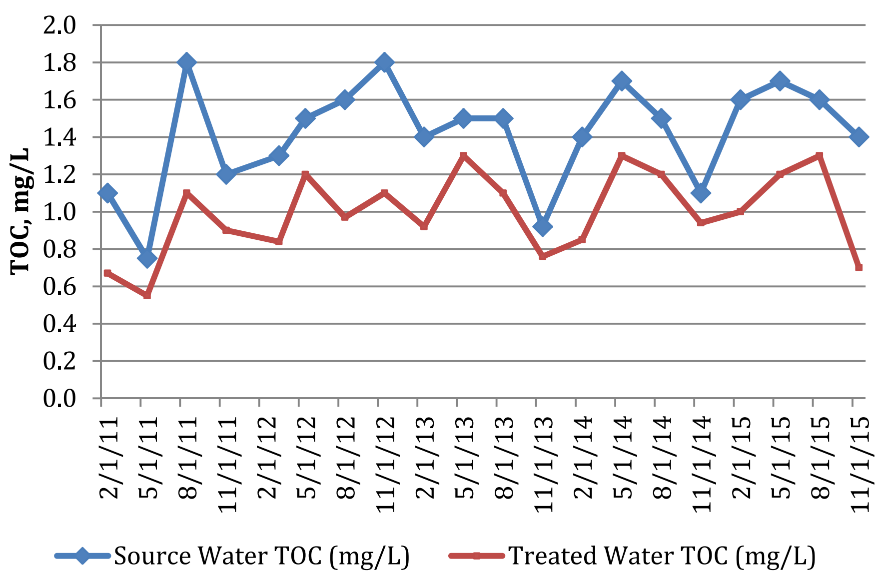
Figure 5-25
Elizabeth George WTP – Raw and Treated Water Turbidity, 2011-2015



Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Elizabeth George WTP were 1.4 mg/L and 1.0 mg/L, respectively, equating to 29 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Elizabeth George WTP. **Figure 5-26** shows a timeseries plot of raw and treated water TOC at Elizabeth George WTP. TOC levels in the raw water were always below 2.0 mg/L, but do show a slight increasing trend during the study period.

Figure 5-26
Elizabeth George WTP, Total Organic Carbon, 2011-2015



Stage 2 D/DBP Rule Compliance Period

NID converted to four Stage 2 D/DBP Rule monitoring sites for the Elizabeth George distribution system in January 2011. TTHM LRAAs from January 2011 to December 2015 ranged from 11.5 to 50.8 µg/L, with the Country Ln. and Indian Flt. site having the highest LRAA of 50.8 µg/L. All LRAAs were well below the primary MCL of 80 µg/L.

HAA5 LRAAs ranged from 15.5 to 32.5 µg/L, with the Hidden Valley PRV site having the highest LRAA of 32.5 µg/L. All LRAAs were well below the primary MCL of 60 µg/L.

Other Detectable Title 22 Constituents of Interest

Copper was detected in the distribution system in 2012 and 2015. However, the copper 90th percentile was below the Action Level of 1.3 mg/L. Thirty samples were collected in both 2012 and 2015 and no samples exceeded the copper Action Level in 2015.

Hexavalent chromium was detected in 2014, ranging from 0.11 to 0.16 µg/L. This is below the MCL of 10 µg/L, but above the PHG of 0.02 µg/L.

Detectable Unregulated Constituents

The four quarters of UCMR 3 sampling was conducted in May 2013, August 2013, November 2013, and February 2014. All perfluorinated compounds and organics at the entry point to the distribution system and the maximum residence time were non-detectable. Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-17**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the PHG for hexavalent chromium at 0.02 µg/L was exceeded.

Table 5-17
Detectable UCMR3 Monitoring Results for Elizabeth George WTP, 2013-2014

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, µg/L	Result at Maximum Residence Time, µg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.059 – 0.11	0.079 – 0.16
Vanadium	DDW Notification Level – 50 ug/L	ND -0.33	0.29 – 0.4
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	30 – 38	29 - 45
Chlorate	DDW Notification Level – 800 ug/L	140 – 590	85 - 550

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Elizabeth George WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Elizabeth George WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Elizabeth George WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

As a Schedule 3 WTP, the Elizabeth George WTP began *Cryptosporidium* monitoring for the second round of LT2ESWTR in October 2016.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Elizabeth George WTP for all required Title 22 compliance constituents. **Table 5-18** lists the existing drinking water regulations and a compliance evaluation for these standards at the Elizabeth George WTP. The Elizabeth George WTP is currently in compliance with existing regulations.

Table 5-18
Regulatory Compliance Evaluation
Nevada Irrigation District – Elizabeth George WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. Began Stage 2 D/DBPR monitoring in January 2011.
Long Term 2 ESWTR	Microbial	Began second round of *Cryptosporidium* monitoring in October 2016. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Loma Rica Water Treatment Plant

System Description

The raw water for the Loma Rica WTP is diverted off of Deer Creek, via the Banner Cascade Pipeline. Loma Rica WTP is a conventional water treatment plant, and the plant design flow is 8.3 mgd, with average flows at 3 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and lime is used for pH adjustment. Chemicals are mixed with an inline mechanical flash mixer. The coagulated water then goes to a serpentine basin where both flocculation and sedimentation occur. The flocculation type is horizontal paddle, with a detention time of 30 minutes. Sedimentation detention time is 4.5 hours at 6.4 mgd. The clarified water is then filtered through four dual media pressure filters. The filter loading rate is six gpm/sf.

The filters are backwashed based on time, pressure differential, or turbidity. Backwash water is sent to sedimentation ponds for two hours and is then recycled back to the headworks, no greater than 10 percent of the plant influent flow. The plant has filter to waste capability after backwash. The filtered water is disinfected with chlorine and stored in a clearwell to meet CT requirements. The average residual leaving the plant is 0.5 mg/L.

Highlight of Changes Since 2012 Update

During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite (September 2013). NID completed the Banner Cascade Pipeline that now provides the source water supply via the Loma Rica Reservoir to the WTP (June 2013).

Significant Potential Contaminating Activities

Since completion of the Banner Cascade Pipeline, which begins at the Deer Creek diversion, there have been reductions in the risks of potential contaminating activities to the plant. Similar to the Cascade Shores WTP, the upper watershed has recreational use above Lake Spaulding and could be a source of contamination. Just upstream of the Deer Creek diversion is a PG&E powerhouse.

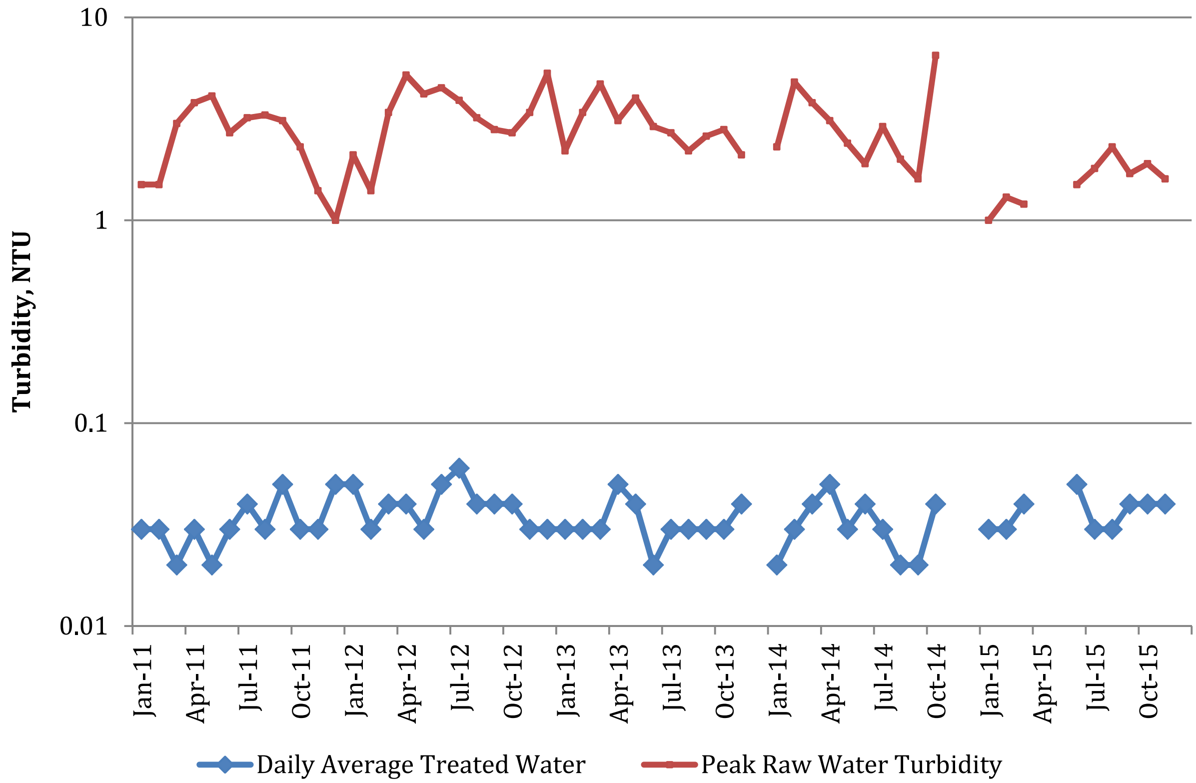
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Loma Rica WTP for the period of study was 2.8 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average removal of solids of 98.9 percent. **Figure 5-27** shows a timeseries plot of raw and treated turbidities. Loma Rica WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Figure 5-27
Loma Rica WTP – Raw and Treated Water Turbidity, 2011-2015



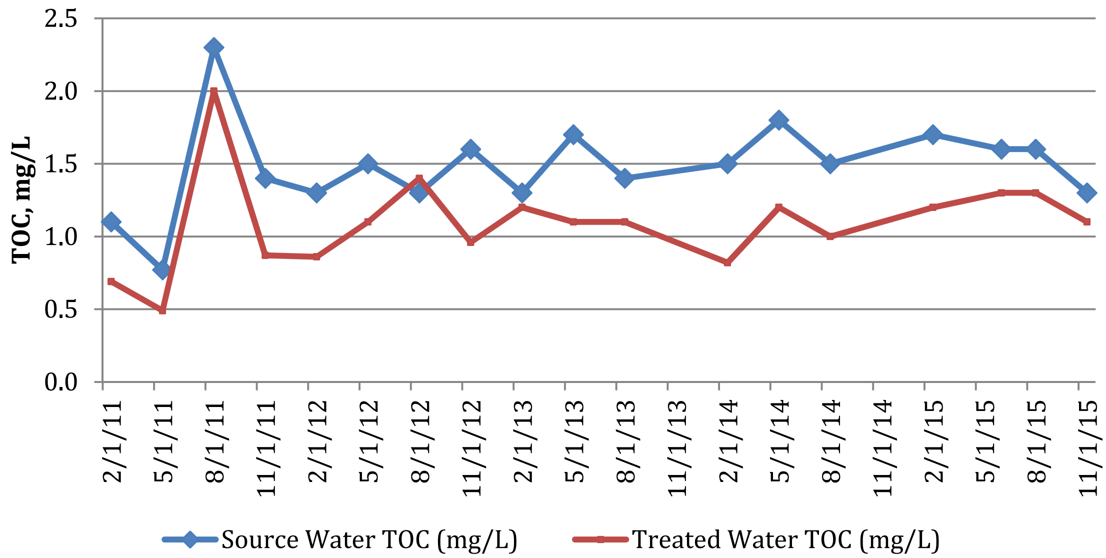
Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Loma Rica WTP were 1.5 mg/L and 1.1 mg/L, respectively, equating to 26 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Loma Rica WTP. **Figure 5-28** shows a timeseries plot of raw and treated water TOC at Loma Rica WTP. TOC levels in the raw water were below 2.0 mg/L except for one sample in August 2011. There are no seasonal trends in either the raw or treated TOC data.

Figure 5-28
Loma Rica WTP, Total Organic Carbon, 2011-2015



Stage 2 D/DBP Rule Compliance Period

NID converted to four Stage 2 D/DBP Rule monitoring sites for the Loma Rica distribution system in March 2011. TTHM LRAAs from March 2011 to December 2015 ranged from 31 to 71.5 µg/L, with the 10495 Oak Drive site having the highest LRAA of 71.5 µg/L. All TTHM LRAAs were below the primary MCL of 80 µg/L. One individual TTHM sample at Oak Drive was measured at 85 µg/L, over the TTHM MCL of 80 µg/L, which occurred in the 2^{nd} quarter of 2015.

HAA5 LRAAs ranged from 21.8 to 46.5 µg/L, with the Alta Sierra Reservoir Effluent site having the highest LRAA of 46.5 µg/L. All LRAAs were well below the primary MCL of 60 µg/L. Individual HAA5 samples were measured at 62 and 63 µg/L at Alta Sierra Reservoir Effluent and the Colfax Hwy sites in the first quarter of 2014.

Other Detectable Title 22 Constituents of Interest

Copper was detected in the distribution system in 2012 and 2015. However, the copper 90^{th} percentile was below the Action Level of 1.3 mg/L. Thirty samples were collected in both 2012 and 2015 and no samples exceeded the copper Action Level in 2015.

Hexavalent chromium was detected in 2014, ranging from 0.058 to 0.11 µg/L. This is below the MCL of 10 µg/L, but above the PHG of 0.02 µg/L.

Detectable Unregulated Constituents

The four quarters of UCMR 3 sampling was conducted in January 2014, July 2014, October 2014, and September 2015. All perfluorinated compounds and organics at the entry point to the distribution system and the maximum residence time were non-detectable.

Additionally, levels of hexavalent chromium, strontium, vanadium, and chlorate were found to be either non-detectable or at very low levels as shown in **Table 5-19**. There is no MCL for chlorate, vanadium, and strontium, however each has an alternate human health advisory as listed in the table and none were exceeded. The MCL for hexavalent chromium was not exceeded, but the PHG for hexavalent chromium at 0.02 μg/L was exceeded.

Table 5-19
Detectable UCMR3 Monitoring Results for Loma Rica WTP, 2014-2015

Constituent	Human Health Advisory	Result at Entry Point to Distribution System, μg/L	Result at Maximum Residence Time, μg/L
Hexavalent Chromium	MCL – 10 ug/L PHG – 0.02 ug/L	0.058 – 0.097	0.064 – 0.11
Vanadium	DDW Notification Level – 50 ug/L	0.21 – 0.41	0.23 – 0.29
Strontium	USEPA Lifetime Health Advisory – 4,000 ug/L	25 – 40	27 - 38
Chlorate	DDW Notification Level – 800 ug/L	380 -1900	200 - 350

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Loma Rica WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Loma Rica WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Loma Rica WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim ESWTR, and the LT2ESWTR.

As a Schedule 3 WTP, the Loma Rica WTP began *Cryptosporidium* monitoring for the second round of LT2ESWTR in October 2016.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Loma Rica WTP for all required Title 22 compliance constituents. **Table 5-20** lists the existing drinking water regulations and a compliance evaluation for these standards at the Loma Rica WTP. The Loma Rica WTP is currently in compliance with existing regulations.

Table 5-20
Regulatory Compliance Evaluation
Nevada Irrigation District – Loma Rica WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. Began Stage 2 D/DBPR monitoring in March 2011.
Long Term 2 ESWTR	Microbial	Began second round of *Cryptosporidium* monitoring in October 2016. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Lake of the Pines Water Treatment Plant

System Description

The raw water intake location for the Lake of the Pines WTP is located on the Magnolia III Canal. The source of supply is pumped from Lake Combie. Lake of the Pines WTP is a conventional water treatment plant, and the plant design flow is 5 mgd, with average flows at 1.3 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and lime is used for pH adjustment. Chemicals are mixed with an adjustable mechanical flash mixer. The coagulated water then goes to a Pulsator Upflow Clarifier where both flocculation and sedimentation occur. The sedimentation detention time is 46 minutes. The clarified water is then filtered through two tri-media gravity filters. The filter loading rate is six gpm/sf.

The filters are backwashed based on time, pressure differential, or turbidity. Backwash water is sent to a settling tank. After settling, the decant water is reclaimed back to the plant's raw water reservoir. The plant has filter to waste capability after backwash, normally for five to seven minutes. Filter to waste water is sent to a separate holding tank where it is then pumped back to the headworks. The filtered water is disinfected with chlorine and stored in a clearwell to meet CT requirements. The average residual leaving the plant is 0.5 mg/L.

Highlight of Changes Since 2012 Update

During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite (2015). In order to minimize DBP formation due to increased water age, the Darkhorse storage tank continues to remain empty during the winter months and the Serene Hill tank is filled to half capacity year-round. As more customers are added to the Darkhorse subdivision, these tanks can return to normal capacity. Also, a portion of the Magnolia III canal was encased in pipe (2013).

Significant Potential Contaminating Activities

The Lake of the Pines WTP uses water diverted from Lake Combie, which is located on the Bear River downstream of Rollins Reservoir. Rollins Reservoir is subject to heavy seasonal recreation. The Bear River between Rollins and Combie is also a summer season recreational area. The Bear River passes under Highway 174 as well as Dog Bar Road, which could have the potential for spills. Lake Combie has low-density residential development around the lake which includes some private docks. The Magnolia III Canal between Lake Combie and the water treatment plant passes through some areas with cattle grazing and other areas of recent residential development, as well as a golf course. For new development adjacent to the canal, NID requires the canal to be encased in a pipe. NID staff has observed that the cattle present along the Magnolia III Canal have become more densely populated, after the construction of the Darkhorse subdivision. Encasement of a portion of the Magnolia III canal has reduced risk of the grazing.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

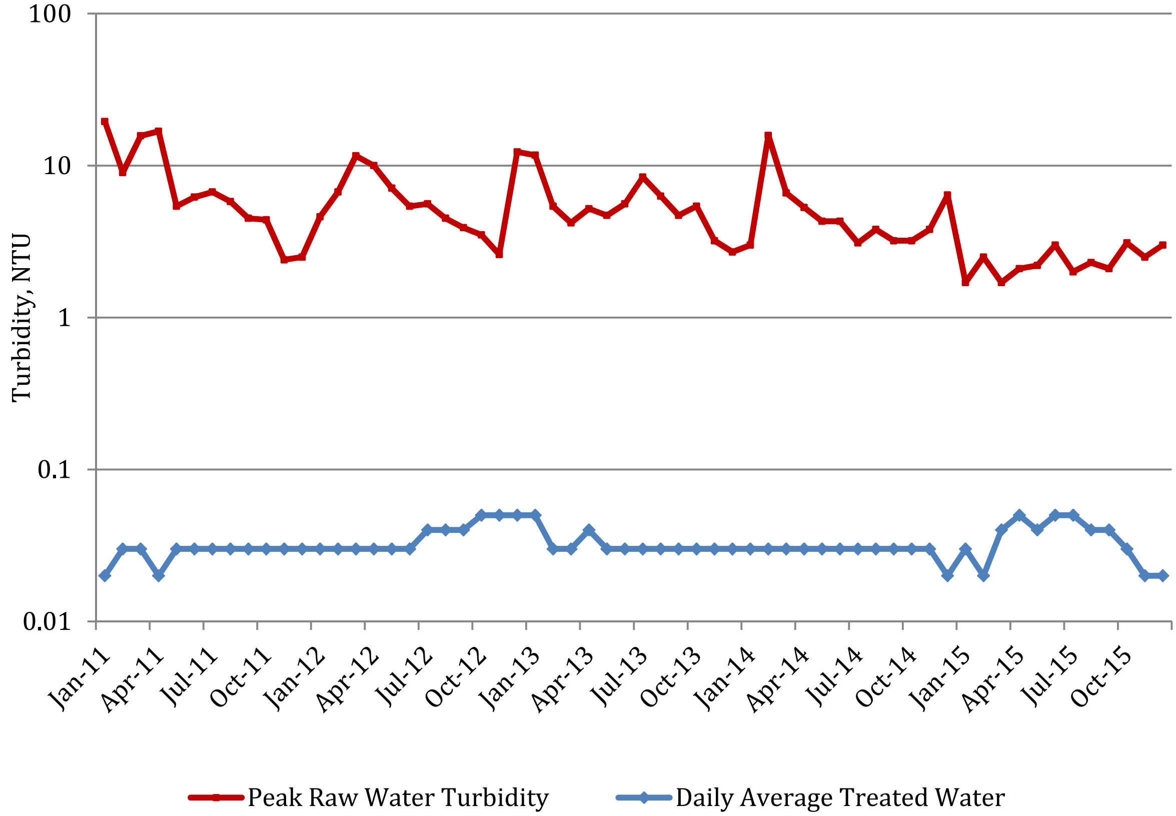
Turbidity

The average raw water turbidity at Lake of the Pines WTP for the period of study was 5.6 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average removal of solids of 99.4 percent. **Figure 5-29** shows a timeseries plot of raw and treated turbidities. Lake of the Pines WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Figure 5-29
Lake of the Pines WTP – Raw and Treated Water Turbidity, 2011-2015



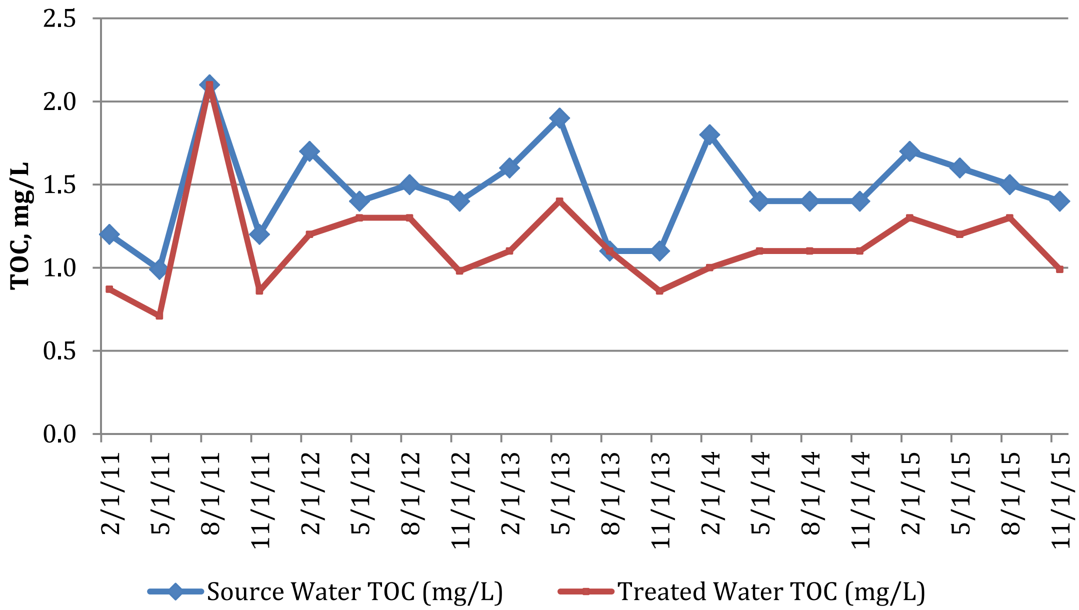
Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Lake of the Pines WTP were 1.5 mg/L and 1.1 mg/L, respectively, equating to 22 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Lake of the Pines WTP. **Figure 5-30** shows a timeseries plot of raw and treated water TOC at Lake of the Pines WTP. TOC levels in the raw water are generally below 2.0 mg/L, except for one sample in August 2011

Stage 1 D/DBP Rule Compliance Period

NID has collected both TTHM and HAA5 data for the Lake of the Pines distribution system. NID sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP Rule monitoring, from January 2011 to November 2012. Lake of the Pines TTHM RAAs ranged from 37.3 to 51.0 µg/L, with an average value of 43.1 µg/L. The HAA5 RAAs ranged from 20 to 27.3 µg/L, with an average value of 24 µg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Figure 5-30
Lake of the Pines WTP, Total Organic Carbon, 2011-2015



Stage 2 D/DBP Rule Compliance Period

NID converted to two Stage 2 D/DBP Rule monitoring sites in February 2013. One of the sites is the existing Stage 1 site (10961 Combie Rd.), and one site is new. TTHM LRAAs from February 2013 to December 2015 ranged from 40.8 to 59.8 µg/L, with the Dark Horse Pump Station site having the highest LRAA of 59.8 µg/L. All TTHMs LRAAs were well below the primary MCL of 80 µg/L.

HAA5 LRAAs ranged from 26.5 to 40 µg/L, with the 10961 Combie Rd. site having the highest LRAA of 40 µg/L. One individual HAA5 sample at the Combie Rd. site was 65 µg/L in the second quarter of 2014. All LRAAs were well below the primary MCL of 60 µg/L.

<u>Other Detectable Title 22 Constituents of Interest</u>

Copper was detected in the distribution system in 2011 and 2014. However, the copper 90th percentile was below the Action Level of 1.3 mg/L. Twenty samples were collected in both 2011 and 2014 and no samples exceeded the copper Action Level in 2014.

Lead was detected in the distribution system in 2011. However, the lead 90th percentile was below the Action Level of 15 µg/L. Twenty samples were collected in 2011.

In 2013, aluminum was detected at 170 µg/L, below the secondary MCL at 200 µg/L.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Lake of the Pines WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Lake of the Pines WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Lake of the Pines WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Lake of the Pines WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Lake of the Pines WTP for all required Title 22 compliance constituents. **Table 5-21** lists the existing drinking water regulations and a compliance evaluation for these standards at the Lake of the Pines WTP. The Lake of the Pines WTP is currently in compliance with existing regulations.

Table 5-21
Regulatory Compliance Evaluation
Nevada Irrigation District – Lake of the Pines WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at D/DBPR Stage 1 site complies with drinking water standards (<80/60 μg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

Lake Wildwood Water Treatment Plant

System Description

The raw water intake location for Lake Wildwood WTP is located on the Newtown Canal, whose source of supply is Deer Creek. Lake Wildwood WTP is a conventional water treatment plant, and the plant design flow is 4 mgd, with average flows at 1.5 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and lime is used for pH adjustment. Chemicals are mixed with a mechanical mixer on clarifier A while clarifier B utilizes a static inline mixer. The coagulated water then goes to two circular upflow (steel) clarifiers where both flocculation and sedimentation occur. The sedimentation detention time is 2.3 hours. The clarified water is then filtered through four dual media gravity filters. The filter loading rate is six gpm/sf.

The filters are backwashed based on time, and then pressure differential or turbidity. Each filter is backwashed at least every five days. Backwash water is sent to a reclaim pond, and after settling, the decant water is reclaimed back to the plant's raw water reservoir. The plant has filter to waste capability after backwash, normally for three to five minutes. The filtered water is disinfected with sodium hypochlorite and stored in a clearwell and storage tanks to meet CT requirements. The average residual leaving the plant is 0.6 mg/L.

Highlight of Changes Since 2012 Update

During the study period the filter media was replaced in two of the filter cells (2014).

Significant Potential Contaminating Activities

The Lake Wildwood WTP diverts off of Deer Creek into the Newtown Canal. Deer Creek passes through Scotts Flat Reservoir where there is summer recreational use. Deer Creek then flows through parts of Nevada City where there is urban runoff and the potential for wastewater collection system spills. Highways 20 and 49 cross the creek, as well as many other local roads, which could be a source of spills. The Newtown Canal passes through low-density residential areas as well as cattle and horse grazing.

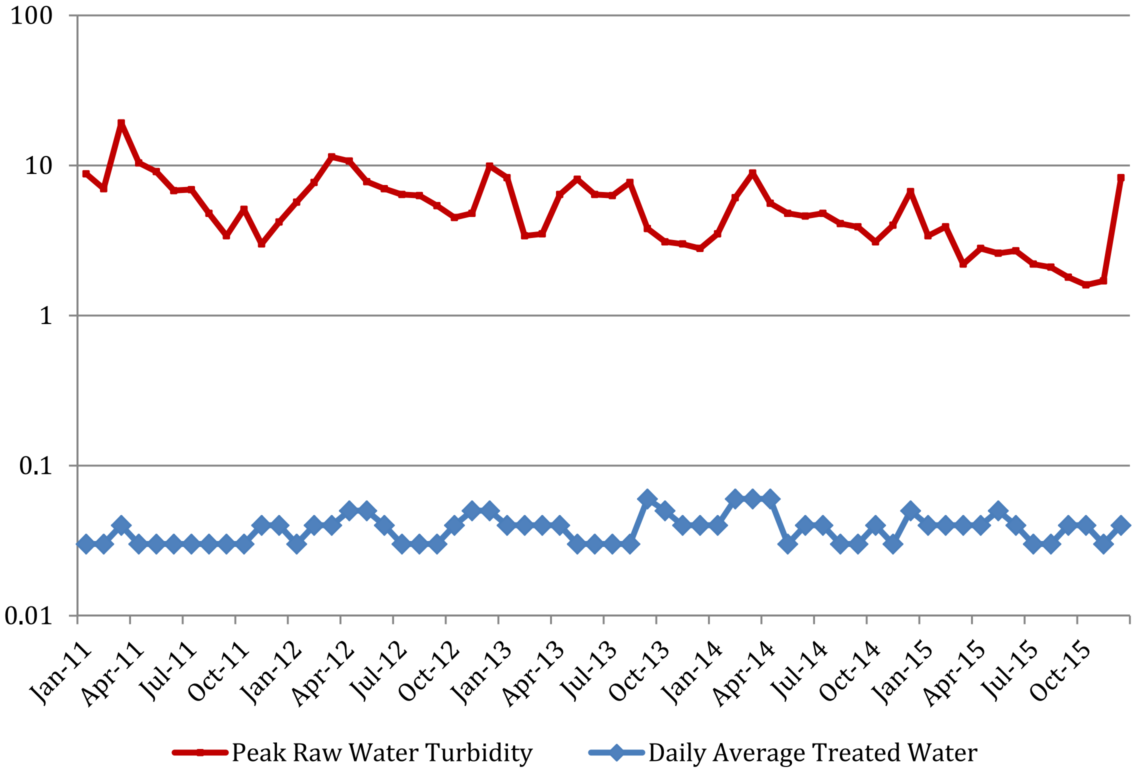
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average raw water turbidity at Lake Wildwood WTP for the period of study was 5.6 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.3 percent. **Figure 5-31** shows a timeseries plot of raw and treated turbidities. Lake Wildwood WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24-hour period.

Figure 5-31
Lake Wildwood WTP – Raw and Treated Water Turbidity, 2011-2015



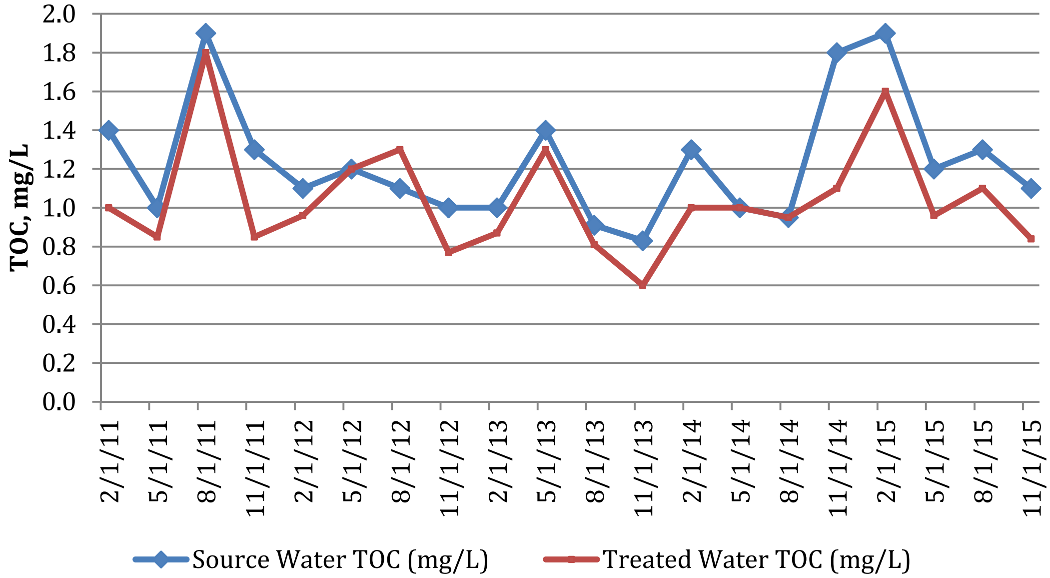
Microbiological Constituent

In both 2011 and 2014, there was one positive total coliform sample in the distribution system. However, these are not in violation of the Total Coliform Rule since they were less than five percent of the total number of samples collected.

Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Lake Wildwood WTP were 1.2 mg/L and 1.0 mg/L, respectively, equating to 15 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the Lake Wildwood WTP. **Figure 5-32** shows a timeseries plot of raw and treated water TOC at Lake Wildwood WTP. TOC levels in the raw water were always below 2.0 mg/L.

Figure 5-32
Lake Wildwood WTP, Total Organic Carbon, 2011-2015



Stage 1 D/DBP Rule Compliance Period

NID has collected both TTHM and HAA5 data for the Lake Wildwood distribution system. NID sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP Rule monitoring, from January 2011 to November 2012. Lake Wildwood TTHM RAAs ranged from 45 to 64.3 µg/L, with an average value of 50.8 µg/L. The HAA5 RAAs ranged from 25.5 to 37.3 µg/L, with an average value of 29.6 µg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Stage 2 D/DBP Rule Compliance Period

NID converted to two new Stage 2 D/DBP Rule monitoring sites in February 2013. TTHM LRAA from February 2013 to December 2015 ranged from 33.8 to 62.8 µg/L, with the 17593 Penn Valley site having the highest LRAA of 52.8 µg/L. All TTHM LRAAs were well below the primary MCL of 80 µg/L.

HAA5 LRAAs ranged from 26.3 to 41.5 µg/L, with the 17592 Penn Valley site having the highest LRAA of 41.5 µg/L. All HAA5 LRAAs were well below the primary MCL of 60 µg/L.

Overall, NID has been trying to limit DBP formation by keeping chlorine residuals as low as possible, but still providing a residual at the furthest locations in the distribution system. NID staff believes that the Lake Wildwood, Lake of the Pines, and Smartville WTPs are vulnerable to spikes in DBPs due to the long, meandering canals that supply these WTPs, which can result in higher TOC and temperatures.

Other Detectable Title 22 Constituents of Interest

Copper was detected in the distribution system in 2011 and 2014. However, the copper 90th percentile was always below the Action Level of 1.3 mg/L. Twenty samples were collected in both 2011 and 2014 and no samples exceeded the copper Action Level in 2014.

Lead was detected in the distribution system in 2011. However, the lead 90th percentile was below the Action Level of 15 μg/L. Twenty samples were collected in 2011.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Lake Wildwood WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Lake Wildwood WTP was designated as Bin 2 and requires 2-log reduction of *Cryptosporidium* plus an additional 1-log action.

The Lake Wildwood WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. The Lake Wildwood WTP meets the superior treated water turbidity element of the Microbial Toolbox in the LT2ESWTR, which grants 1-log additional action. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Lake Wildwood WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017. The Lake Wildwood WTP is currently classified under Bin 2.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Lake Wildwood WTP for all required Title 22 compliance constituents. **Table 5-22** lists the existing drinking water regulations and a compliance evaluation for these standards at the Lake Wildwood WTP. The Lake Wildwood WTP is currently in compliance with existing regulations.

Table 5-22
Regulatory Compliance Evaluation
Nevada Irrigation District – Lake Wildwood WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at D/DBPR Stage 1 site complies with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 2. Achieves 1-log additional action through superior treated water turbidity.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

North Auburn Water Treatment Plant

System Description

The raw water intake location for North Auburn WTP is located on the Combie Ophir Canal, or Rock Creek Reservoir. North Auburn WTP is a conventional water treatment plant, and the plant design flow is 6 mgd, with average flows at 2.33 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and lime was used for pH adjustment during most of the study, but converted to sodium hydroxide. Chemicals are mixed with an adjustable inline flash mixer. The coagulated water then goes to an upflow clarifier where both flocculation and sedimentation occur. The sedimentation detention time is 91 minutes. The clarified water is then filtered through two dual media gravity filters. The filter loading rate is six gpm/sf.

The filters are typically backwashed based on turbidity. In the summer, each filter is backwashed at least every five days. In the winter, each filter is backwashed at least every three days. Backwash water is sent to a reclaimed pond, and after settling, the decant water is reclaimed back to North Auburn WTP's raw water reservoir. The plant has filter to waste capability after backwash, normally for three to five minutes. The filtered water is disinfected with chlorine and stored in a clearwell to meet CT requirements. The average residual leaving the plant is 0.5 mg/L.

Highlight of Changes Since 2012 Update

During the study period the disinfectant was converted from chlorine gas to sodium hypochlorite (January 2013) and the mixers on the upflow clarifiers were changed from belt to direct drive for better control and optimization of clarifier operation.

Significant Potential Contaminating Activities

The North Auburn WTP receives water from Rock Creek Reservoir, which is fed with water from the Bear River Canal. The water in the Bear River Canal comes from Rollins Lake, which is subject to significant recreation as well as a wastewater discharge. The canals downstream cross Highway 174, Interstate 80, railroad tracks, and other local roads which could be a source for spills. Rock Creek Reservoir also receives local drainage from Rock Creek that includes high-density rural development, commercial, light industrial areas, and a portion of the Auburn Airport. PG&E does not implement any water quality management programs at the Rock Creek Reservoir.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

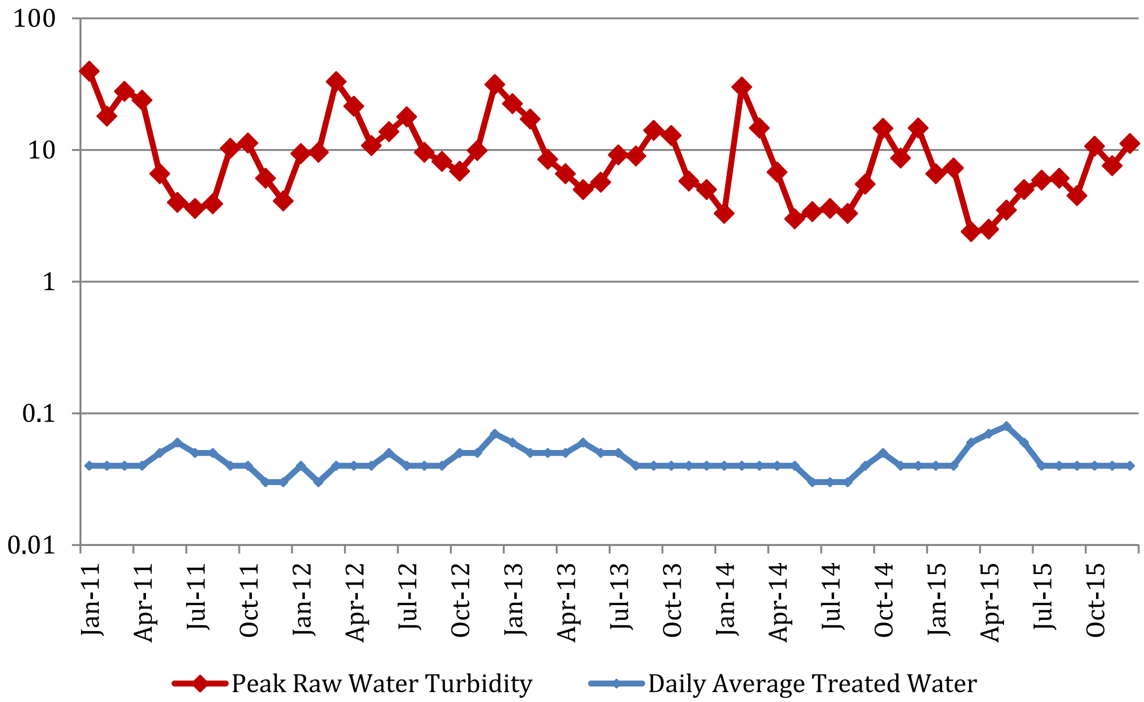
<u>Turbidity</u>

The average raw water turbidity at North Auburn WTP for the period of study was 10.8 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.6 percent. **Figure 5-33** shows a timeseries plot of raw and treated turbidities. North Auburn WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

<u>Microbiological Constituent</u>

In 2015, there were two positive coliform samples in the distribution system in September 2015. This was a violation of the Total Coliform Rule since it was more than one monthly sample positive. No fecal coliform was detected and no repeat samples were positive. NID found the sample station to be the cause and it was replaced immediately.

Figure 5-33
North Auburn WTP – Raw and Treated Water Turbidity, 2011-2015



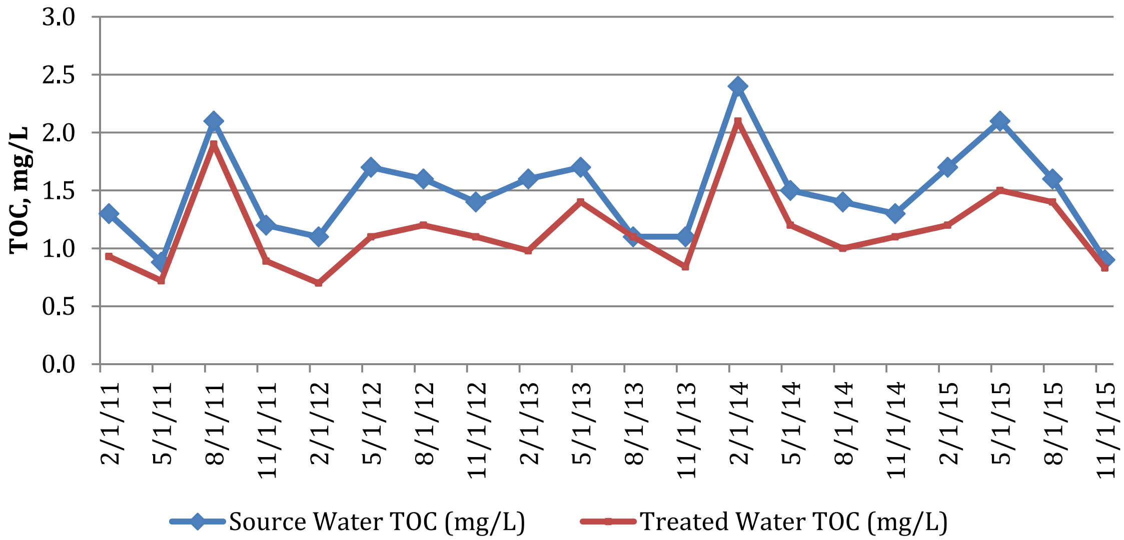
Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water quarterly in order to determine TOC removal compliance. The average raw and treated water TOC levels at North Auburn WTP were 1.5 mg/L and 1.2 mg/L, respectively, equating to 22 percent average removal. Since all of the TOC RAAs for both source and treated waters were less than 2.0 mg/L, no TOC removal calculation is required for the North Auburn WTP. **Figure 5-34** shows a timeseries plot of raw and treated water TOC at North Auburn WTP. TOC levels in the raw water were below 2.0 mg/L throughout the reporting period, except for three samples in August 2011, February 2014, and May 2015

Stage 1 D/DBP Rule Compliance Period

NID has collected both TTHM and HAA5 data for the North Auburn distribution system. NID sampled quarterly for TTHM and HAA5 at one site in the distribution system for Stage 1 D/DBP Rule monitoring, from January 2011 to November 2012. North Auburn TTHM RAAs ranged from 36.8 to 44.3 µg/L, with an average value of 40 µg/L. The HAA5 RAAs ranged from 28.8 to 36.3 µg/L, with an average value of 32.4 µg/L. Over the reporting period, RAAs are well below the respective MCLs per the Stage 1 D/DBPR.

Figure 5-34
North Auburn WTP, Total Organic Carbon, 2011-2015



Stage 2 D/DBP Rule Compliance Period

NID converted to two new Stage 2 D/DBP Rule monitoring sites in March 2013. TTHM LRAA from March 2013 to December 2015 ranged from 43.8 to 70 µg/L, with the 11325 Edgewood site having the highest LRAA of 70 µg/L. All TTHMLRAAs were well below the primary MCL of 80 µg/L. One individual TTHM sample was measured at 91 µg/L, over the TTHM MCL of 80 µg/L, which occurred in the 4^{th} quarter of 2015 at the Edgewood site.

HAA5 LRAAs ranged from 32 to 45.3 µg/L, with the Mt. Vernon and Old Post site having the highest LRAA of 45.3 µg/L. Two individual HAA5 samples were measured at 61 µg/L and 62 µg/L during the first quarter of 2013 and the second quarter of 2014, respectively, at the Edgewood site. All LRAAs were well below the primary MCL of 60 µg/L.

<u>Other Detectable Title 22 Constituents of Interest</u>

Copper was detected in the distribution system in 2011 and 2014. However, the copper 90^{th} percentile was always below the Action Level of 1.3 mg/L. Twenty samples were collected in both 2011 and 2014 and no samples exceeded the copper Action Level in 2014.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* and *Giardia* data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus/*Cryptosporidium* continues to be appropriate reduction requirements for the North Auburn WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, North Auburn WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The North Auburn WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 0.5-log credit for *Giardia* and 2.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the North Auburn WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017. The North Auburn WTP is currently classified under Bin 1.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the North Auburn WTP for all required Title 22 compliance constituents. **Table 5-23** lists the existing drinking water regulations and a compliance evaluation for these standards at the North Auburn WTP. The North Auburn WTP is currently in compliance with existing regulations.

Table 5-23
Regulatory Compliance Evaluation
Nevada Irrigation District – North Auburn WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs, except one monthly exceedence of the Total Coliform Rule in September 2015.
SWTR	Microbial and Turbidity	Data continue to support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC < 2.0 mg/L in raw and treated water. TTHM/HAA5 RAA at D/DBPR Stage 1 site complies with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 ESWTR	Microbial	Need to begin second round of monitoring for *E. coli* in October 2017, and submit monitoring plan in July 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 µg/L, respectively).

Smartville Water Treatment Plant

System Description

The raw water intake location for Smartville WTP is located on the Meade Canal. At the end of 2010, the primary raw water location for Smartville WTP was changed to the Meade Canal in order to provide higher source water quality. Smartville WTP is a conventional water treatment plant, and the plant design flow is 0.085 mgd, with average flows at 0.037 mgd.

Clarion and soda ash are used as the primary coagulants and pH buffer, and the influent water is mixed with an inline static mixer. The coagulated water goes to an enclosed flocculation basin with a detention time of 13.5 minutes, and then to a sedimentation basin with a detention time of 78 minutes. The clarified water is then filtered through two dual media pressure filters. The filter loading rate is 1.5 gpm/sf.

The filters are typically backwashed based on time or turbidity. Backwash water is sent to a decant pond and then to an irrigation canal downstream of the plant. The plant has filter to waste capability after backwash, normally for 10 to 15 minutes. The filtered water is disinfected with a mixed oxidant solution that is generated onsite then is stored in an 80,000-gallon chlorine contact tank to meet CT requirements. The average residual leaving the plant is 0.5 to 1.0 mg/L.

Highlight of Changes Since 2012 Update

During the study period the effluent flow meter was replaced.

Significant Potential Contaminating Activities

The Smartville WTP is fed by the Meade Canal. This is fed by the China Union Canal, which diverts off of Squirrel Creek. Water from Deer Creek is fed into Squirrel Creek via the Tunnel Canal. Deer Creek passes through Scotts Flat reservoir where summer recreational use is quite high. Deer Creek then flows through parts of Nevada City and Grass Valley where there is urban runoff and the potential for wastewater collection system spills. The City of Nevada City Wastewater Treatment Plant also discharges to Deer Creek within the watershed. Highways 20 and 49 cross the creek, as well as many other local roads, which could be a source of spills. Squirrel Creek also passes through Penn Valley where there is extensive small ranch grazing, perched septic systems, a mobile home park with wastewater ponds. As described in **Section 3**, there is also a popular swimming hole in Western Gateway Park. The canals pass through low-density residential areas as well as some cattle grazing.

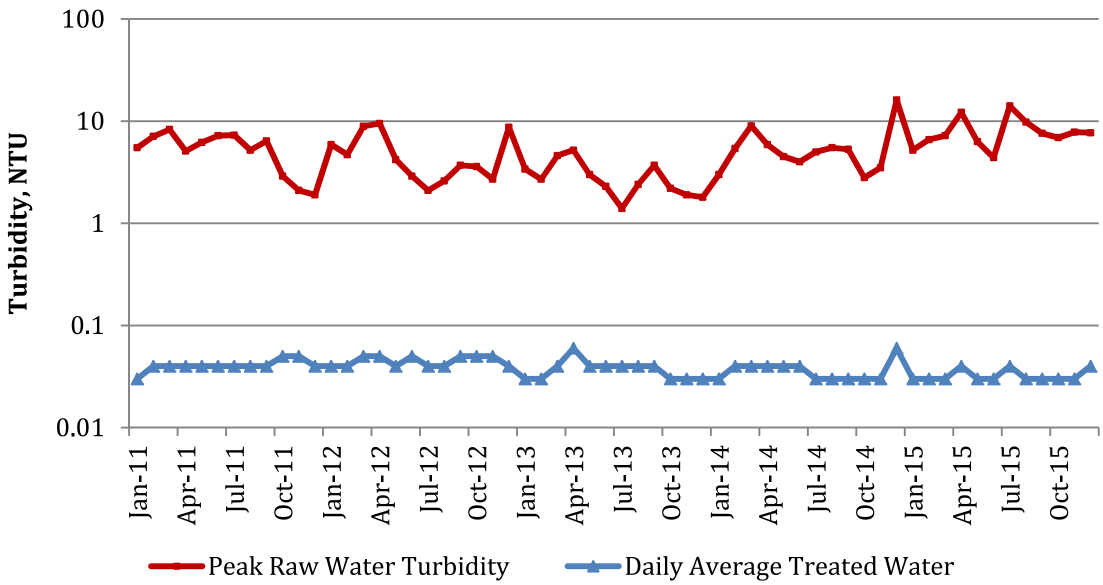
Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average raw water turbidity at Smartville WTP for the period of study was 5.4 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average removal of solids of 99.2 percent. **Figure 5-35** shows a timeseries plot of raw and treated turbidities. Smartville WTP meets all current turbidity standards. It should be noted that the raw water turbidity is the maximum peak daily, provided as a monthly average. The treated water turbidities are a monthly average of a daily average, which is based on samples taken every four hours in a 24 hour period.

Figure 5-35
Smartville WTP – Raw and Treated Water Turbidity, 2011-2015



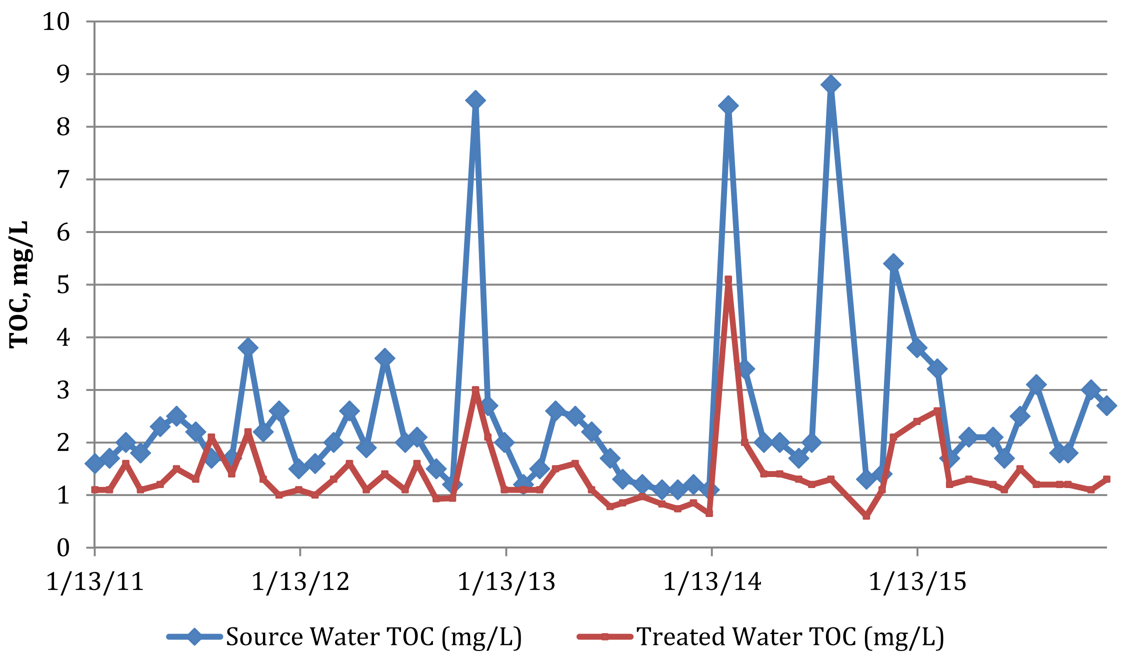
Microbiological Constituent

There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products

NID monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water monthly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Smartville WTP were 2.4 mg/L and 1.4 mg/L, respectively, equating to 37.4 percent average removal. Since Smartville WTP has source water with a TOC RAA greater than 2.0 mg/L, TOC removal calculation is required. Based on the monthly alkalinity and TOC levels in the raw water, Smartville WTP needs to achieve 25 to 45 percent TOC removal, depending on source water alkalinity. Although there were five months (August 2012, December 2012, February 2014, February 2015, March 2015) in which the TOC removal ratio was less than 1.0, Smartville WTP remains in compliance with the TOC treatment technique as the RAA TOC removal ratio greater than 1.0 was achieved. (August 2012 and March 2015 could have been credited a 1.0 ratio as source water TOC was less than 2.0 mg/L). **Figure 5-36** shows a timeseries plot of raw and treated water TOC at Smartville WTP. TOC levels in the raw water show an increase in the winter and spring, with the lowest levels during the summer and early fall. The highest recorded level was 8.8 mg/L in August 2014.

Figure 5-36
Smartville WTP, Total Organic Carbon, 2011-2015



Stage 2 D/DBP Rule Compliance Period

NID converted to one Stage 2 D/DBP Rule monitoring sites for the Smartville distribution system in January 2011. TTHM LRAAs from January 2011 to December 2015 ranged from 27 to 61.8 µg/L. All LRAAs were below the primary MCL of 80 µg/L. HAA5 LRAAs ranged from 20 to 46.8 µg/L, and all LRAAs were well below the primary MCL of 60 µg/L. One individual HAA sample was measured at 72 µg/L, over the HAA MCL of 60 µg/L, which occurred in the 1st quarter of 2015.

<u>Other Detectable Title 22 Constituents of Interest</u>

Lead and copper was detected in the distribution system in 2013. However, the copper 90th percentile was always below the Action Level of 1.3 mg/L and the lead 90th percentile was always below the Action Level of 15 µg/L. None of the five samples exceeded either the lead or copper Action Level.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data presented in **Section 3**, 4/5-log reduction of *Giardia*/virus continues to be appropriate reduction requirements for the Smartville WTP under the SWTR. Under the initial round of source water monitoring as part of the LT2ESWTR, Smartville WTP was designated as Bin 1 and requires 2-log reduction of *Cryptosporidium*.

The Smartville WTP is classified as a conventional filtration WTP, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 1.5-log credit for *Giardia* and 3.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Long Term 1 ESWTR, and the LT2ESWTR.

As a Schedule 4 WTP, the Smartville WTP will begin *E. coli* monitoring for the second round of LT2ESWTR in October 2017. The Smartville WTP is currently classified under Bin 1.

Regulatory Compliance Evaluation

NID has been monitoring the raw and treated water for the Smartville WTP for all required Title 22 compliance constituents. **Table 5-24** lists the existing drinking water regulations and a compliance evaluation for these standards at the Smartville WTP. The Smartville WTP is currently in compliance with existing regulations.

Table 5-24
Regulatory Compliance Evaluation
Nevada Irrigation District – Smartville WTP

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	No MCLs exceeded based on review of the CCRs.
SWTR	Microbial and Turbidity	Data continue to support 4/5—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Long Term 1 ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met for combined filter effluent and individual filter effluent. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBPR	Disinfectants and Disinfection By-Products	TOC > 2.0 mg/L in raw and treated water. Meeting TOC removal requirement. Began Stage 2 D/DBPR monitoring in January 2011.
Long Term 2 ESWTR	Microbial	Will begin second round of *Cryptosporidium* monitoring in October 2017. Currently classified as Bin 1.
Stage 2 D/DBPR	Disinfectants and Disinfection By-Products	TTHM/HAA5 LRAAs for Stage 2 are below drinking water standards (<80/60 μg/L, respectively).

This section consists of a discussion of the key findings for this 2017 Update and a list of recommendations. Significant changes over the past five years are summarized at the beginning of this section.

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

SIGNIFICANT CHANGES SINCE THE 2012 UPDATE

During the past five years, new information has been generated that was used to evaluate source water quality, treatment capabilities, and potential contaminating activities. This new information, which is summarized below, was obtained and evaluated for this 2017 Update.

- Many of the water treatment plants underwent upgrades and minor modifications, some key changes included:
  - Filter upgrades at the Alta Water Treatment Plant (WTP).
  - Conversion to sodium hypochlorite at the Bowman WTP.
  - Conversion to sodium hypochlorite at the Foothill 1/2 WTPs.
  - Replacement of filter media and underdrain at the Foothill 2 WTP.
  - Replacement of filter media at the Sunset WTP.
  - Completion of the Banner Cascade Pipeline to serve the Cascade Shores, Elizabeth George, and Loma Rica WTPs.
  - Conversion to sodium hypochlorite at the Loma Rica WTP.
  - Replacement of filter media on filters 3 and 4 at the Lake Wildwood WTP.
  - Partial completion of Magnolia III canal encasement to serve the Lake of the Pines WTP.
  - Conversion to sodium hypochlorite at the Lake of the Pines WTP.
  - Conversion to sodium hypochlorite and improvements to the upflow clarifier at the North Auburn WTP.

- There was one ambient monitoring program collecting data in the watershed during the study period. Additional monitoring data along Squirrel Creek continues to show elevated levels of *Escherichia coli* (*E. coli*) and indicates that there are sources of fecal contamination upstream of Penn Valley that may be contributing.

- Generally during the study period, 2011 through 2015, the source water turbidity levels remained similar or slightly lower than in the last study period. The same peaking trend during storm events was evident. Nevada Irrigation District (NID) has a more vigilant operating procedure to avoid diverting water during peak storm turbidities.

- *E. coli* monthly medians remained at similar levels seen previously, with only the Smartville WTP having consistently elevated source water levels. The raw water data for the Smartville WTP continue to indicate that there appears to be a source of fecal contamination between Deer Creek and the plant, which warrants further consideration.

- Many of the WTPs total organic carbon (TOC) levels appear to be increasing in the raw and treated water. There is no clear cause of this, but it could be related to drought effects and algae proliferation.

- Several distribution systems saw increasing trends in disinfection by-product (DBP) levels during the study period. An evaluation of source water temperatures indicates that temperatures were higher at NID WTPs and could be contributing to increased total trihalomethane (TTHM) levels. Other factors, such as pH, TOC, and water age could also be contributing to the increase in DBP levels.

- Both Placer County Water Agency (PCWA) and NID continue to implement National Pollutant Discharge Elimination System (NPDES) permits for canal aquatic herbicide application activities and implement actions to protect the water treatment plant diversions. The most commonly used herbicides in the canal are copper-based products.

- Donner Summit and Cascade Shores Wastewater Treatment Plants (WWTPs) both indicate that they will significantly reduce, or eliminate, waste discharge over the next five years.

- Outdoor cannabis cultivation has grown exponentially in the watershed during the study period. Each county has independent ordinances and regulations to manage the potential impacts from outdoor cultivation. Statewide regulations related to medical and recreational marijuana use are currently in development, so more changes are expected in the next five year period.

KEY FINDINGS AND CONCLUSIONS

The key findings and conclusions for this report are organized as they pertain to source water quality, treatment and regulatory compliance, and watershed contaminant sources. Highlights of these findings and conclusions are presented below.

Raw Water Quality for the Yuba/Bear River

Overall, the Yuba/Bear River provides excellent quality water. The raw water can be treated to meet all drinking water standards using conventional treatment processes. No persistently present constituents that require additional treatment processes have been identified in the raw water. Key findings for the constituents of interest are presented below.

Turbidity

- The median raw water turbidity ranges from 1.2 nephelometric turbidity units (NTU) at the Cascade Shores WTP to 8.4 NTU at the North Auburn WTP.

- Generally, the raw water turbidity for the Alta, Monte Vista, Cascade Shores, Loma Rica, Elizabeth George, and Sunset WTPs stays below 10 NTU. During the reporting period, the remainder of the WTPs occasionally frequented above 10 NTU. North Auburn WTP had the most months where raw water monthly averages were above 10 NTU, for 22 months out of 60 months, likely caused by conditions in the local watershed and reservoir.

- Completion of the Banner Cascade Pipeline by NID in June 2013 improved raw water turbidities for the Elizabeth George WTP.

- Rollins Reservoir can fill with turbid waters during the wet season. This results in higher turbidities at WTPs located downstream of Rollins Reservoir, when turbid waters are released from Rollins Reservoir during the winter and spring.

Microbiological Constituents

- The median *E. coli* values range from 2 most probable number per 100 milliliters (MPN/100mL) at Cascade Shores WTP to 52 MPN/100mL at the Smartville WTP.

- *E. coli* levels for the Banner Cascade Pipeline WTPs have been reduced since completion of the pipeline. There is a slight increase at the downstream WTPs.

- *E. coli* levels increase downstream for the Boardman Canal WTPs and the Deer Creek WTPs. There is no clear trend in the data for the WTPs downstream of Rollins Reservoir. These trends are similar to the Second and 2012 Updates.

- All of the WTPs, except for Smartville, can continue with their current level of treatment of 3/4-log reduction for *Giardia* and viruses under the Surface Water Treatment Rule (SWTR). The Smartville WTP is currently operated to achieve 4/5-log reduction for *Giardia* and viruses, and should continue.

- Since the Sunset WTP had more than six *E. coli* monthly medians greater than 200 MPN/100mL, a closer examination of its monthly medians was conducted. The majority of months with higher median levels the Sunset WTP was not in operation. Peak levels can be associated with precipitation, but there are periods when they are not so there are likely other sources contributing *E. coli*.

- Higher *E. coli* levels at the Lake of the Pines WTP are often related to precipitation events and also ranch land along Magnolia III canal where cattle have been observed. Partial encasement of the Magnolia III canal has resulted in a reduction in the frequency and magnitude of peak *E. coli* levels at the Alexis Drive monitoring site.

- The data supports the possible Bin 1 classification of *Cryptosporidium* (2-log reduction) under the Long Term 2 Enhanced SWTR (LT2ESWTR) for the Auburn, Bowman, Foothill, and Sunset WTPs.

Disinfection By-Product Precursors

- Average TOC levels for all WTPs range from 1.2 milligrams per liter (mg/L) at Lake Wildwood and Foothill 1 WTPs to 2.4 mg/L at Smartville WTP.

- TOC levels did not increase consistently downstream for similar groupings of WTPs.

- Smartville WTP has the highest TOC levels, likely due to exposure to a natural watercourse (Squirrel Creek).

- TOC levels are seasonally variable, with the peak levels typically occurring during the wet season (late fall to early spring).

- NID WTPs showed a stronger increasing trend in temperature through the reporting period.

- Temperature plays a role in DBP formation; however it is evident that other factors are also impacting formation (water age, pH, and TOC).

- TTHM formation seems more related to temperature in NID systems compared to PCWA. This could be due to better preservation of colder temperatures in winter at NID WTPs, compared to PCWA WTPs.

- Overall, haloacetic acid (HAA5) formation is less correlated to temperature than TTHM formation.

Individual Intake Evaluations

All of the water treatment plants are currently in compliance with all existing drinking water regulations. PCWA and NID implement various types of treatment processes, depending on facility size and source water quality, and meet all current drinking water standards, including maximum contaminant levels (MCLs) and treatment technology requirements. Below is a summary of the selected treatment and regulatory compliance issues.

Turbidity

All treated water turbidity standards were met at all of the water treatment plants. The average raw water turbidity at the water treatment plants varies from 1.5 NTU at Cascade Shores WTP to 10.8 NTU at North Auburn WTP; while the average treated water turbidity varies from 0.02 NTU at Bowman and Sunset WTPs to 0.06 NTU at Colfax WTP. Overall, each of the water treatment plants achieves large amounts of solids removal with overall reductions varying from 97.9 to 99.6 percent removal.

Microbiological Constituents

All treated water coliform standards were met in each of the distribution systems, with the exception of September 2015 in the North Auburn system. There were a few occasions of total coliform positive results, but no others resulted in fecal coliform detects or violations of the Total Coliform Rule.

Disinfection By-Products

All of the water treatment plants, except the Smartville WTP, met the alternative compliance criterion for enhanced coagulation by having raw or treated water TOC levels less than 2 mg/L. Smartville WTP is required to calculate TOC removal and has met the reduction requirements through the study period.

The treated water Stage 1 Disinfectants/Disinfection By-Product Rule (D/DBPR) standards were met in each of the distribution systems. All of the water treatment plants have DBP running annual average (RAA) levels below the primary MCLs, 80 and 60 ug/L, for TTHMs and HAA5 respectively. There is also seasonality in the levels of DBPs, but it is variable at each water treatment plant depending on source water quality, treatment, and distribution system operations.

The treated water Stage 2 D/DBPR standards were also met in each of the distribution systems. All of the water treatment plants have DBP locational RAA (LRAA) levels below the primary MCLs, 80 and 60 ug/L, for TTHMs and HAA5 respectively. PCWA was required to conduct Operational Evaluations under the Stage 2 D/DBPR for the Applegate and Bowman distribution systems based on triggers in 2014 and 2015, respectively.

Of note were the increasing levels of TTHMs for many of the water treatment plants during the study period, some of the individual samples exceeded the MCL of 80 µg/L. PCWA and NID addressed the problem by altering disinfection practices at the water treatment plants, installing tank mixers, and optimizing distribution system operations.

Other Detectable Title 22 Constituents of Interest

There were minor detections of lead and copper in the distribution system for several of the systems, but none of the 90th percentile values exceeded the respective Action Levels. Bowman WTP had detectable levels of manganese and Lake of the Pines WTP had detectable levels of aluminum. The Alta and Colfax WTPs have had low level detections, well below the MCL, of total xylenes in the treated water due to clearwell tank coatings.

Other Detectable Unregulated Constituents

PCWA sampled four of its WTPs (Bowman, Auburn, Foothill 1/Foothill 2, and Sunset) and NID sampled two of its WTPs (Elizabeth George and Loma Rica) for unregulated constituents under the Unregulated Contaminant Monitoring Rule. Most constituents were non-detectable. There were low level detects, well below human health advisory levels, of hexavalent chromium, vanadium, strontium, and chlorate.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the total and fecal coliform data presented in **Section 3**, 3/4-log reduction of *Giardia*/virus appears to continue to be appropriate reduction requirements for all of the water treatment plants, except the Smartville WTP. Smartville WTP has historically provided 4/5-log reduction and should continue to do so based on source water quality and the potential influence of upstream contaminating activities.

Based on the bin classification process for the LT2ESWTR all the water treatment plants were classified as Bin 1, requiring 2-log reduction of *Cryptosporidium*, except Bowman and Lake Wildwood WTPs. They were classified as Bin 2 and are each required to implement an additional 1-log action.

The water treatment plants implement either conventional or direct filtration to receive reduction credit for *Giardia*, viruses, and *Cryptosporidium* for physical removal. Disinfection with free chlorine provides the remaining credit for *Giardia* and viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and either the Interim Enhanced SWTR (IESWTR) or the Long Term 1 ESWTR.

Watershed Contaminant Sources

There are numerous types of potential contaminating activities in the watershed. Seven activities were selected for evaluation in this report based on constituents of interest and predominance in the watershed. Selected findings for each of these activities are provided below.

Canal Aquatic Herbicide Use

Although there is limited pesticide application in the Yuba/Bear River watershed, it has the potential to be significant in terms of source water quality due to the regulation of most pesticides in drinking water and its proximity of use to the water treatment plants. This evaluation focused on the seasonal algae control programs implemented by PCWA and NID.

Many of the conveyance canals, as well as Rock Creek Reservoir, are owned and operated by Pacific Gas and Electric (PG&E). PG&E does not conduct any chemical treatment of algae or aquatic plants; they use manual methods such as drawdown and pressure washing.

PCWA and NID apply herbicides as needed, typically sometime between April and October, which are based on chemical control using herbicides. During the study period PCWA used Cutrine-Plus and Cutrine-Ultra (copper ethanolamine herbicide), Algimycin-PWF (copper chelated based algaecide/cyanobacteriocide), Phycomycin (sodium carbonate peroxyhydrate algaecide), Round Up Custom (glyphosate herbicide), and Reward (diquat herbicide). During the study period NID used Cutrine–Ultra and Cutrine Plus (copper ethanolamine herbicide), Aquamaster (glyphosate herbicide), Round Up Custom (glyphosate herbicide), Nautique (copper carbonate herbicide), Cascade (dipotassium salt of endothall herbicide), Green Clean Pro (sodium carbonate peroxyhydrate algaecide), Captain (copper ethylenediamine complex chelated copper herbicide), and Phycomycin (sodium carbonate peroxyhydrate algaecide). Both agencies have coverage under a General NPDES Permit from the State Water Resources Control Board (State Board) and are in strict accordance with the permit terms. Each has submitted an Aquatic Pesticide Application Plan (APAP). The agencies are careful not to apply the copper-based chemicals near the water treatment plant intakes and water treated with glyphosate or endothall is not diverted to the intakes.

A review of water quality from the PCWA and NID water treatment plants shows that there have been no detects of organics in the source water. Also, copper levels in the treated water are either non-detectable or well below the action level of 1.3 mg/L.

Livestock Grazing

Livestock in the Yuba/Bear River watershed primarily includes cattle and sheep and is a relatively small livestock population in the watershed, especially rangeland grazing cattle. Cattle are the livestock of more concern because they are a known host for *Cryptosporidium parvum*. Also, there are several areas in close proximity to the water treatment plants where the cattle grazing could be more significant, such as near the Auburn, Lake of the Pines, Lake Wildwood, and Smartville WTPs.

The total livestock population documented by the United States Department of Agriculture for Nevada County, including both rangeland and dairy cows, was just under 4,800 in 2012. This is an approximate 15 percent decrease over the five-year period from 2007 to 2012. There is only one active United States Forest Service (USFS) grazing allotment in the upper watershed. This is the Canyon Creek Allotment. The allotment covers land in the Canyon Creek and Texas/Fall Creek sub basins. The permit currently covers 65 head of cattle grazing during the summer, between July 16 and September 20, and is expected to be increased to 100. The USFS has plans to reopen another allotment in the watershed, the English Mountain allotment upstream of Jackson Meadows Reservoir. In addition, NID manages a grazing lease along the Bear River below Rollins Reservoir, the Luster Lease. Three areas of particular interest are private ownership in the Squirrel Creek watershed, along Magnolia III canal, and along the Ragsdale Random in Meadow Vista.

Rangeland research published during the study strongly supports the effectiveness of best management practices related to vegetated buffers and grazing intensity to reduce the impact on source water quality. The State Board plans to include grazing as part of its Statewide Federal Lands order.

A review of available *Cryptosporidium* data for the water treatment plants indicates that there are relatively low levels throughout the watershed and no consistent relationship on seasonal or geospatial trends. The impacts are expected to be highly localized.

Forest Activities

This study identified timber harvesting and wildfires as activities of significant interest. The USFS and the State Board agree that the most important source of pollution in the forests is the timber harvesting road system.

Timber harvesting can occur on both public and private lands and is regulated separately. Timber harvesting on federal lands is regulated by the USFS and by the California Department of Forestry and Fire Protection (CALFIRE) on state and private lands. There continues to be more timber harvest harvesting on state and private lands, compared with federal lands.

A review of the Nevada County Agricultural Commissioners annual crop report shows that harvesting operations were quite variable during the study period. This could be explained by the fact that most of the timber harvesting in the Yuba/Bear River watershed is by commercial growers, such as Sierra Pacific Industries, who have plans for rotational harvesting cycles and also implement salvage harvesting after wildfires.

Wildfires cause the loss of ground cover, the chemical transformation of soil, and the reduction in soil infiltration rates which all increase the likelihood of erosion and hydrophobic soils, contributing to increased solids in the receiving water and an increase in the turbidity of the raw water at the water treatment plants. There were only three fires greater than 20 acres in the upper watershed, all in the Bear River sub basin. The most significant was the Lowell Fire in 2015, but no water quality data was available to identify potential impacts.

A specific review of the turbidity and TOC data show that there are distinct seasonal peaks in both constituents during the wet winter months. It is possible that erosion from burned areas is contributing to those peaks.

Both NID and PCWA participate in the Cosumnes, American, Bear, Yuba Regional Integrated Water Master Planning effort. This includes applying for grant funding of a variety of projects, including source water protection efforts to reduce fuels and improve forest health.

Recreation

There is a large amount of recreation that occurs in the Yuba/Bear River watershed. Recreation occurs in each of the sub basins, at varying levels. Recreation includes body and non-body contact activities. Body contact recreation includes swimming, wading, and rafting and is allowed on all major reservoirs and river reaches in all sub basins. Non-body contact recreation includes camping, boating, off-highway vehicle (OHV) use, fishing, hiking, biking and winter activities such as snow play, skiing and snowmobiling.

Camping occurs in both formal campgrounds, nearly 50, and dispersed in the Tahoe National Forest. A review of user statistics for NID and PG&E shows that the annual use of their recreational facilities is also quite large and is likely to have associated impacts.

Some of the key day-use activities that occur in the watershed include hiking, OHV use, boating, fishing, cross-country skiing, and snowmobiling. The USFS completed the Travel Management Program to designate OHV roads and trails. Motorized Vehicle Use Maps have been developed for the forest. The USFS is now completing a similar process to designate roads and trails for over-snow vehicles (OSV) in the Forest.

PG&E allows access to most of its facilities for day-use including parts of the water supply system such as Deer Creek Forebay, Drum Forebay and Afterbay, Alta Forebay, Halsey Forebay and Afterbay, Rock Creek Reservoir, and Wise Forebay. Most of these are limited to on-shore fishing with limited parking available.

Day-use for the lower Bear River and Squirrel Creek does have significant use during the warm weather months of July, August, and September. Access to the Bear River is used at the Highway 174 and Dog Bar Road crossings and in the area of the Bear River Campground, as well as the adjacent landowners. There are sanitation facilities near the Bear River Campground, but not at any other of these areas. Squirrel Creek recreation is centered on the Western Gateway Regional Park in Penn Valley. There are sanitation facilities provided.

Recreation analysis by USFS, NID, and PG&E all indicate that activities will be expanded in the future and each agency is planning to upgrade or expand current recreational facilities.

Studies conducted by the Central Valley Regional Water Quality Control Board (Regional Board) support that there are distinct impacts on Squirrel Creek that may be attributed to by recreationalists. None of the water treatment plants show a peak in coliform levels during the peak recreational use period of June through August.

Source Water Spills

A hazardous material spill or leak into the river system could occur as a result of a vehicular traffic accident, railroad accident, pipeline leak or spill, wastewater treatment plant spill, or other incident. In the event of a leak or spill, timely notification is critical to ensure that the water treatment plant operators are provided with sufficient time and information to best respond to potential treatment concerns.

A review of the California Office of Emergency Services (Cal OES) Hazardous Materials Spill Reports revealed 28 incidents in the watershed. Most were small volume sewage or petroleum spills. In addition, there were two Category I Sanitary Sewer Overflows.

Both PCWA and NID have developed spill notification programs to ensure timely notification in the event that a spill threatens the source water quality for a water treatment plant. Both agencies are provided direct notification from their respective County OES in the event that a canal or receiving water is impacted. Both agencies also coordinate closely with PG&E regarding source water quality. NID receives direct notification from the City of Nevada City in the event of a wastewater spill from the wastewater treatment plant. Also, PCWA now has enhanced coordination with the California Highway Patrol and the California Department of Transportation due to spill event on Interstate 80 in December 2015.

Wastewater

There are three permitted NPDES wastewater treatment plants in the Yuba/Bear Watershed; Donner Summit Public Utilities District, Cascade Shores, and City of Nevada City. These are shown on the Watershed Map, **Figure 2-1**. Each of these facilities has a collection system associated with them that are also located within the watershed. In addition, parts of the City of Grass Valley and Nevada County Sanitation District collection systems are also located in the watershed.

The Donner Summit PUD facility is located in the upper watershed and provides full nitrification and denitrification. The Cascade Shores Wastewater Treatment Plant discharges to Gas Canyon Creek, which is a tributary to Greenhorn Creek and eventually discharges to Rollins Reservoir. The City of Nevada City Wastewater Treatment Plant discharges to Deer Creek, just west of Nevada City. Each of these facilities had minor violations during the study period, but generally discharge in compliance with their NPDES permits.

In addition, although there are numerous land discharge systems and individual on-site septic systems located in the watershed there is only one land discharge facility of interest due to its proximity to Squirrel Creek. This is the Creekside Village Mobile Home Park (MHP). The Creekside Village MHP uses their evaporative percolation ponds located on the north side of Squirrel Creek. The current WDR is outdated and needs to be replaced by a new General Order from the State Board. There is no receiving water monitoring required under the permit from the Regional Board. It is possible that the pond system could be impacting the source water quality of Squirrel Creek. Data for the Smartville WTP show that the peak *E. coli* levels occur in the spring months, when the water table would be at its highest from winter rain recharge.

Urban Runoff

There is limited urbanization of the watershed upstream of the WTPs. Small cities and urban areas are regulated under the Phase II Stormwater Program. Under the Phase II Stormwater Program, Stormwater Management Plans (SWMP) were implemented with specific best management practices (BMPs) to minimize pollution, including implementation of treatment BMPs in new development. Monitoring was not required for any Phase II permittees in the Yuba/Bear River watershed.

There is one NPDES Stormwater Phase I permit; the Statewide California Department of Transportation (Caltrans). There are three Phase II permits; the cities of Grass Valley and Auburn and Placer County/North Auburn. An inventory of the Construction Stormwater Program resulted in identification of 10 sites. An inventory was conducted to identify the Industrial Stormwater Permittees in the watershed, resulting in eight permits. There was limited ambient monitoring data conducted by these programs.

Mining

Mining has occurred in the Yuba/Bear River watershed for over 150 years. The intensity of use has decreased remarkably over that time, so that mining is now a relatively minimal activity. There have been no detections at levels of concern for constituents specific to mining at the WTPs. Mining occurs on both public and private lands for both metallic and non-metallic ores. Currently, there are four active surface mines, which quarry for sand, rock and stone.

A review of the US Bureau of Land Management (USBLM) LR2000 Database was conducted to identify mining patents and mining claims. There are no authorized mineral patents in the watershed, however there are several pending applications for gold (but there has been no activity on these in over 20 years). There are no active or pending mining claims either in the watershed counties. One gold claim was patented in Nevada County in 1992, but it was not authorized to mine. There is one approved millsite, the Hansen Bros. surface mine in Nevada County. The Lava Cap Mine is an active Superfund Site where management continues. The mine has been capped and discharge will be treated by 2019.

Cannabis Cultivation

Outdoor cannabis cultivation has grown exponentially in the watershed during the study period. Only personal medical cultivation is legal on private property, however there are significant illegal grow operations throughout the watershed. Outdoor cultivation has the potential to impact source water quality since the grow sites typically result in erosion, use of fertilizers and pesticides, and collection of trash. The outdoor cultivation period is typically April through October.

Cannabis cultivation is regulated differently in the three watershed counties, but all three ban commercial grow activities. The counties and cities are in the midst of developing ordinances and regulations and appear to be moving toward more restrictive cultivation requirements.

RECOMMENDATIONS

Table 6-1 presents the recommendations developed for this 2017 Update, listed by subject area and not by priority. Development of recommendations for watershed management actions that are economically feasible and within the authority of the participating water agencies is critical. Recommendations will be implemented by the participating water agencies as they have resources available.

TABLE 6-1
2017 Update Recommendations

Water Quality and Treatment

Recommendation	Agency Impacted	Basis for Recommendation
Continue to optimize treatment during times of potentially reduced source water quality – i.e. adjust coagulant dose, optimize polymers, reduce flow if possible to increase hydraulic detention times and reduce filtration loading rates, ensure optimized disinfection practices and contact time (CT).	PCWA and NID	Based on historical treatment challenges posed by source water quality, optimization is most likely to be important during storm events or during other high turbidity periods.
Continue to optimize disinfection treatment during higher temperature periods to minimize DBP formation. Consider effects of water age on DBP formation. Consider assessing distribution system management practices which may affect detention time and optimize to prevent formation of DBPs. This could include; installation of tank mixers, increased flushing at dead ends, correlating water production more closely during transitional demand periods (i.e. fall), and optimize storage volume in the tanks seasonally.	PCWA and NID	DBP levels in the distribution system have the potential to increase to levels of regulatory concern so preventing further development is critical. Disinfection optimization during times of high temperature source water is important. Minimizing water age at all times is another important strategy to keep DBP levels low.
Request laboratories notify agency when source water *E. coli* in plant influent result is greater than 200 MPN/100mL. Evaluate the need to resample next day and documentation of potential causes of high result (if any evident).	PCWA and NID	The microbial data collected through the study period supports 3/4-log reduction of *Giardia* and viruses at all the WTPs, except Smartville. However, there were some unusual data results which should be assessed if they are repeated. These response procedures could enhance understanding of the source water quality.

TABLE 6-1 Cont'd
2017 Update Recommendations

Recommendation	Agency Impacted	Basis for Recommendation
Continue to meet enhanced treated water turbidity limits to achieve 1-log action credit at the Bowman and Lake Wildwood WTPs in accordance with Round 1 bin classifications of the LT2ESWTR.	PCWA and NID	This regulatory requirement is met by superior treated water quality turbidity.
Conduct and complete Round 2 of LT2ESWTR source water monitoring and update bin classifications and treatment requirements based on results.	PCWA and NID	This regulatory requirement will provide key information on source water quality related to protozoa. Use of EPA Method 1623 will provide quantification of *Giardia* as well. This information will verify the appropriate level of treatment currently based on surrogate data. Detailed lab results will assist in interpreting the data.
Confirm levels and investigate potential sources of *E. coli* at Sunset WTP.	PCWA	During the study period there was an increased frequency of *E. coli* seen at the influent of the Sunset WTP, during various times of the year. PCWA expanded its monitoring in December 2016 to confirm levels and identify areas of potential contaminant sources.
Continue canal protections for Magnolia III canal to Robles Drive to protect source water quality.	NID	The voluntary encasement of a portion of the Magnolia III canal resulted in reduced peaks and frequency of high coliform results and continuation of encasement is expected to result in more protection of source water quality at the Lake of the Pines WTP.
Continue canal protections upstream of Smartville WTP to protect source water quality.	NID	The voluntary encasement of the Cascade and Magnolia III canals shows improvement in source water quality at the downstream water treatment plants. Canal protections upstream of Smartville WTP are likely to result in source water quality improvement.

TABLE 6-1 Cont'd
2017 Update Recommendations

Watershed Contaminant Sources

Recommendation	Agency Impacted	Basis for Recommendation
Consider conducting an assessment of algae conditions at Rock Creek Reservoir to evaluate potential impacts on source water quality (i.e. organic carbon, coliform, blue-green algae presence).	PCWA and NID	During the study period there were increased occurrence of algae associated water quality impacts at North Auburn, Foothill, and Sunset WTPs. Increased presence, and future drinking water regulation, of blue-green algae in Northern California leads to potential concern for the reservoir.
Consider enhancing coordination and communication with PG&E to include results of algae assessment results and investigate the need for an algae assessment and management plan at Rock Creek Reservoir.	PCWA and NID	PG&E does not implement a comprehensive algae management plan for Rock Creek Reservoir. If assessments identify impacts to drinking water quality, consider working with PG&E to minimize risks to public health.
Continue to use the Cosumnes, American, Bear, and Yuba Rivers Integrated Regional Water Management Plan as a vehicle for grant funding of projects related to water quality. Consider submitting application for grant funding of source water protection projects such as public education along the canals, pet waste management stations along the canals, and canal fencing through vulnerable areas.	PCWA and NID	The impact of local activities is apparent in the source water quality. Implementing source water protection projects along the canals in close proximity to the water treatment plants will be more likely to impact source water quality.
Consider submitting a letter to watershed counties and USFS to identify source water quality impact concern over outdoor cannabis cultivation (i.e. clear cutting, grading, fertilizer and pesticide use, illegal dumping).	PCWA and NID	Outdoor cannabis cultivation, both personal and commercial, often results in conditions that may deteriorate source water quality. As counties are developing regulations related to cultivation it would be timely to provide input on the potential concerns related to drinking water impacts.

TABLE 6-1 Cont'd
2017 Update Recommendations

Recommendation	Agency Impacted	Basis for Recommendation
Consider outreach to the Regional Board to encourage update of the Waste Discharge Requirements for the Creekside Mobile Home Park Waste Ponds to prevent water quality impacts to Squirrel Creek, upstream of the Smartville WTP. Also, consider coordinating with the Regional Board to confirm the use of Squirrel Creek as existing conveyance for MUN supply and applicable beneficial use protections.	NID	Sampling by NID and other ambient programs has confirmed that there is degradation in the microbial quality of the source water for the Smartville WTP through the Penn Valley area. There are numerous sources that are potentially contributing (grazing, recreation, wastewater) so assessment and protection strategies would need to be multi-pronged. Coordination with Regional Board will ensure that they are protecting the source water.
Consider annual outreach to City of Grass Valley and Nevada County Sanitation District regarding notification of significant sanitary sewer overflows to the water supply system (Deer Creek, Squirrel Creek).	NID	Early notification in the event of a sewage or other hazardous material spill will ensure protection of public health. Some agencies may not be aware of which water conveyances are used for drinking water supply.

APPENDIX A
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- Dan Dottai. Placer County Engineering Department. ddottai@placer.ca.gov. Personal communication.
- George Rofasco. Placer County Planning Department. (530) 745 – 3065. Personal communication.
- Todd Smith. Nevada County Community Development. (530) 265 – 1257. Personal communication.
- Rick Weaver. US Forest Service. (530) 265 – 4531. Personal Communication.
- Bruni Davila. Remedial Project Manager, USEPA Region 9. (415) 972-3162. davila.brunilda@epa.gov. Personal communication.
- USEPA. Lava Cap Mine Superfund Website: https://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/7508188dd3c99a2a8825742600743735/7f29f3b3740158ca88257007005e944f!OpenDocument
- Placer County Sheriff Marijuana Eradication Team: http://www.placer.ca.gov/departments/sheriff/unitsanddivisions/specialoperations
- Placer County Board of Supervisors Marijuana Notices: https://www.placer.ca.gov/news/2016/jun/supervisors-limit-medical-marijuana
- California Department of Public Health Medical Marijuana Program: http://www.cdph.ca.gov/programs/MMP/Pages/default.aspx
- California Bureau of Medical Cannabis Regulation: http://www.bmcr.ca.gov/about_us/faq.shtml

- California Department of Food and Agriculture, CalCannabis Cultivation Licensing: https://www.cdfa.ca.gov/is/mccp/
- State Water Resources Control Board. Cannabis Cultivation Regulatory and Enforcement Unit: http://www.waterboards.ca.gov/water_issues/programs/enforcement/cannabis_enforcement.shtml
- Central Valley Regional Water Quality Control Board. Cannabis Cultivation Waste Discharge Regulatory Program. http://www.waterboards.ca.gov/centralvalley/water_issues/cannabis/index.shtml
- Captain Joe Cook. US Forest Service. (530) 478 – 6131. Personal communication.
- Detective Mike Fisher. Sierra County Sheriff. (530) 289 – 3700. Personal communication.
- Central Valley Regional Water Quality Control Board NPDES Order No. R5-2015-0113. Waste Discharges Associated with Medical Cannabis Cultivation Activities.
- California Proposition 64 (2016).
- Placer County Code Chapter 8.10 – Medical Marijuana Regulations.
- Placer County Ordinance 5851-B.
- Nevada County Code Title 2, Chapter 4, Article 5 – Marijuana Cultivation.
- Nevada County Ordinance 2416.
- Nevada County Sheriff Office Marijuana Website: https://marijuana.mynevadacounty.com/
- Sierra County Code Chapter 8.01 – Marijuana Cultivation.
- Sierra County Ordinances 1055, 1071 and 1073.
- Sierra County Measure B (2016).
- City of Grass Valley Development Code.
- City of Nevada City Municipal Code.

APPENDIX B
SUMMARIES OF PCWA AND NID DATA

Alta

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	3.98	0.059
Feb-11	5.04	0.066
Mar-11	5.81	0.07
Apr-11	5.01	0.064
May-11	4.21	0.048
Jun-11	3.43	0.05
Jul-11	2.38	0.046
Aug-11	1.85	0.04
Sep-11	1.87	0.044
Oct-11	3.71	0.051
Nov-11	2.27	0.042
Dec-11	2.3	0.043
Jan-12	4.12	0.04
Feb-12	2.75	0.04
Mar-12	5.1	0.05
Apr-12	4.98	0.05
May-12	2.83	0.04
Jun-12	3.21	0.04
Jul-12	2.3	0.04
Aug-12	3	0.04
Sep-12	3.53	0.05
Oct-12	3.31	0.05
Nov-12	4.93	0.04
Dec-12	5.1	0.05
Jan-13	3.15	0.05
Feb-13	3.75	0.045
Mar-13	4.44	0.05
Apr-13	3.93	0.05
May-13	3.71	0.05
Jun-13	3.63	0.045
Jul-13	3.16	0.05
Aug-13	3.41	0.05
Sep-13	3.5	0.05
Oct-13	3.18	0.04
Nov-13	3.59	0.04
Dec-13	2.98	0.04
Jan-14	3.96	0.04
Feb-14	6.33	0.046
Mar-14	9.5	0.04
Apr-14	4.37	0.04
May-14	2.54	0.04
Jun-14	2.24	0.04
Jul-14	2.5	0.04
Aug-14	3.2	0.04
Sep-14	4.57	0.05
Oct-14	3.33	0.05
Nov-14	3.13	0.04
Dec-14	4.69	0.04
Jan-15	2.51	0.05
Feb-15	4.8	0.04
Mar-15	3.61	0.04
Apr-15	4.8	0.04
May-15	4.36	0.046
Jun-15	3.96	0.04
Jul-15	2.4	0.04
Aug-15	2.86	0.045
Sep-15	4.5	0.05
Oct-15	4.86	0.04
Nov-15	4.92	0.05
Dec-15	6.3	0.04

min	1.85	0.04	
max	9.5	0.07	
average	3.8	0.05	98.81%
median	3.62	0.0445	
95th	5.8345	0.05925	

Monte Vista

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	3.99	0.056
Feb-11	2.54	0.055
Mar-11	5.47	0.054
Apr-11	5.9	0.048
May-11	7.17	0.048
Jun-11	6.46	0.042
Jul-11	6.85	0.042
Aug-11	7.19	0.041
Sep-11	5.28	0.05
Oct-11	6.25	0.05
Nov-11	4.54	0.038
Dec-11	3.29	0.037
Jan-12	6.02	0.04
Feb-12	3.3	0.04
Mar-12	8.58	0.05
Apr-12	5.87	0.05
May-12	4.46	0.05
Jun-12	3.95	0.05
Jul-12	2.7	0.05
Aug-12	4	0.05
Sep-12	2.83	0.05
Oct-12	4.54	0.04
Nov-12	5.18	0.04
Dec-12	5.8	0.04
Jan-13	1.83	0.04
Feb-13	1.38	0.03
Mar-13	3.2	0.03
Apr-13	3.71	0.04
May-13	4.4	0.04
Jun-13	4.9	0.05
Jul-13	4.38	0.05
Aug-13	4	0.05
Sep-13	2.7	0.05
Oct-13	3.66	0.04
Nov-13	2.6	0.04
Dec-13	1.7	0.03
Jan-14	1.54	0.032
Feb-14	5.56	0.03
Mar-14	3.61	0.03
Apr-14	3.33	0.036
May-14	3.06	0.03
Jun-14	3.8	0.04
Jul-14	2.2	0.04
Aug-14	2.48	0.04
Sep-14	2.95	0.04
Oct-14	3.7	0.05
Nov-14	3.14	0.03
Dec-14	5.1	0.03
Jan-15	2.06	0.03
Feb-15	4.75	0.033
Mar-15	2.87	0.03
Apr-15	3	0.03
May-15	5	0.03
Jun-15	4.23	0.04
Jul-15	3.2	0.05
Aug-15	2.9	0.05
Sep-15	3.55	0.056
Oct-15	3.6	0.042
Nov-15	4.03	0.04
Dec-15	5.44	0.033

min	1.38	0.03	
max	8.58	0.056	
average	4.10	0.04	98.99%
median	3.875	0.04	
95th	6.866	0.05405	

Colfax

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	3.19	0.052
Feb-11	4.23	0.05
Mar-11	14.9	0.06
Apr-11	8.15	0.054
May-11	9.75	0.056
Jun-11	6.7	0.048
Jul-11	17.6	0.049
Aug-11	17.9	0.05
Sep-11	8.91	0.049
Oct-11	11.86	0.05
Nov-11	5.52	0.054
Dec-11	2.4	0.053
Jan-12	3.8	0.06
Feb-12	1.95	0.06
Mar-12	7.51	0.06
Apr-12	9.13	0.06
May-12	6.48	0.06
Jun-12	7.82	0.06
Jul-12	7.87	0.06
Aug-12	8.65	0.06
Sep-12	6.95	0.06
Oct-12	11.39	0.06
Nov-12	8.2	0.06
Dec-12	7.6	0.06
Jan-13	2.21	0.06
Feb-13	1.8	0.06
Mar-13	3.49	0.06
Apr-13	6.15	0.06
May-13	6.64	0.06
Jun-13	11.7	0.06
Jul-13	12.4	0.06
Aug-13	9.47	0.06
Sep-13	5.9	0.06
Oct-13	7.58	0.06
Nov-13	3.92	0.06
Dec-13	1.7	0.06
Jan-14	1.75	0.06
Feb-14	6.25	0.057
Mar-14	5.2	0.06
Apr-14	3.3	0.06
May-14	5.47	0.06
Jun-14	9.79	0.05
Jul-14	7.78	0.06
Aug-14	6.85	0.06
Sep-14	5.53	0.06
Oct-14	8.75	0.05
Nov-14	10.35	0.06
Dec-14	9.09	0.06
Jan-15	2.63	0.05
Feb-15	3.78	0.055
Mar-15	3.13	0.052
Apr-15	4.5	0.06
May-15	3.9	0.054
Jun-15	6.15	0.05
Jul-15	6.8	0.05
Aug-15	7.6	0.05
Sep-15	7.1	0.05
Oct-15	8.9	0.06
Nov-15	4.63	0.06
Dec-15	4.55	0.063

min	1.7	0.048	
max	17.9	0.063	
average	6.92	0.06	99.18%
median	6.75	0.06	
95th	12.525	0.06	

Applegate

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	6.99	0.052
Feb-11	6.91	0.088
Mar-11	6.63	0.076
Apr-11	6.7	0.07
May-11	6.72	0.058
Jun-11	6.76	0.049
Jul-11	6.56	0.048
Aug-11	6.9	0.046
Sep-11	7.52	0.047
Oct-11	6.02	0.057
Nov-11	5.65	0.049
Dec-11	7.45	0.047
Jan-12	6.1	0.05
Feb-12	3.7	0.05
Mar-12	11.8	0.042
Apr-12	13.3	0.05
May-12	5.7	0.05
Jun-12	9.75	0.04
Jul-12	7.2	0.03
Aug-12	16.9	0.02
Sep-12	9.68	0.02
Oct-12	20.63	0.01
Nov-12	8.9	0.03
Dec-12	10.3	0.02
Jan-13	4.65	0.02
Feb-13	3.23	0.02
Mar-13	3.89	0.03
Apr-13	9.01	0.04
May-13	7.31	0.04
Jun-13	12.4	0.05
Jul-13	11.56	0.04
Aug-13	13.1	0.03
Sep-13	10.1	0.03
Oct-13	13.5	0.03
Nov-13	6.5	0.03
Dec-13	1.74	0.03
Jan-14	2.3	0.02
Feb-14	8.98	0.02
Mar-14	9.74	0.02
Apr-14	7.82	0.02
May-14	7.7	0.03
Jun-14	7.9	0.03
Jul-14	10.55	0.03
Aug-14	10.4	0.02
Sep-14	7.57	0.02
Oct-14	14.7	0.03
Nov-14	7.08	0.03
Dec-14	7.93	0.03
Jan-15	2.16	0.03
Feb-15	5.48	0.03
Mar-15	3.98	0.03
Apr-15	4	0.02
May-15	4.68	0.01
Jun-15	10.8	0.02
Jul-15	7.4	0.04
Aug-15	8.97	0.04
Sep-15	12.3	0.04
Oct-15	15.6	0.04
Nov-15	7.9	0.04
Dec-15	6.5	0.04

min	1.74	0.01	
max	20.63	0.088	
average	8.24	0.04	99.56%
median	7.485	0.03	
95th	14.745	0.0586	

Bowman

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	20.96	0.031
Feb-11	7.19	0.026
Mar-11	21.64	0.034
Apr-11	12.9	0.029
May-11	6.08	0.033
Jun-11	1.84	0.027
Jul-11	0.787	0.021
Aug-11	1.22	0.023
Sep-11	3.77	0.022
Oct-11	4.07	0.021
Nov-11	4.47	0.025
Dec-11	4.75	0.031
Jan-12	6.75	0.04
Feb-12	2.51	0.03
Mar-12	15.98	0.03
Apr-12	5.83	0.03
May-12	2.5	0.02
Jun-12	1	0.02
Jul-12	1.21	0.02
Aug-12	1.08	0.02
Sep-12	1.29	0.02
Oct-12	10.7	0.03
Nov-12	6.97	0.03
Dec-12	22.1	0.03
Jan-13	8.34	0.03
Feb-13	2.64	0.03
Mar-13	1.59	0.03
Apr-13	1.36	0.02
May-13	1.18	0.01
Jun-13	1.7	0.01
Jul-13	1.36	0.01
Aug-13	1.08	0.02
Sep-13	1.16	0.02
Oct-13	4.67	0.03
Nov-13	2.83	0.03
Dec-13	1.32	0.02
Jan-14	1.77	0.03
Feb-14	22.8	0.03
Mar-14	9.04	0.03
Apr-14	4.12	0.03
May-14	1.6	0.03
Jun-14	1.28	0.03
Jul-14	1.94	0.03
Aug-14	0.99	0.03
Sep-14	0.79	0.02
Oct-14	4.94	0.03
Nov-14	4.75	0.03
Dec-14	6.84	0.03
Jan-15	2.93	0.025
Feb-15	3.05	0.03
Mar-15	2.2	0.02
Apr-15	1.4	0.02
May-15	1.77	0.02
Jun-15	2.3	0.02
Jul-15	2.2	0.02
Aug-15	1.39	0.02
Sep-15	1.23	0.01
Oct-15	4.24	0.02
Nov-15	3	0.02
Dec-15	5.7	0.02

min	0.787	0.01	
max	22.8	0.04	
average	4.82	0.02	0.995
median	2.575	0.0265	
95th	20.994	0.0311	

Auburn

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	2.18	0.044
Feb-11	2.18	0.039
Mar-11	2.36	0.039
Apr-11	6.21	0.034
May-11	18.12	0.036
Jun-11	10.75	0.027
Jul-11	8.86	0.025
Aug-11	9.25	0.024
Sep-11	9.19	0.023
Oct-11	8.93	0.023
Nov-11	5.87	0.023
Dec-11	2.71	0.059
Jan-12		
Feb-12		
Mar-12		
Apr-12	6.8	0.03
May-12	8.1	0.03
Jun-12	10.5	0.03
Jul-12	8.3	0.03
Aug-12	8.7	0.03
Sep-12	8.03	0.02
Oct-12	9.3	0.03
Nov-12	7.96	0.03
Dec-12	8.8	0.03
Jan-13		
Feb-13	2.21	0.04
Mar-13	2.31	0.03
Apr-13	3.4	0.033
May-13	10.2	0.03
Jun-13	7.1	0.04
Jul-13	5.3	0.05
Aug-13	4.92	0.05
Sep-13	5.51	0.04
Oct-13	5.36	0.06
Nov-13	4.16	0.05
Dec-13	2.69	0.07
Jan-14		
Feb-14	1.87	0.04
Mar-14		
Apr-14		
May-14	4.72	0.04
Jun-14	4.4	0.04
Jul-14	5.36	0.04
Aug-14	6.4	0.04
Sep-14	5.84	0.04
Oct-14	7.2	0.05
Nov-14	12.4	0.05
Dec-14		
Jan-15		
Feb-15		
Mar-15		
Apr-15	11.06	0.023
May-15	5.37	0.03
Jun-15	5.6	0.03
Jul-15	7.37	0.03
Aug-15	9.63	0.03
Sep-15	8.79	0.02
Oct-15	6.78	0.02
Nov-15	6.2	0.03
Dec-15	4.3	0.04

min	1.87	0.02
max	18.12	0.07
average	6.73	0.04
median	6.4	0.03
95th	10.936	0.0554

Foothill 1-4

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	7.12	0.05
Feb-11	7.29	0.053
Mar-11	7.39	0.05
Apr-11	7.54	0.041
May-11	7.42	0.038
Jun-11	7.47	0.051
Jul-11	7.04	0.041
Aug-11	6.67	0.039
Sep-11	6.75	0.038
Oct-11	7.18	0.041
Nov-11	7.57	0.042
Dec-11	7.38	0.049
Jan-12	13	0.05
Feb-12	5.2	0.04
Mar-12	46.4	0.04
Apr-12	13.2	0.048
May-12	6.3	0.04
Jun-12	2.7	0.045
Jul-12	2.16	0.05
Aug-12	2.3	0.05
Sep-12	1.85	0.05
Oct-12	1.58	0.05
Nov-12	0.89	
Dec-12		
Jan-13		
Feb-13	2.4	0.04
Mar-13	2.34	0.04
Apr-13	2.39	0.04
May-13	1.97	0.04
Jun-13	2.1	0.04
Jul-13	1.95	0.045
Aug-13	1.79	0.04
Sep-13	1.53	0.04
Oct-13	1.42	0.03
Nov-13	1.88	0.03
Dec-13	2.5	0.03
Jan-14	1.94	0.03
Feb-14	16.4	0.04
Mar-14	6.3	0.04
Apr-14		
May-14	2.3	0.02
Jun-14	1.08	0.03
Jul-14	1.18	0.03
Aug-14	1.3	0.03
Sep-14	1.2	0.03
Oct-14	1.3	0.0345
Nov-14	4.8	
Dec-14	6.39	0.05
Jan-15	2.71	0.05
Feb-15	3.29	0.04
Mar-15	1.6	0.05
Apr-15	1.42	0.05
May-15	1.55	0.03
Jun-15	1.4	0.04
Jul-15	2.3	0.05
Aug-15	1.6	0.04
Sep-15	1.4	0.05
Oct-15	1.3	0.04
Nov-15		
Dec-15		

	min	0.89	0.02
	max	46.4	0.053
0.995	average	4.862364	0.041236
	median	2.34	0.04
	95th	13.06	0.05

Foothill 5-9

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	7.12	0.037
Feb-11	7.29	0.039
Mar-11	7.39	0.036
Apr-11	7.54	0.028
May-11	7.42	0.025
Jun-11	7.47	0.04
Jul-11	7.04	0.029
Aug-11	6.67	0.026
Sep-11	6.75	0.025
Oct-11	7.18	0.032
Nov-11	7.57	0.028
Dec-11	7.38	0.036
Jan-12	10.86	0.034
Feb-12	5.7	0.03
Mar-12	32.5	0.04
Apr-12	14.2	0.04
May-12	6.3	0.03
Jun-12	2.7	0.0353
Jul-12	2.16	0.04
Aug-12	2.3	0.04
Sep-12	1.85	0.04
Oct-12	1.3	0.04
Nov-12	0.89	0.03
Dec-12		
Jan-13		
Feb-13	3.2	0.03
Mar-13	2.34	0.03
Apr-13	2.39	0.03
May-13	1.97	0.03
Jun-13	2.1	0.03
Jul-13	1.95	0.037
Aug-13	1.79	0.03
Sep-13	1.53	0.04
Oct-13	1.42	0.034
Nov-13	5.7	0.03
Dec-13	2.5	0.03
Jan-14	1.94	0.03
Feb-14	16.4	0.04
Mar-14	10	0.04
Apr-14	4.1	0.04
May-14	2.3	0.03
Jun-14	1.08	0.03
Jul-14	1.18	0.04
Aug-14	1.3	0.03
Sep-14	1.2	0.03
Oct-14	1.2	0.0345
Nov-14	3.3	0.03
Dec-14	6.39	0.05
Jan-15	2.71	0.04
Feb-15	3.29	0.04
Mar-15	1.6	0.04
Apr-15	1.42	0.04
May-15	1.55	0.04
Jun-15	1.5	0.04
Jul-15	1.9	0.04
Aug-15	1.9	0.04
Sep-15	1.44	0.04
Oct-15	4.2	0.04
Nov-15	1.8	0.03
Dec-15	6.53	0.06

min	0.89	0.025
max	32.5	0.06
average	4.736207	0.035272
median	2.6	0.03565
95th	11.361	0.04

Foothill 15

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11	7.12	
Feb-11	7.29	
Mar-11	7.39	
Apr-11	7.54	
May-11	7.42	
Jun-11	7.47	0.07
Jul-11	7.04	0.035
Aug-11	6.67	0.029
Sep-11	6.75	0.034
Oct-11	7.18	0.034
Nov-11	7.57	0.03
Dec-11	7.38	0.04
Jan-12	8.36	0.033
Feb-12		
Mar-12	12.7	0.04
Apr-12	9.2	0.04
May-12	6.3	0.03
Jun-12	2.7	0.04
Jul-12	2.16	0.03
Aug-12	2.3	0.03
Sep-12	1.85	0.03
Oct-12	1.3	0.03
Nov-12	2.5	0.03
Dec-12	17.5	0.05
Jan-13	8.9	0.03
Feb-13		
Mar-13		
Apr-13	2.3	0.03
May-13	1.97	0.03
Jun-13	2.1	0.03
Jul-13	1.95	0.03
Aug-13	1.79	0.03
Sep-13	1.53	0.03
Oct-13	1.42	0.03
Nov-13	6.7	0.04
Dec-13		
Jan-14		
Feb-14		
Mar-14	6.3	0.03
Apr-14	4.6	0.03
May-14	2.3	0.03
Jun-14	1.08	0.03
Jul-14	1.18	0.03
Aug-14	1.3	0.03
Sep-14	1.2	0.03
Oct-14	1.2	0.03
Nov-14	2.3	0.03
Dec-14		
Jan-15		
Feb-15		
Mar-15		
Apr-15	1.42	0.04
May-15	1.55	0.04
Jun-15	1.3	0.03
Jul-15	1.9	0.03
Aug-15	1.9	0.03
Sep-15	1.44	0.03
Oct-15	4.2	0.03
Nov-15	3.2	0.03
Dec-15	1.9	0.03

min	1.08	0.029	
max	17.5	0.07	
average	4.45	0.03	0.993
median	2.4	0.03	
95th	9.065	0.04	

Sunset

Date	Average Raw Water Turbidity	Daily Average Treated Water
Jan-11		
Feb-11		
Mar-11		
Apr-11		
May-11		
Jun-11		
Jul-11	1.36	0.027
Aug-11	1.68	0.024
Sep-11	1.87	0.026
Oct-11	2.31	0.077
Nov-11		
Dec-11		
Jan-12		
Feb-12		
Mar-12		
Apr-12		
May-12		
Jun-12		
Jul-12	1.47	0.03
Aug-12	1.3	0.02
Sep-12	1.2	0.02
Oct-12	1.46	0.02
Nov-12		
Dec-12		
Jan-13		
Feb-13		
Mar-13		
Apr-13		
May-13		
Jun-13	2.03	0.03
Jul-13	2	0.02
Aug-13	1.34	0.02
Sep-13	1.66	0.02
Oct-13		
Nov-13		
Dec-13		
Jan-14		
Feb-14		
Mar-14		
Apr-14		
May-14	1.67	0.03
Jun-14	1.6	0.02
Jul-14	1.68	0.02
Aug-14	1.44	0.02
Sep-14		
Oct-14		
Nov-14		
Dec-14		
Jan-15		
Feb-15		
Mar-15		
Apr-15	1.7	0.025
May-15	1.34	0.02
Jun-15	1.46	0.02
Jul-15	1.66	0.02
Aug-15	1.71	0.02
Sep-15	1.67	0.02
Oct-15		
Nov-15		
Dec-15		

min	1.2	0.02	
max	2.31	0.077	
average	1.618636	0.024955	0.985
median	1.66	0.02	
95th	2.0285	0.03	

Alta

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/9/2011	23	0.6	0.4	26.8%
5/3/2011	23	0.5	0.4	27.8%
8/1/2011	17	1.2	0.7	38.3%
11/7/2011	23	1.5	0.8	47.3%
2/14/2012	21	1.5	0.92	38.7%
5/2/2012	24	0.7	0.43	38.6%
8/7/2012	21	1.3	0.8	38.5%
11/15/2012	26	0.97	0.74	23.7%
2/21/2013	22	1.2	0.9	29.2%
5/28/2013	24	1.6	1.3	18.8%
8/7/2013	21	1.4	0.9	37.9%
12/12/2013	27	1.2	0.9	25.8%
2/11/2014	22	2.0	1.1	45.0%
5/29/2014	20	1.4	0.9	35.0%
8/18/2014	24	1.3	0.9	32.3%
11/7/2014	28	1.5	1.0	34.0%
2/3/2015	25	1.6	1.2	25.0%
5/13/2015	24	1.7	1.3	23.5%
8/10/2015	25	1.5	1.0	33.3%
11/4/2015	29	2.2	1.4	36.4%

min	0.5		
max	2.2		
ave	1.3	0.9	32.8%
median	1.4		
95th	2.01		

Monte Vista

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/10/2011	43	0.5	0.4	22.6%
5/3/2011	34	0.5	0.4	25.9%
8/1/2011	19	1.7	0.8	52.9%
11/7/2011	25	1.2	0.8	31.7%
2/14/2012	30	1.3	0.9	30.8%
5/2/2012	38	0.9	0.6	37.5%
8/7/2012	29	1.2	1.0	16.7%
11/15/2012	29	1.0	0.7	27.6%
2/12/2013	38	0.7	0.0	100.0%
5/28/2013	29	1.2	0.9	27.5%
8/7/2013	22	1.4	1.3	7.1%
11/20/2013	28	1.6	1.1	31.3%
2/11/2014	34	2.0	1.2	40.0%
5/20/2014	29	1.5	1.0	33.3%
8/18/2014	28	1.7	1.2	29.4%
11/18/2014	28	1.6	1.0	37.5%
2/4/2015	33	1.3	1.2	7.7%
5/13/2015	28	1.8	1.3	27.8%
8/10/2015	26	1.6	1.2	25.0%
11/19/2015	29	1.5	1.1	26.7%

min	0.5		
max	2.0		
ave	1.3	0.9	31.9%
median	1.4		
95th	1.81		

Colfax

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/15/2011	39	1.1	0.7	37.3%
5/3/2011	30	0.6	0.4	35.5%
8/1/2011	18	1.1	1.2	-9.1%
11/7/2011	25	1.2	0.9	27.5%
2/14/2012	31	1.3	0.9	28.5%
5/2/2012	38	0.8	0.6	32.5%
8/7/2012	24	1.2	0.9	28.3%
11/8/2012	29	1.2	0.8	37.5%
2/21/2013	36	0.7	0.5	28.8%
5/8/2013	30	1.5	1.0	33.3%
8/7/2013	0	1.2	1.0	20.8%
12/12/2013	30	1.4	0.9	36.4%
2/11/2014	32	1.9	1.2	36.8%
5/28/2014	28	1.4	0.9	34.3%
9/17/2014	28	1.4	1.0	28.6%
11/18/2014	28	1.6	1.0	37.5%
2/3/2015	34	1.4	1.0	32.1%
5/14/2015	31	1.6	1.1	31.3%
8/10/2015	28	1.7	1.1	35.3%
11/5/2015	28	2.1	1.3	38.1%

min	0.6		
max	2.1		
ave	1.3	0.9	30.6%
median	1.4		
95th	1.91		

Applegate

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/16/11	36	2.0	1.4	30.0%
5/17/11	38	0.9	0.7	28.7%
8/2/11	20	1.0	0.8	21.0%
11/7/11	28	1.3	1.2	7.7%
2/14/12	32	1.5	1.3	13.3%
5/2/12	40	1.1	1.1	0.0%
8/8/12	26	1.3	1.1	15.4%
11/8/12	30	1.3	1.0	23.8%
2/26/13	39	0.9	0.7	17.8%
5/14/13	33	1.4	1.2	14.3%
8/8/13	35	1.4	1.2	14.3%
12/12/13	31	1.3	1.2	7.7%
2/11/14	28	2.5	2.0	20.0%
5/30/14	33	1.5	1.3	13.3%
9/17/14	29	1.5	1.3	13.3%
11/6/14	32	1.3	1.2	7.7%
2/3/15	36	1.8	1.3	27.8%
5/13/15	33	1.7	1.6	5.9%
8/10/15	28	1.6	1.4	12.5%
11/5/15	31	2.1	1.7	19.0%

min	0.9		
max	2.5		
ave	1.5	1.2	15.7%
median	1.4		
95th	2.12		

Bowman

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/10/2011	27	1.1	0.9	21.8%
5/12/2011	43	0.9	0.5	42.6%
8/23/2011	20	1.0	0.7	26.0%
11/8/2011	28	1.3	0.9	29.2%
2/15/2012	26	1.1	0.8	23.6%
5/17/2012	28	1.2	0.9	28.3%
8/14/2012	25	1.1	0.9	16.4%
11/29/2012	32	1.5	1.2	20.0%
2/14/2013	26	1.5	1.1	26.7%
5/22/2013	28	1.2	0.9	22.5%
8/27/2013	24	1.2	1.0	16.7%
11/13/2013	29	1.1	0.9	14.5%
2/13/14	29	1.2	0.9	24.2%
5/21/14	29	1.5	1.0	33.3%
8/6/14	28	1.5	1.2	20.0%
11/6/14	33	1.4	1.0	30.0%
2/5/15	31	1.5	1.1	26.7%
5/21/15	31	1.5	1.1	26.7%
8/13/15	31	1.4	1.0	28.6%
11/19/15	35	1.3	0.9	30.8%

min	0.9		
max	1.5		
ave	1.3	1.0	25.4%
median	1.3		
95th	1.5		

Auburn

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
1/12/2011	24	1.4	Plant Off	
2/10/2011	49	1.0	Plant Off	
3/16/2011	45	3.0	Plant Off	
4/26/2011	55	1.2	0.8	33.3%
5/12/2011	46	0.9	0.6	31.1%
6/16/2011	43	1.1	0.8	30.0%
7/12/2011	33	1.1	0.8	30.0%
8/23/2011	25	1.1	0.7	34.5%
9/20/2011	11	1.1	0.8	30.0%
10/18/2011	37	1.6	1.2	25.0%
11/8/2011	31	1.2	0.9	28.3%
12/8/2011	29	1.1	0.8	30.9%
1/24/2012	36	2.0	Plant Off	
2/15/2012	38	1.5	Plant Off	
3/13/2012	38	1.5	Plant Off	
4/30/2012	56	1.6	1.2	25.0%
5/17/2012	34	1.3	1.0	25.4%
6/13/2012	29	1.3	1.0	26.9%
7/24/2012	35	1.3	0.9	28.5%
8/14/2012	26	1.1	0.9	16.4%
9/12/2012	24	1.0	0.8	23.2%
10/3/2012	26	1.0	0.9	14.0%
11/1/2012	33	2.0	1.2	40.0%
12/19/2012	47	1.9	Plant Off	
1/30/2013	46	1.4	Plant Off	
2/14/2013	50	1.1	0.8	27.3%
3/21/2013	39	1.6	1.0	37.5%
5/22/13	31	1.3	1.0	23.1%
8/27/13	29	1.2	0.9	25.8%
11/13/13	29	1.3	0.9	34.6%
5/21/14	34	1.5	1.0	
8/6/14	33	1.9	1.2	35.3%
11/6/14	33	1.6	1.1	36.8%
8/13/15	34	1.7	1.1	31.3%
Plant Off	Plant Off	Plant Off	Plant Off	

min	0.9		35.3%
max	3.0		
ave	1.4	0.9	
median	1.3		
95th	2		
			29.2%

Foothill 15 MGD

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/15/2011	28	1.3	Plant Off	
5/11/2011	35	0.9	Plant Off	
8/16/2011	19	1.1	0.7	39.1%
11/16/2011	40	0.9	0.5	41.2%
2/16/2012	28	1.0	Plant Off	
5/15/2012	30	1.3	0.9	29.2%
8/16/2012	28	1.2	0.8	30.0%
11/7/2012	37	0.8	0.6	27.6%
2/20/2013	27	1.7	Plant off	
5/23/2013	28	1.3	0.9	27.7%
8/20/2013	25	1.2	0.9	23.3%
11/14/2013	30	1.4	1.0	30.7%
5/22/2014	23	1.1	0.8	
9/18/2014	28	1.4	1.0	26.4%
11/12/2014	25	1.0	0.7	28.6%
5/12/2015	29	1.2	0.9	25.3%
8/11/2015	32	1.6	1.1	
11/18/2015	21	1.5	1.1	25.0%

			31.3%
min	0.8		26.7%
max	1.7		
ave	1.2	0.9	
median	1.2		
95th	1.615		29.4%

Foothill 40 MGD

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/15/2011	28	1.3	1.0	26.9%
5/11/2011	35	0.9	0.6	30.8%
8/16/2011	19	1.1	0.7	32.7%
11/16/2011	40	0.9	0.6	32.9%
2/16/2012	28	1.0	0.8	24.0%
5/15/2012	30	1.3	0.9	27.7%
8/16/2012	28	1.2	0.9	24.2%
11/7/2012	37	0.8	0.6	25.0%
2/20/2013	27	1.7	1.1	35.3%
5/23/2013	28	1.3	1.0	23.1%
8/20/2013	25	1.2	0.9	25.8%
11/14/2013	30	1.4	1.0	31.4%
2/12/2014	27	2.7	1.5	44.4%
5/22/2014	23	1.1	0.8	25.5%
9/18/2014	28	1.4	1.0	28.6%
11/12/2014	25	1.0	0.7	27.4%
2/10/2015	22	2.6	1.4	46.2%
5/12/2015	29	1.2	0.9	22.5%
8/11/2015	32	1.6	1.1	31.3%
11/18/2015	21	1.5	Plant off	

min	0.8		
max	2.7		
ave	1.4	0.9	29.8%
median	1.3		
95th	2.605		

Sunset

Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	% Removal
2/15/2011	30	1.4	Plant Off	
5/11/2011	38	1.2	Plant Off	
8/16/2011	22	1.3	0.7	43.1%
11/16/2011	46	1.0	Plant Off	
2/16/2012	29	1.1	Plant Off	
8/16/2012	30	1.4	1.0	
11/7/2012	37	1.2	Plant Off	30.0%
6/12/2013	29	1.6	1.1	
8/20/2013	26	1.3	0.9	
5/22/2014	30	1.3	1.0	31.3%
9/18/2014	31	5.1	Plant off	30.0%
5/12/2015	28	1.5	1.0	
8/11/2015	33	1.6	1.1	
11/18/2015	Plant off	Plant off	Plant off	23.1%

min	1.0		
max	5.1		
ave	1.6	1.0	33.3%
median	1.3		31.3%
95th	3		
			31.7%

Alta

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	8	8	
Feb-11	1	7	0	
Mar-11	1	4	2	
Apr-11	1	30	23	
May-11	1	2	0	
Jun-11	1	130	50	
Jul-11	1	70	30	
Aug-11	1	35	17	
Sep-11	1	22	2	
Oct-11	1	1600	22	
Nov-11	1	170	2	
Dec-11	1	170	4	13.33333
Jan-12	1	80	2	12.83333
Feb-12	1	300	14	14
Mar-12	1	300	36	16.83333
Apr-12	1	22	0	14.91667
May-12	1	17	0	14.91667
Jun-12	1	50	4	11.08333
Jul-12	1	170	9	9.333333
Aug-12	1	240	0	7.916667
Sep-12	1	900	4	8.083333
Oct-12	1	300	30	8.75
Nov-12	1	110	2	8.75
Dec-12	1	500	130	19.25
Jan-13	1	50	8	19.75
Feb-13	1	50	2	18.75
Mar-13	1	22	2	15.91667
Apr-13	1	500	8	16.58333
May-13	1	300	0	16.58333
Jun-13	1	70	13	17.33333
Jul-13	1	110	13	17.66667
Aug-13	1	170	2	17.83333
Sep-13	1	500	23	19.41667
Oct-13	1	80	80	23.58333
Nov-13	1	110	4	23.75
Dec-13	1	500	11	13.83333
Jan-14	1	50	13	14.25
Feb-14	1	50	0	14.08333
Mar-14	1	80	7	14.5
Apr-14	1	13	2	14
May-14	1	22	0	14
Jun-14	1	50	0	12.91667
Jul-14	1	140	23	13.75
Aug-14	1	240	80	20.25
Sep-14	1	13	0	18.33333
Oct-14	1	23	0	11.66667
Nov-14	1	21	0	11.33333
Dec-14	1	130	4	10.75
Jan-15	1	170	2	9.833333
Feb-15	1	14	0	9.833333
Mar-15	1	110	22	11.08333
Apr-15	1	500	130	21.75
May-15	1	240	2	21.91667
Jun-15	1	0	0	21.91667
Jul-15	1	50	23	21.91667
Aug-15	1	11	4	15.58333
Sep-15	1	130	2	15.75
Oct-15	1	130	4	16.08333
Nov-15	1	49	49	20.16667
Dec-15	1	17	0	19.83333

Alta

min	0	0	7.916667
max	1600	130	23.75
average	165.8667	15.4	
median	80	4	
95th	500	80	

Monte Vista

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	30	4	
Feb-11	1	27	27	
Mar-11	1	23	13	
Apr-11	1	7	0	
May-11	1	11	2	
Jun-11	1	80	2	
Jul-11	1	90	50	
Aug-11	1	130	50	
Sep-11	1	170	22	
Oct-11	1	110	4	
Nov-11	1	59	4	
Dec-11	1	500	11	15.75
Jan-12	1	8	2	15.58333
Feb-12	1	7	2	13.5
Mar-12	1	50	4	12.75
Apr-12	1	30	0	12.75
May-12	1	70	2	12.75
Jun-12	1	110	11	13.5
Jul-12	1	110	8	10
Aug-12	1	130	8	6.5
Sep-12	1	240	20	6.333333
Oct-12	1	500	30	8.5
Nov-12	1	130	4	8.5
Dec-12	1	300	30	10.08333
Jan-13	1	50	4	10.25
Feb-13	1	50	0	10.08333
Mar-13	1	26	4	10.08333
Apr-13	1	22	4	10.41667
May-13	1	50	0	10.25
Jun-13	1	240	30	11.83333
Jul-13	1	170	17	12.58333
Aug-13	1	300	8	12.58333
Sep-13	1	900	8	11.58333
Oct-13	1	280	4	9.416667
Nov-13	1	19	4	9.416667
Dec-13	1	50	0	6.916667
Jan-14	1	13	8	7.25
Feb-14	1	1600	1600	140.5833
Mar-14	1	30	17	141.6667
Apr-14	1	23	23	143.25
May-14	1	50	9	144
Jun-14	1	30	8	142.1667
Jul-14	1	50	4	141.0833
Aug-14	1	17	2	140.5833
Sep-14	1	80	8	140.5833
Oct-14	1	14	8	140.9167
Nov-14	1	50	8	141.25
Dec-14	1	80	4	141.5833
Jan-15	1	80	0	140.9167
Feb-15	1	50	2	7.75
Mar-15	1	30	4	6.666667
Apr-15	1	80	2	4.916667
May-15	1	70	30	6.666667
Jun-15	1	90	23	7.916667
Jul-15	1	80	30	10.08333
Aug-15	1	8	4	10.25
Sep-15	1	23	2	9.75
Oct-15	1	140	13	10.16667
Nov-15	1	22	8	10.16667
Dec-15	1	8	0	9.833333

MV

min	7	0	4.916667
max	1600	1600	144
average	129.95	36.83333	
median	50	6	
95th	500	31	

Colfax

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	240	2	
Feb-11	1	11	2	
Mar-11	1	50	50	
Apr-11	1	7	2	
May-11	1	30	23	
Jun-11	1	30	30	
Jul-11	1	300	23	
Aug-11	1	500	300	
Sep-11	1	300	8	
Oct-11	1	70	30	
Nov-11	1	140	50	
Dec-11	1	300	4	43.66667
Jan-12	1	50	30	46
Feb-12	1	50	8	46.5
Mar-12	1	80	80	49
Apr-12	1	80	14	50
May-12	1	50	2	48.25
Jun-12	1	110	23	47.66667
Jul-12	1	500	80	52.41667
Aug-12	1	240	2	27.58333
Sep-12	1	240	130	37.75
Oct-12	1	110	14	36.41667
Nov-12	1	110	13	33.33333
Dec-12	1	1600	33	35.75
Jan-13	1	80	8	33.91667
Feb-13	1	30	30	35.75
Mar-13	1	130	50	33.25
Apr-13	1	110	7	32.66667
May-13	1	130	14	33.66667
Jun-13	1	140	23	33.66667
Jul-13	1	300	30	29.5
Aug-13	1	300	13	30.41667
Sep-13	1	1600	50	23.75
Oct-13	1	140	8	23.25
Nov-13	1	17	4	22.5
Dec-13	1	140	2	19.91667
Jan-14	1	50	50	23.41667
Feb-14	1	30	4	21.25
Mar-14	1	30	23	19
Apr-14	1	30	4	18.75
May-14	1	30	0	17.58333
Jun-14	1	240	130	26.5
Jul-14	1	130	13	25.08333
Aug-14	1	110	2	24.16667
Sep-14	1	130	2	20.16667
Oct-14	1	30	30	22
Nov-14	1	80	8	22.33333
Dec-14	1	30	30	24.66667
Jan-15	1	50	30	23
Feb-15	1	500	11	23.58333
Mar-15	1	12	0	21.66667
Apr-15	1	20	2	21.5
May-15	1	30	8	22.16667
Jun-15	1	23	23	13.25
Jul-15	1	23	23	14.08333
Aug-15	1	70	2	14.08333
Sep-15	1	50	2	14.08333
Oct-15	1	220	7	12.16667
Nov-15	1	17	2	11.66667
Dec-15	1	240	79	15.75

Colfax

min	7	0	11.66667
max	1600	300	52.41667
average	174.8333	27.95	
median	80	13.5	
95th	500	82.5	

Applegate

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	300	2	
Feb-11	1	900	50	
Mar-11	1	170	11	
Apr-11	1	80	17	
May-11	1	240	8	
Jun-11	1	1600	27	
Jul-11	1	170	170	
Aug-11	1	300	50	
Sep-11	1	300	70	
Oct-11	1	900	13	
Nov-11	1	1600	50	
Dec-11	2	160	26	41.16667
Jan-12	2	12.5	10.5	41.875
Feb-12	2	100	21.5	39.5
Mar-12	2	53	5.5	39.04167
Apr-12	2	140	60	42.625
May-12	2	120	31.5	44.58333
Jun-12	2	950	98.5	50.54167
Jul-12	2	240	70.5	42.25
Aug-12	2	240	65	43.5
Sep-12	2	400	63.5	42.95833
Oct-12	2	290	110	51.04167
Nov-12	2	175	23	48.79167
Dec-12	2	215	17	48.04167
Jan-13	2	205	37	50.25
Feb-13	2	190	28.5	50.83333
Mar-13	2	600	15	51.625
Apr-13	2	305	23.5	48.58333
May-13	2	400	23.5	47.91667
Jun-13	2	400	170	53.875
Jul-13	2	275	76.5	54.375
Aug-13	2	700	70	54.79167
Sep-13	2	515	50	53.66667
Oct-13	2	175	6.5	45.04167
Nov-13	2	85	15.5	44.41667
Dec-13	2	75	22	44.83333
Jan-14	2	161.5	22	43.58333
Feb-14	2	36	4	41.54167
Mar-14	2	23.5	11.5	41.25
Apr-14	2	40	13.5	40.41667
May-14	2	150	118.5	48.33333
Jun-14	2	150	150	46.66667
Jul-14	2	215	36.5	43.33333
Aug-14	2	100	30.5	40.04167
Sep-14	2	145	15	37.125
Oct-14	2	175	71.5	42.54167
Nov-14	2	128.5	2	41.41667
Dec-14	2	370	270	62.08333
Jan-15	2	100	15	61.5
Feb-15	2	1250	235	80.75
Mar-15	2	66	25	81.875
Apr-15	2	700	78	87.25
May-15	2	175	33.5	80.16667
Jun-15	3	123.3	37	70.75
Jul-15	2	270	60	72.70833
Aug-15	2	275	36.5	73.20833
Sep-15	2	235	154	84.79167
Oct-15	2	55	26.5	81.04167
Nov-15	2	175	38	84.04167
Dec-15	2	135	41	64.95833

Applegate

min	12.5	2	37.125
max	1600	270	87.25
average	313.905	52.21667	
median	182.5	32.5	
95th	965	170	

Bowman

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	11	4	
Feb-11	1	17	2	
Mar-11	1	50	13	
Apr-11	1	36	22	
May-11	1	170	130	
Jun-11	1	80	30	
Jul-11	1	7	0	
Aug-11	1	27	4	
Sep-11	1	170	22	
Oct-11	1	500	300	
Nov-11	1	500	130	
Dec-11	1	1600	300	79.75
Jan-12	2	38.5	2	79.58333
Feb-12	2	270	15	80.66667
Mar-12	2	252	25	81.66667
Apr-12	2	43.5	3.5	80.125
May-12	2	96	29	71.70833
Jun-12	2	215	6	69.70833
Jul-12	2	29.5	8.5	70.41667
Aug-12	2	80	9	70.83333
Sep-12	2	79.5	12.5	70.04167
Oct-12	2	161.5	29	47.45833
Nov-12	2	400	33.5	39.41667
Dec-12	2	950	3	14.66667
Jan-13	2	315	26.5	16.70833
Feb-13	2	46	4	15.79167
Mar-13	2	26	0	13.70833
Apr-13	2	53	5	13.83333
May-13	2	90	20	13.08333
Jun-13	2	80	7.5	13.20833
Jul-13	2	165	16	13.83333
Aug-13	2	80	7.5	13.70833
Sep-13	2	165	23	14.58333
Oct-13	2	370	25	14.25
Nov-13	2	235	22.5	13.33333
Dec-13	2	205	51.5	17.375
Jan-14	2	19	7.5	15.79167
Feb-14	2	161	12	16.45833
Mar-14	2	190	4.5	16.83333
Apr-14	2	23	10.5	17.29167
May-14	2	30	21.5	17.41667
Jun-14	2	22	12.5	17.83333
Jul-14	2	175	18	18
Aug-14	2	28	4	17.70833
Sep-14	2	51.5	4	16.125
Oct-14	2	47	29	16.45833
Nov-14	2	51.5	13	15.66667
Dec-14	2	900	475	50.95833
Jan-15	2	46.5	6.5	50.875
Feb-15	2	22	6	50.375
Mar-15	2	28.5	6	50.5
Apr-15	2	105	8.5	50.33333
May-15	2	80	19.5	50.16667
Jun-15	2	36.5	15	50.375
Jul-15	2	30.5	9.5	49.66667
Aug-15	2	22.5	15	50.58333
Sep-15	2	30	19	51.83333
Oct-15	2	114	12	50.41667
Nov-15	2	150	21	51.08333
Dec-15	2	71	9	12.25
Bowman				
	min	7	0	12.25
	max	1600	475	81.66667
	average	167.4667	35	
	median	80	12.75	
	95th	520	138.5	

Auburn

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	240	30	
Feb-11	1	300	34	
Mar-11	1	140	30	
Apr-11	1	50	13	
May-11	1	50	30	
Jun-11	1	300	170	
Jul-11	1	110	50	
Aug-11	1	170	8	
Sep-11	1	1600	110	
Oct-11	1	300	23	
Nov-11	1	900	110	
Dec-11	2	1050	41.5	54.125
Jan-12	2	102	5	52.04167
Feb-12	2	490	40	52.54167
Mar-12	2	205	21.5	51.83333
Apr-12	2	80	66.5	56.29167
May-12	2	920	145	65.875
Jun-12	2	1050	80	58.375
Jul-12	2	320	8.5	54.91667
Aug-12	2	205	66	59.75
Sep-12	2	155	50	54.75
Oct-12	2	270	240	72.83333
Nov-12	2	1050	50	67.83333
Dec-12	2	1250	41	67.79167
Jan-13	2	370	30	69.875
Feb-13	2	266.5	55	71.125
Mar-13	2	175	17	70.75
Apr-13	2	120	6	65.70833
May-13	2	300	158.5	66.83333
Jun-13	2	145	16	61.5
Jul-13	2	210	145	72.875
Aug-13	2	180	36.5	70.41667
Sep-13	2	1250	90	73.75
Oct-13	2	185	26	55.91667
Nov-13	2	135	17	53.16667
Dec-13	2	80	7.5	50.375
Jan-14	2	65	40	51.20833
Feb-14	2	150	21.5	48.41667
Mar-14	2	1250	28	49.33333
Apr-14	2	150	125	59.25
May-14	2	485	175	60.625
Jun-14	2	125	125	69.70833
Jul-14	2	235	205	74.70833
Aug-14	2	175	36	74.66667
Sep-14	2	535	165	80.91667
Oct-14	2	160	105	87.5
Nov-14	2	270	36	89.08333
Dec-14	2	1050	855	159.7083
Jan-15	2	505	140	168.0417
Feb-15	2	160	15	167.5
Mar-15	2	360	65	170.5833
Apr-15	2	335	125	170.5833
May-15	2	110	26.5	158.2083
Jun-15	2	65.5	19	149.375
Jul-15	2	300	90	139.7917
Aug-15	2	76	69.5	142.5833
Sep-15	2	33.5	26	131
Oct-15	2	185	105	131
Nov-15	2	285	16	129.3333
Dec-15	2	1070	124.5	68.45833
Auburn				
	min	33.5	5	48.41667
	max	1600	855	170.5833
	average	380.975	80.09167	
	median	222.5	41.25	
	95th	1250	176.5	

Foothill

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels	E coli RAA
Jan-11	1	50	9	
Feb-11	1	23	2	
Mar-11	1	22	22	
Apr-11	1	30	23	
May-11	1	23	4	
Jun-11	1	170	30	
Jul-11	1	140	30	
Aug-11	1	50	13	
Sep-11	1	300	30	
Oct-11	1	500	70	
Nov-11	1	110	7	
Dec-11	1	50	4	20.33333
Jan-12	1	80	8	20.25
Feb-12	1	80	30	22.58333
Mar-12	1	130	8	21.41667
Apr-12	1	900	80	26.16667
May-12	1	110	4	26.16667
Jun-12	1	22	2	23.83333
Jul-12	1	50	17	22.75
Aug-12	1	50	2	21.83333
Sep-12	1	23	23	21.25
Oct-12	1	50	30	17.91667
Nov-12	1	300	13	18.41667
Dec-12	1	1600	13	19.16667
Jan-13	1	300	23	20.41667
Feb-13	1	50	23	19.83333
Mar-13	1	300	110	28.33333
Apr-13	1	900	50	25.83333
May-13	1	130	17	26.91667
Jun-13	1	30	8	27.41667
Jul-13	1	500	300	51
Aug-13	1	70	11	51.75
Sep-13	1	500	30	52.33333
Oct-13	1	23	8	50.5
Nov-13	1	30	4	49.75
Dec-13	1	50	30	51.16667
Jan-14	1	170	11	50.16667
Feb-14	1	1600	75	54.5
Mar-14	1	80	30	47.83333
Apr-14	1	60	50	47.83333
May-14	1	70	30	48.91667
Jun-14	1	220	50	52.41667
Jul-14	1	80	8	28.08333
Aug-14	1	80	30	29.66667
Sep-14	1	50	23	29.08333
Oct-14	1	500	500	70.08333
Nov-14	1	300	130	80.58333
Dec-14	1	220	70	83.91667
Jan-15	1	70	50	87.16667
Feb-15	1	500	13	82
Mar-15	1	8	2	79.66667
Apr-15	1	500	50	79.66667
May-15	1	170	11	78.08333
Jun-15	1	130	30	76.41667
Jul-15	1	30	13	76.83333
Aug-15	1	500	20	76
Sep-15	1	50	23	76
Oct-15	1	900	27	36.58333
Nov-15	1	79	11	26.66667
Dec-15	1	1600	0	20.83333
Foothill				
	min	8	0	17.91667
	max	1600	500	87.16667
	average	261.8833	39.08333	
	median	80	23	
	95th	935	111	

Sunset

Sample Date	Number of Samples Taken	Average Total Coliform Levels	E. coli	Folsom Dam (FLD) Precipitation	Auburn (AUB) Precipitation
Jan-11	1	900	280	1.78	2.25
Feb-11	1	8	4	4.64	6.32
Mar-11	1	240	80	7.6	12.13
Apr-11	1	80	30	0.51	0.58
May-11	1	170	170	2.21	2.67
Jun-11	1	80	30	1.73	2.97
Jul-11	1	300	30	0	0
Aug-11	1	70	4	0.35	0
Sep-11	1	50	2	0	0
Oct-11	1	500	50	2.25	2.9
Nov-11	1	170	80	0.74	0.84
Dec-11	1	30	17	0.34	0.03
Jan-12	1	130	30	2.92	0.9
Feb-12	1	70	30	1.45	1.81
Mar-12	1	80	50	5.63	10.15
Apr-12	1	130	130	3.82	6.47
May-12	1	130	30	0.04	0.09
Jun-12	1	90	70	0.26	0.21
Jul-12	1	17	4	0	0.03
Aug-12	1	80	8	0	0
Sep-12	1	240	240	0	0
Oct-12	1	23	2	1.57	1.95
Nov-12	1	170	110	6.22	7.93
Dec-12	1	1600	13	6.15	11.19
Jan-13	1	1600	13	0.63	0.63
Feb-13	1	900	17	0.27	0.5
Mar-13	1	300	50	1.62	1.49
Apr-13	1	900	300	0.74	1.64
May-13	1	900	220		0.72
Jun-13	1	500	50	0.47	0.89
Jul-13	1	70	8	0	0
Aug-13	1	170	23		0
Sep-13	1	500	80		0.37
Oct-13	1	170	4	0	0.19
Nov-13	1	30	4	0.95	1.68
Dec-13	1	80	23	0.39	0.41
Jan-14	1	80	8	0.51	0.56
Feb-14	1	130	80	7.37	4.93
Mar-14	1	130	50		4.96
Apr-14	1	170	80	1.44	1.79
May-14	1	220	30		
Jun-14	1	240	7	0	
Jul-14	1	23	23	0	0.01
Aug-14	1	23	4		
Sep-14	1	50	50		0.97
Oct-14	1	240	240	0.2	0.38
Nov-14	1	80	7	2.01	3.67
Dec-14	1	300	130	9.25	12.74
Jan-15	1	220	50		0
Feb-15	1	70	21		3.26
Mar-15	1	110	21		0.25
Apr-15	1	300	30		1.45
May-15	1	80	23		0.36
Jun-15	1	70	17		0.24
Jul-15	1	23	13		0
Aug-15	1	110	110		0
Sep-15	1	500	500		0.09
Oct-15	1	900	280	0.19	0
Nov-15	1	79	27		3.56
Dec-15	1	1600	350	2.56	6.44
Sunset					
	min	8	2		
	max	1600	500		
	average	287.1	73.95		
	median	130	30		
	95th	935	281		

North Auburn (NID)

Jan-11	21.1
Feb-11	14.6
Mar-11	7.95
Apr-11	22.95
May-11	37.15
Jun-11	18.6
Jul-11	9.35
Aug-11	87.9
Sep-11	13.9
Oct-11	36.35
Nov-11	13.1
Dec-11	23.95
Jan-12	50
Feb-12	3.05
Mar-12	23.7
Apr-12	8.05
May-12	5.75
Jun-12	6.85
Jul-12	6.75
Aug-12	14.4
Sep-12	32.85
Oct-12	42.2
Nov-12	12.45
Dec-12	92.7
Jan-13	6.85
Feb-13	12.7
Mar-13	9.15
Apr-13	7.6
May-13	9.55
Jun-13	17.85
Jul-13	19.95
Aug-13	21.4
Sep-13	42.9
Oct-13	26
Nov-13	10.25
Dec-13	16.9
Jan-14	6.3
Feb-14	12.15
Mar-14	22
Apr-14	9.15
May-14	7.65
Jun-14	18.2
Jul-14	7.05
Aug-14	61.95
Sep-14	24.55
Oct-14	6.35
Nov-14	60.9
Dec-14	109.6
Jan-15	7.8
Feb-15	20.45
Mar-15	6.85
Apr-15	4.65
May-15	8
Jun-15	19.9
Jul-15	14.15
Aug-15	18.4
Sep-15	11.6
Oct-15	15.85
Nov-15	53.4
Dec-15	37.9

LT2 Summary for PCWA

Auburn			Bowman			Foothill			Sunset		
Date	Giardia (cysts/L)	Crypto (oocysts/L)	Date	Giardia (cysts/L)	Crypto (oocysts/L)	Date	Giardia (cysts/L)	Crypto (oocysts/L)	Date	Giardia (cysts/L)	Crypto (oocysts/L)
10/6/2015	0.1	0	10/6/2015	0	0	10/6/2015	0	0	10/13/2015	0	0
11/3/2015	0	0.1	11/3/2015	0.158	0	11/3/2015	0	0	11/3/2015	0	0
12/2/2015	0.1	0.2	12/2/2015	0	0	12/8/2015	0	0	12/2/2015	0	0
1/5/2016	0	0	1/5/2016	0	0.1	1/5/2016	0	0	1/5/2016	0	0
2/2/2016	0.21	0	2/2/2016	0	0	2/2/2016	0	0	2/2/2016	0	0
3/1/2016	0	0	3/1/2016	0	0	3/1/2016	0	0	3/1/2016	0	0
4/5/2016	0	0	4/12/2016	0	0	4/5/2016	0	0	4/5/2016	0	0.1
5/3/2016	0	0.1	5/3/2016	0	0.1	5/3/2016	0	0	5/3/2016	0	0
6/8/2016	0	0	6/8/2016	0	0	6/8/2016	0	0	6/8/2016	0	0
7/26/2016	0	0	7/26/2016	0	0	7/26/2016	0.1	0	7/26/2016	0	0
8/2/2016	0.1	0	8/2/2016	0	0	8/2/2016	0	0	8/2/2016	0	0
9/13/2016	0	0	9/13/2016	0	0	9/13/2016	0	0	9/13/2016	0	0
10/4/2016	0	0	10/4/2016	0	0	10/4/2016	0	0	10/4/2016	0	0
11/1/2016	0.2	0	11/1/2016	0	0	11/1/2016	0	0	11/1/2016	0	0.2
average	0.051	0.029		0.013	0.014		0.007	0.000		0.000	0.021

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Placer CWA- Alta System No.: 3110024 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/18	5/20	8/11	11/17	2/8	5/13	8/17	11/16	2/9	5/3	8/1	11/7	2/14	5/2	8/7	11/15	2/21	5/28	8/7	
Site 1	29.0	28.0	48.0	45.0	39.0	27.0	47.0	77.0	24.0	20.0	51.0	32.0	31.0	16.0	43.0	32.0	25.0	70.0	41.0	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	29.0	28.0	48.0	45.0	39.0	27.0	47.0	77.0	24.0	20.0	51.0	32.0	31.0	16.0	43.0	32.0	25.0	70.0	41.0	
Running Annual Average				37.5	40.0	39.8	39.5	47.5	43.8	42.0	43.0	31.8	33.5	32.5	30.5	30.5	29.0	42.5	42.0	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	1165 Mattel Drive, Dutch Flat
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Brad Wilkins
Signature

10/9/2013
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Alta System No.: 3110024 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/18	5/20	8/11	12/14	2/8	5/13	8/17	11/16	2/9	5/3	8/1	11/7
Site 1	23.0	24.0	19.0	19.0	25.0	11.0	28.0	23.0	11.0	12.0	19.0	16.0
Site 2												
Site 3												
Site 4												
Site 5												
Site 6												
Site 7												
Site 8												
Site 9												
Site 10												
Site 11												
Site 12												
Quarterly Average	23.0	24.0	19.0	19.0	25.0	11.0	28.0	23.0	11.0	12.0	19.0	16.0
Running Annual Average				21.3	21.8	18.5	20.8	21.8	18.3	18.5	16.3	14.5
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1

Year:	2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/14	5/2	8/7	11/15	2/21	5/28	8/7	
Site 1	31.0	17.0	25.0	29.0	18.0	26.0	7.5	
Site 2								
Site 3								
Site 4								
Site 5								
Site 6								
Site 7								
Site 8								
Site 9								
Site 10								
Site 11								
Site 12								
Quarterly Average	31.0	17.0	25.0	29.0	18.0	26.0	7.5	
Running Annual Average	19.5	20.8	22.3	25.5	22.3	24.5	20.1	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	1165 Mattel Drive, Dutch Flat
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Brad Wilkins 10/9/2013

Signature Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Distribution System Monitoring For TTHMs

System Name: **Placer County Water Agency - Alta** System #: **3110024**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/11/14	5/29/14	8/18/14	11/7/14	2/3/15	5/13/15	8/10/15	11/4/15	2/8/16			
Mattel Drive	Result	30.00	43.00	37.00	33.00	54.00	72.00	52.00	50.00	42.00			
	LRAA	30	36.5	36.6667	35.75	41.75	49	52.75	57	54			
	OEL	15	29	36.75	36.5	44.5	57.75	57.5	56	46.5			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	30	36.5	36.6667	35.75	41.75	49	52.75	57	54			

Brad Wilkins

Signature

3/9/2016

Date

Distribution System Monitoring For HAA5s

System Name: **Placer County Water Agency - Alta**

System #: **3110024**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/11/14	5/29/14	8/18/14	11/7/14	2/3/15	5/13/15	8/10/15	11/4/15	2/8/16			
Mattel Drive	Result	7.80	15.00	12.00	10.00	39.00	26.00	20.00	14.00	22.00			
	LRAA	7.8	11.4	11.6	11.2	19	21.75	23.75	24.75	20.5			
	OEL	3.9	9.45	11.7	11.75	25	25.25	26.25	18.5	19.5			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
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	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	7.8	11.4	11.6	11.2	19	21.75	23.75	24.75	20.5			

Brad Wilkins

Signature

3/9/2016

Date

TTHM/HAA5 Report for Disinfection Byproducts Compliance
(For Systems Monitoring Annually or Every Three Years)

System Name: Placer CWA - Monte Vista

System No.: 3110124

Calendar Year: 2011-2015

Sample Location	Sample Date	Total Trihalomethanes Level (TTHM) (µg/L or ppb)	Five Haloacetic Acids Level (HAA5) (µg/L or ppb)
Ridge Road Sample Station, Dutch Flat (Corner of I-80 and Ridge Road)	8/1/11	49.0	26.0
Ridge Road Sample Station, Dutch Flat (Corner of I-80 and Ridge Road)	8/7/12	41.0	18.0
Ridge Road Sample Station, Dutch Flat (Corner of I-80 and Ridge Road)	8/7/13	45.0	18.0
Ridge Road Sample Station, Dutch Flat (Corner of I-80 and Ridge Road)	8/18/14	44.0	23.0
Ridge Road Sample Station, Dutch Flat (Corner of I-80 and Ridge Road)	8/10/15	54.0	22.0

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Colfax   System No.: 3110006   Year: 2013   Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/18	5/20	8/11	11/17	2/8	5/13	8/17	11/16	2/15	5/3	8/1	11/7	2/14	5/2	8/7	11/8	2/21	5/8	8/7	
Site 1	38.0	59.0	56.0	61.0	61.0	51.0	80.0	80.0	42.0	44.0	81.0	49.0	55.0	44.0	73.0	61.0	45.0	58.0	47.0	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	38.0	59.0	56.0	61.0	61.0	51.0	80.0	80.0	42.0	44.0	81.0	49.0	55.0	44.0	73.0	61.0	45.0	58.0	47.0	
Running Annual Average				53.5	59.3	57.3	63.3	68.0	63.3	61.5	61.8	54.0	57.3	57.3	55.3	58.3	55.8	59.3	52.8	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	1090 Hillcrest Drive, Colfax
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Brad Wilkins
Signature

10/9/2013
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Colfax System No.: 3110006 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/18	5/20	8/11	12/14	2/8	5/13	8/17	11/16	2/15	5/3	8/1	11/7	2/14	5/2	8/7	11/8	2/21	5/8	8/7	
Site 1	31.0	30.0	22.0	28.0	52.0	34.0	40.0	32.0	39.0	33.0	43.0	27.0	41.0	42.0	48.0	26.0	40.0	37.0	29.0	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	31.0	30.0	22.0	28.0	52.0	34.0	40.0	32.0	39.0	33.0	43.0	27.0	41.0	42.0	48.0	26.0	40.0	37.0	29.0	
Running Annual Average				27.8	33.0	34.0	38.5	39.5	36.3	36.0	36.8	35.5	36.0	38.3	39.5	39.3	39.0	37.8	33.0	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	1090 Hillcrest Drive, Colfax
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Brad Wilkins 10/9/2013

Signature Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Distribution System Monitoring For TTHMs

System Name: **Placer County Water Agency - Colfax** System #: **3110006**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/11/14	5/28/14	8/25/14	11/18/14	2/3/15	5/14/15	8/10/15	11/5/15	2/8/16			
Hillcrest Drive	Result	55.00	87.00	88.00	63.00	31.00	46.00	57.00	46.00	48.00			
	LRAA	55	71	76.6667	73.25	67.25	57	49.25	45	49.25			
	OEL	27.5	57.25	79.5	75.25	53.25	46.5	47.75	48.75	49.75			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
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	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	55	71	76.6667	73.25	67.25	57	49.25	45	49.25			

Brad Wilkins

Signature

3/9/2016

Date

Distribution System Monitoring For HAA5s

System Name: **Placer County Water Agency - Colfax** System #: **3110006**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/11/14	5/28/14	See Below	11/18/14	2/3/15	5/14/15	8/10/15	11/5/15	2/8/16			
Hillcrest Drive	Result	32.00	34.00	34.00	29.00	34.00	33.00	26.00	20.00	51.00			
	LRAA	32	33	33.3333	32.25	32.75	32.5	30.5	28.25	32.5			
	OEL	16	25	33.5	31.5	32.75	32.25	29.75	24.75	37			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
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	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	32	33	33.3333	32.25	32.75	32.5	30.5	28.25	32.5			

Brad Wilkins 3/9/2016

Signature Date

Comments: Our laboratory had a sample refridgerator malfunction during Labor Day weekend 2014 where many samples were lost due to temperature. We were able to make up many of the samples as they provided us with a list of what they thought were all missing samples prior to October; however, we were not able to re-sample for HAA5 for Colfax in September because it was not included in the list the lab provided us. Based upon advice from DDW on 10/8/2014, the HAA5 result represented in Quarter 3 2014 is the result from 5/28/14 for averaging purposes.

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Applegate

System No.: 3110050 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):			8/11				8/17	11/16	2/16	5/17	8/2	11/7	2/14	5/2	8/8	11/8	2/26	5/14	8/8	
Site 1			70.0				85.0	100.0	24.0	23.0	80.0	53.0	56.0	51.0	71.0	70.0	44.0	77.0	67.0	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average			70.0				85.0	100.0	24.0	23.0	80.0	53.0	56.0	51.0	71.0	70.0	44.0	77.0	67.0	
Running Annual Average										58.0	56.8	45.0	53.0	60.0	57.8	62.0	59.0	65.5	64.5	
Meets Standard?* (check box)	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken			1				1	1	1	1	1	1	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	385 Julie Way, Applegate
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments: Quarterly monitoring initiated following 8/17/10 results received, in accordance with Title 22, Section 64535.2(b)(2).

Brad Wilkins
Signature

10/9/2013
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Placer CWA- Applegate System No.: 3110050 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):			8/11				8/17	11/16	2/16	5/17	8/2	11/7	2/14	5/2	8/8	11/8	2/26	5/14	8/8	
Site 1			31.0				36.0	59.0	14.0	15.0	39.0	31.0	41.0	41.0	27.0	35.0	32.0	30.0	18.0	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average			31.0				36.0	59.0	14.0	15.0	39.0	31.0	41.0	41.0	27.0	35.0	32.0	30.0	18.0	
Running Annual Average										31.0	31.8	24.8	31.5	38.0	35.0	36.0	33.8	31.0	28.8	
Meets Standard?* (check box)	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken			1				1	1	1	1	1	1	1	1	1	1	1	1	1	

Identify the sample locations in the table below.

Site	Sample Location
1	385 Julie Way, Applegate
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Brad Wilkins
Signature

10/9/2013
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Distribution System Monitoring For TTHMs

System Name: **Placer County Water Agency - Applegate** System #: **3110050**

Sample Site		2014				2015				2016			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
	Date	2/11/14	5/30/14	8/25/14	11/6/14	2/3/15	5/13/15	8/10/15	11/5/15	2/8/16			
Julie Way	Result	90.00	90.00	49.00	42.00	67.00	78.00	71.00	43.00	69.00			
	LRAA	90	90	76.3333	67.75	62	59	64.5	64.75	65.25			
	OEL	45	67.5	69.5	55.75	56.25	66.25	71.75	58.75	63			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
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	LRAA												
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	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	90	90	76.3333	67.75	62	59	64.5	64.75	65.25			

Brad Wilkins
Signature

3/9/2016
Date

Distribution System Monitoring For HAA5s

System Name: **Placer County Water Agency - Applegate** System #: **3110050**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/11/14	5/30/14	See Below	11/6/14	2/3/15	5/13/15	8/10/15	11/5/15	2/8/16			
Julie Way	Result	33.00	41.00	41.00	34.00	43.00	54.00	26.00	38.00	59.00			
	LRAA	33	37	38.3333	37.25	39.75	43	39.25	40.25	44.25			
	OEL	16.5	28.75	39	37.5	40.25	46.25	37.25	39	45.5			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
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	LRAA												
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	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	33	37	38.3333	37.25	39.75	43	39.25	40.25	44.25			

Brad Wilkins — Signature

3/9/2016 — Date

Comments: 1)Applegate exceeded the OEL in the second quarter 2014. In accordance with Section 64534.2(d)(6) of Title 22 and an email dated 7/8/14 from Steve Watson, a limited scope OEL report will be submitted with the monthly reports due August 10, 2014. 2) Our laboratory had a sample refridgerator malfunction during Labor Day weekend 2014 where many samples were lost due to temperature. We were able to make up many of the samples as they provided us with a list of what they thought were all missing samples prior to October; however, we were not able to re-sample for HAA5 for Applegate in September because it was not included in the list the lab provided us. Based upon advice from DDW on 10/8/2014, the HAA5 result represented in Quarter 3 2014 is the result from 5/28/14 for averaging purposes.

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Auburn/Bowman System No.: 3110005 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/11	5/13	8/12	11/2	2/16	5/13	8/11	11/4	2/10	5/12	8/23	11/8	2/15	5/17	8/14	11/29	2/14	5/22	8/27	
Site 1	27.0	34.0	48.0	50.0	27.0	40.0	56.0	82.0	50.0	40.0	62.0	72.0	37.0	43.0	66.0	65.0	59.0	53.0	58.0	
Site 2	31.0	43.0	49.0	51.0	34.0	66.0	74.0	83.0	61.0	44.0	60.0	42.0	44.0	66.0	65.0	72.0	52.0	78.0	31.0	
Site 3	39.0	53.0	56.0	48.0	49.0	61.0	84.0	100.0	69.0	51.0	71.0	67.0	56.0	86.0	90.0	92.0	74.0	110.0	40.0	
Site 4	22.0	36.0	49.0	46.0	33.0	37.0	55.0	82.0	52.0	42.0	63.0	54.0	38.0	63.0	69.0	61.0	66.0	65.0	65.0	
Site 5 (old)	29.0	38.0	46.0	46.0																
Site 5 (new)					N/A	36.0	56.0	84.0	N/A	47.0	68.0	54.0	N/A	61.0	68.0	N/A	60.0	60.0	61.0	
Site 6	23.0	41.0	51.0	45.0	N/A	37.0	64.0	79.0	N/A	46.0	70.0	56.0	N/A	63.0	74.0	N/A	63.0	62.0	65.0	
Site 7	18.0	23.0	25.0	38.0	N/A	38.0	44.0	57.0	N/A	36.0	36.0	30.0	N/A	36.0	47.0	N/A	59.0	63.0	62.0	
Site 8	25.0	44.0	44.0	55.0	N/A	57.0	68.0	82.0	N/A	44.0	58.0	45.0	N/A	56.0	70.0	N/A	49.0	79.0	34.0	
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	26.8	39.0	46.0	47.4	35.8	46.5	62.6	81.1	58.0	43.8	61.0	52.5	43.8	59.3	68.6	72.5	60.3	71.3	52.0	
Running Annual Average				39.8	42.0	43.9	48.1	56.5	62.1	61.4	61.0	53.8	50.3	54.1	56.0	61.0	65.2	68.2	64.0	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐
Number of Samples Taken	8	8	8	8	4	8	8	8	4	8	8	8	4	8	8	4	8	8	8	

Identify the sample locations in the table below.

Site	Sample Location
1	13730 Bowman Road, Auburn
2	Maidu MKT, Auburn/Folsom Road, Auburn
3	1248 Vintage Way, Auburn
4	Ricos-Petes, Highway 49, Auburn
5 (old)	213 Channel Hill Drive, Auburn (site w/ Auburn WTP operating)
5 (new)	Sample Station, Oak Ridge Wy, Auburn (site w/ Auburn WTP operating)
6	Sample Station, Westwood Drive, Auburn (site w/Auburn WTP operating)
7	989 Mikkelsen Drive, Auburn (site w/ Auburn WTP operating)
8	1265 High Street, Auburn (site w/ Auburn WTP operating)
9	
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11	
12	

Comments: Sites (5) through (8) are not monitored when the Auburn WTP is shut off. Site 5 was changed due to access restrictions in March 2010.

Brad Wilkins 10/8/2013

Signature Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Auburn/Bowman System No.: 3110005 Year: 2013 Quarter: 3rd

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/11	5/13	8/12	11/2	2/16	5/13	8/11	11/4	2/10	5/12	8/23	11/8	2/15	5/17	8/14	11/29	2/14	5/22	8/27	
Site 1	21.0	30.0	29.0	29.0	25.0	33.0	35.0	49.0	40.0	40.0	42.0	62.0	36.0	45.0	39.0	39.0	73.0	45.0	38.0	
Site 2	15.0	24.0	15.0	24.0	26.0	52.0	27.0	49.0	38.0	31.0	25.0	33.0	30.0	47.0	29.0	28.0	35.0	40.0	8.7	
Site 3	20.0	27.0	17.0	25.0	19.0	31.0	42.0	36.0	33.0	24.0	28.0	30.0	23.0	36.0	37.0	34.0	29.0	42.0	7.1	
Site 4	17.0	29.0	29.0	28.0	28.0	32.0	34.0	43.0	42.0	40.0	42.0	49.0	35.0	62.0	12.0	38.0	62.0	47.0	38.0	
Site 5 (old)	20.0	30.0	33.0	28.0																
Site 5 (new)					N/A	32.0	35.0	43.0	N/A	41.0	44.0	55.0	N/A	47.0	38.0	N/A	72.0	45.0	36.0	
Site 6	19.0	32.0	29.0	27.0	N/A	32.0	30.0	51.0	N/A	42.0	43.0	48.0	N/A	54.0	38.0	N/A	91.0	43.0	33.0	
Site 7	14.0	20.0	17.0	28.0	N/A	33.0	39.0	59.0	N/A	38.0	20.0	26.0	N/A	47.0	29.0	N/A	70.0	44.0	39.0	
Site 8	18.0	30.0	19.0	24.0	N/A	55.0	31.0	50.0	N/A	33.0	25.0	30.0	N/A	44.0	29.0	N/A	36.0	40.0	9.8	
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	18.0	27.8	23.5	26.6	24.5	37.5	34.1	47.5	38.3	36.1	33.6	41.6	31.0	47.8	31.4	34.8	58.5	43.3	26.2	
Running Annual Average				24.0	25.6	28.0	30.7	35.9	39.3	39.0	38.9	37.4	35.6	38.5	37.9	36.2	43.1	42.0	40.7	
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Number of Samples Taken	8	8	8	8	4	8	8	8	4	8	8	8	4	8	8	4	8	8	8	

Identify the sample locations in the table below.

Site	Sample Location
1	13730 Bowman Road, Auburn
2	Maidu MKT, Auburn/Folsom Road, Auburn
3	1248 Vintage Way, Auburn
4	Ricos-Petes, Highway 49, Auburn
5 (old)	213 Channel Hill Drive, Auburn (site w/ Auburn WTP operating)
5 (new)	Sample Station, Oak Ridge Wy, Auburn (site w/ Auburn WTP operating)
6	Sample Station, Westwood Drive, Auburn (site w/Auburn WTP operating)
7	989 Mikkelsen Drive, Auburn (site w/ Auburn WTP operating)
8	1265 High Street, Auburn (site w/ Auburn WTP operating)
9	
10	
11	
12	

Comments: Sites (5) through (8) are not monitored when the Auburn WTP is shut off. Site 5 was changed due to access restrictions in March 2010.

Brad Wilkins
Signature

10/8/2013
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Distribution System Monitoring For TTHMs

System Name: **Placer County Water Agency - Auburn/Bowman** System #: **3110005**

		2014				2015				2016			
Sample Site		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
	Date	2/13/14	5/21/14	8/6/14	11/6/14	2/5/15	5/21/15	8/13/15	11/19/15	2/5/16			
Landis Circle	Result	71.00	70.00	70.00	47.00	88.00	81.00	78.00	43.00	73.00			
	LRAA	71	70.5	70.3333	64.5	68.75	71.5	73.5	72.5	68.75			
	OEL	35.5	52.75	70.25	58.5	73.25	74.25	81.25	61.25	66.75			
Tracy Lane (changed from Calloway Circle 12/30/14)	Result	66.00	56.00	58.00	58.00	66.00	61.00	58.00	38.00	68.00			
	LRAA	66	61	60	59.5	59.5	60.75	60.75	55.75	56.25			
	OEL	33	44.5	59.5	57.5	62	61.5	60.75	48.75	58			
Westwood Drive	Result	64.00	60.00	58.00	60.00	62.00	55.00	59.00	36.00	73.00			
	LRAA	64	62	60.6667	60.5	60	58.75	59	53	55.75			
	OEL	32	46	60	59.5	60.5	58	58.75	46.5	60.25			
Sunrise Ridge (changed from Vintage Way 12/30/14)	Result	62.00	50.00	46.00	51.00	72.00	59.00	78.00	59.00	100.00			
	LRAA	62	56	52.6667	52.25	54.75	57	65	67	74			
	OEL	31	40.5	51	49.5	60.25	60.25	71.75	63.75	84.25			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	65.75	62.375	60.9167	59.1875	60.75	62	64.5625	62.0625	63.6875			

Brad Wilkins 3/9/2016

Signature Date

Distribution System Monitoring For HAA5s

System Name: **Placer County Water Agency - Auburn/Bowman** System #: **3110005**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/13/14	5/21/14	8/6/14	11/6/14	2/5/15	5/21/15	8/13/15	11/19/15	2/5/16			
Landis Circle	Result	34.00	32.00	30.00	14.00	31.00	46.00	23.00	16.00	55.00			
	LRAA	34	33	32	27.5	26.75	30.25	28.5	29	35			
	OEL	17	24.5	31.5	22.5	26.5	34.25	30.75	25.25	37.25			
Tracy Lane (changed from Calloway Circle 12/30/14)	Result	41.00	36.00	30.00	37.00	44.00	60.00	25.00	12.00	59.00			
	LRAA	41	38.5	35.6667	36	36.75	42.75	41.5	35.25	39			
	OEL	20.5	28.25	34.25	35	38.75	50.25	38.5	27.25	38.75			
Westwood Drive	Result	45.00	40.00	24.00	40.00	45.00	62.00	19.00	17.00	52.00			
	LRAA	45	42.5	36.3333	37.25	37.25	42.75	41.5	35.75	37.5			
	OEL	22.5	31.25	33.25	36	38.5	52.25	36.25	28.75	35			
Sunrise Ridge (changed from Vintage Way 12/30/14)	Result	21.00	14.00	16.00	22.00	30.00	41.00	31.00	42.00	48.00			
	LRAA	21	17.5	17	18.25	20.5	27.25	31	36	40.5			
	OEL	10.5	12.25	16.75	18.5	24.5	33.5	33.25	39	42.25			
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
	Result												
	LRAA												
	OEL												
Overall	RAA	35.25	32.875	30.25	29.75	30.3125	35.75	35.625	34	38			

Brad Wilkins

Signature

3/9/2016

Date

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Foothill   System No.: 3110025   Year: 2012   Quarter: 1st

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/11	5/13	8/13	11/10	2/10	5/17	8/10	11/9	2/15	5/11	8/16	11/16	2/16							
Site 1 (old)	24.0	37.0	39.0	32.0	38.0															
Site 1 (new)						40.0	50.0	64.0	35.0	28.0	52.0	36.0								
Site 2	25.0	41.0	49.0	40.0	47.0	46.0	55.0	65.0	37.0	31.0	62.0	39.0								
Site 3	30.0	48.0	44.0	46.0	48.0	54.0	65.0	81.0	49.0	37.0	52.0	43.0								
Site 4	42.0	64.0	71.0	58.0	62.0	65.0	94.0	88.0	58.0	43.0	81.0	41.0								
Site 5	N/A	52.0	52.0	N/A	N/A	54.0	46.0	N/A	N/A	N/A	66.0	N/A								
Site 6	N/A	40.0	40.0	N/A	N/A	42.0	54.0	N/A	N/A	N/A	52.0	N/A								
Site 7	N/A	48.0	48.0	N/A	N/A	48.0	57.0	N/A	N/A	N/A	59.0	N/A								
Site 8	N/A	40.0	40.0	N/A	N/A	42.0	50.0	N/A	N/A	N/A	51.0	N/A								
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	30.3	46.3	47.9	44.0	48.8	48.9	58.9	74.5	44.8	34.8	59.4	39.8								
Running Annual Average				42.1	46.7	47.4	50.1	57.8	56.8	53.2	53.3	44.7								
Meets Standard?* (check box)	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Number of Samples Taken	4	8	8	4	4	8	8	4	4	4	8	4								

Identify the sample locations in the table below.

Site	Sample Location
1 (old)	6205 Arcadia Ave., Loomis
1 (new)	6100 Helens Court, Loomis
2	5903 Sunset Blvd., Rocklin (Sunset Plaza)
3	Ketchikan PRS, Ketchikan Ave., Rocklin
4	3720 Cincinnati Ave., Rocklin
5	2210 Taylor Road, Penryn (Sampled when Sunset WTP is operated)
6	3850 N. Lakeshore Blvd., Loomis (Sampled when Sunset operated)
7	5005 Clairmont Ave., Rocklin (Sampled when Sunset WTP is operated)
8	3360 Midas Ave., Rocklin (Sampled when Sunset WTP is operated)
9	
10	
11	
12	

Comments: Sites (5) thru (8) are not monitored when the Sunset WTP is shut off. Samples for sites 5 - 8 were collected on 6/18/09 in the second quarter of 2009, and 6/23/10 in the second quarter of 2010.

Brad Wilkins   4/4/2012
Signature   Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Placer CWA- Foothill System No.: 3110025 Year: 2011 Quarter: 4th

Year:	2009				2010				2011				2012				2013			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/11	5/13	8/13	11/10	2/10	5/17	8/10	11/9	2/15	5/11	8/16	11/16								
Site 1 (old)	19.0	31.0	26.0	31.0	30.0															
Site 1 (new)						37.0	34.0	49.0	45.0	35.0	40.0	36.0								
Site 2	20.0	29.0	26.0	31.0	27.0	41.0	27.0	34.0	30.0	35.0	34.0	35.0								
Site 3	22.0	31.0	26.0	32.0	31.0	39.0	34.0	33.0	26.0	32.0	35.0	38.0								
Site 4	17.0	24.0	21.0	31.0	22.0	30.0	22.0	24.0	22.0	43.0	27.0	31.0								
Site 5	N/A	43.0	31.0	N/A	N/A	30.0	32.0	N/A	N/A	N/A	39.0	N/A								
Site 6	N/A	40.0	27.0	N/A	N/A	29.0	31.0	N/A	N/A	N/A	44.0	N/A								
Site 7	N/A	37.0	27.0	N/A	N/A	19.0	28.0	N/A	N/A	N/A	38.0	N/A								
Site 8	N/A	43.0	28.0	N/A	N/A	28.0	33.0	N/A	N/A	N/A	46.0	N/A								
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	19.5	34.8	26.5	31.3	27.5	31.6	30.1	35.0	30.8	36.3	37.9	35.0								
Running Annual Average				28.0	30.0	29.2	30.1	31.1	31.9	33.0	35.0	35.0								
Meets Standard?* (check box)	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Number of Samples Taken	4	8	8	4	4	8	8	4	4	4	8	4								

Identify the sample locations in the table below.

Site	Sample Location
1 (old)	6205 Arcadia Ave., Loomis
1 (new)	6100 Helens Court, Loomis
2	5903 Sunset Blvd., Rocklin (Sunset Plaza)
3	Ketchikan PRS, Ketchikan Ave., Rocklin
4	3720 Cincinnati Ave., Rocklin
5	2210 Taylor Road, Penryn (Sampled when Sunset WTP is operated)
6	3850 N. Lakeshore Blvd., Loomis (Sampled when Sunset operated)
7	5005 Clairmont Ave., Rocklin (Sampled when Sunset WTP is operated)
8	3360 Midas Ave., Rocklin (Sampled when Sunset WTP is operated)
9	
10	
11	
12	

Comments: Sites (5) thru (8) are not monitored when the Sunset WTP is shut off. Samples for sites 5 - 8 were collected on 6/18/09 in the second quarter of 2009, 6/23/10 in the second quarter of 2010.

Brad Wilkins
Signature

1/5/2012
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Distribution System Monitoring For TTHMs

System Name: **Placer County Water Agency - Foothill/Sunset** System #: **3110025**

Sample Site		2014 Qtr 1	2014 Qtr 2	2014 Qtr 3	2014 Qtr 4	2015 Qtr 1	2015 Qtr 2	2015 Qtr 3	2015 Qtr 4	2016 Qtr 1	2016 Qtr 2	2016 Qtr 3	2016 Qtr 4
	Date	2/12/14	5/22/14	8/20/14	11/12/14	2/10/15	5/12/15	8/12/15	11/18/15	2/10/16			
3720 Cincinnati	Result	56.00	76.00	27.00	39.00	47.00	63.00	61.00	48.00	48.00			
	LRAA	56	66	53	49.5	47.25	44	52.5	54.75	55			
	OEL	28	52	46.5	45.25	40	53	58	55	51.25			
5903 Sunset	Result	74.00	66.00	54.00	33.00	45.00	63.00	54.00	42.00	43.00			
	LRAA	74	70	64.6667	56.75	49.5	48.75	48.75	51	50.5			
	OEL	37	51.5	62	46.5	44.25	51	54	50.25	45.5			
2252 Penryn Rd (Changed from 2210 Taylor 08/2014 due to access)	Result	75.00	51.00	59.00	29.00	47.00	56.00	50.00	46.00	33.00			
	LRAA	75	63	61.6667	53.5	46.5	47.75	45.5	49.75	46.25			
	OEL	37.5	44.25	61	42	45.5	47	50.75	49.5	40.5			
Ascension Sample Station	Result	77.00	67.00	65.00	57.00	48.00	65.00	77.00	52.00	65.00			
	LRAA	77	72	69.6667	66.5	59.25	58.75	61.75	60.5	64.75			
	OEL	38.5	52.75	68.5	61.5	54.5	58.75	66.75	61.5	64.75			
Claudio Sample Station	Result	74.00	66.00	65.00	38.00	46.00	61.00	83.00	59.00	38.00			
	LRAA	74	70	68.3333	60.75	53.75	52.5	57	62.25	60.25			
	OEL	37	51.5	67.5	51.75	48.75	51.5	68.25	65.5	54.5			
Lake Forest	Result	75.00	56.00	50.00	37.00	54.00	57.00	49.00	57.00	44.00			
	LRAA	75	65.5	60.3333	54.5	49.25	49.5	49.25	54.25	51.75			
	OEL	37.5	46.75	57.75	45	48.75	51.25	52.25	55	48.5			
Ketchikan Sample Station	Result	61.00	63.00	54.00	50.00	49.00	61.00	66.00	52.00	39.00			
	LRAA	61	62	59.3333	57	54	53.5	56.5	57	54.5			
	OEL	30.5	46.75	58	54.25	50.5	55.25	60.5	57.75	49			
Becky Way Sample Station	Result	73.00	50.00	54.00	30.00	42.00	49.00	44.00	36.00	38.00			
	LRAA	73	61.5	59	51.75	44	43.75	41.25	42.75	41.75			
	OEL	36.5	43.25	57.75	41	42	42.5	44.75	41.25	39			
	Result												
	LRAA												
	OEL												
Overall	RAA	70.625	66.25	62	56.2813	50.4375	49.8125	51.5625	54.0313	53.09375			

Brad Wilkins

Signature

3/9/2016

Date

Distribution System Monitoring For HAA5s

System Name: **Placer County Water Agency - Foothill/Sunset** System #: **3110025**

Sample Site		2014				2015				2016			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
	Date	2/12/14	5/22/14	8/20/14	11/12/14	2/10/15	5/12/15	8/12/15	11/18/15	2/10/16			
3720 Cincinnati	Result	19.00	27.00	12.00	24.00	22.00	29.00	35.00	33.00	26.00			
	LRAA	19	23	19.3333	20.5	21.25	21.75	27.5	29.75	30.75			
	OEL	9.5	18.25	17.5	21.75	20	26	30.25	32.5	30			
5903 Sunset	Result	42.00	34.00	36.00	22.00	47.00	41.00	30.00	32.00	29.00			
	LRAA	42	38	37.3333	33.5	34.75	36.5	35	37.5	33			
	OEL	21	27.5	37	28.5	38	37.75	37	33.75	30			
2252 Penryn Rd (Changed from 2210 Taylor 08/2014 due to access)	Result	56.00	40.00	39.00	20.00	33.00	42.00	34.00	36.00	23.00			
	LRAA	56	48	45	38.75	33	33.5	32.25	36.25	33.75			
	OEL	28	34	43.5	29.75	31.25	34.25	35.75	37	29			
Ascension Sample Station	Result	36.00	31.00	19.00	20.00	26.00	30.00	25.00	33.00	28.00			
	LRAA	36	33.5	28.6667	26.5	24	23.75	25.25	28.5	29			
	OEL	18	24.5	26.25	22.5	22.75	26.5	26.5	30.25	28.5			
Claudio Sample Station	Result	39.00	32.00	22.00	20.00	28.00	43.00	25.00	32.00	41.00			
	LRAA	39	35.5	31	28.25	25.5	28.25	29	32	35.25			
	OEL	19.5	25.75	28.75	23.5	24.5	33.5	30.25	33	34.75			
Lake Forest	Result	31.00	25.00	38.00	25.00	33.00	52.00	36.00	38.00	32.00			
	LRAA	31	28	31.3333	29.75	30.25	37	36.5	39.75	39.5			
	OEL	15.5	20.25	33	28.25	32.25	40.5	39.25	41	34.5			
Ketchikan Sample Station	Result	22.00	32.00	23.00	23.00	32.00	41.00	30.00	36.00	30.00			
	LRAA	22	27	25.6667	25	27.5	29.75	31.5	34.75	34.25			
	OEL	11	21.5	25	25.25	27.5	34.25	33.25	35.75	31.5			
Becky Way Sample Station	Result	57.00	37.00	35.00	19.00	33.00	47.00	33.00	27.00	22.00			
	LRAA	57	47	43	37	31	33.5	33	35	32.25			
	OEL	28.5	32.75	41	27.5	30	36.5	36.5	33.5	26			
	Result												
	LRAA												
	OEL												
Overall	RAA	37.75	35	32.6667	29.9063	28.4063	30.5	31.25	34.1875	33.46875			

Brad Wilkins

Signature

3/9/2016

Date

Applegate Monthly Raw Water Temperature Readings

Year **2012**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	Septembe r	October	November	December
1	8.4	13.4	9.1	10.2	15.9	18.5	19.0	20.0	18.9	18.8	13.9	12.5
2	8.9	10.0	7.7	10.8	14.1	19.1	20.0	20.4	19.6	19.6	15.0	13.4
3	9.1	9.5	7.8	12.0	14.5	20.3	19.8	20.2	19.7	18.7	13.6	13.2
4	9.4	9.9	7.7	11.7	14.5	17.2	20.6	21.7	17.8	18.4	14.1	13.6
5	10.2	8.2	9.3	14.1	15.0	15.9	20.5	20.9	19.3	16.9	14.2	12.8
6	7.9	12.1	9.9	9.5	15.2	15.9	19.1	20.7	19.7	16.7	15.6	12.5
7	7.8	12.3	7.4	10.0	14.7	15.9	20.6	20.0	18.3	16.7	15.8	13.4
8	7.2	12.5	9.2	11.3	15.7	18.5	21.0	23.7	19.1	17.6	12.9	12.4
9	7.7	12.5	10.8	11.6	16.4	15.9	20.5	22.6	19.5	16.4	14.7	11.8
10	7.8	10.6	10.5	11.6	16.5	16.2	21.3	22.0	19.1	17.2	10.8	12.1
11	8.1	10.5	9.6	11.6	16.4	19.6	22.4	22.1	19.7	15.5	8.2	10.9
12	7.4	10.1	8.9	11.5	16.9	19.9	21.8	22.0	19.8	14.3	9.4	11.1
13	8.8	9.9	10.1	10.6	19.0	21.2	23.3	23.0	18.9	14.2	11.6	10.0
14	8.8	8.9	9.8	10.6	16.7	19.1	20.1	23.2	23.0	16.4	10.7	11.1
15	7.5	10.0	10.8	11.7	17.9	19.2	19.9	22.5	20.0	15.5	13.1	7.2
16	8.4	9.6	10.5	11.6	19.0	20.3	19.4	22.3	22.0	16.3	11.7	8.6
17	6.3	7.4	10.5	12.7	18.2	23.1	19.4	22.4	17.8	16.6	13.1	10.5
18	8.1	7.8	9.1	12.6	16.4	20.4	19.2	21.5	17.8	15.8	11.5	9.2
19	10.4	8.4	7.4	15.8	17.0	18.7	20.6	22.5	18.9	16.6	12.9	11.2
20	8.6	8.6	8.1	16.4	17.4	18.7	22.1	20.4	18.4	16.6	13.1	9.4
21	10.7	8.7	10.1	18.9	18.4	21.3	21.6	26.7	18.7	17.1	13.1	7.0
22	9.6	9.7	10.4	16.4	19.0	16.9	22.5	20.1	19.1	16.5	12.8	9.0
23	10.9	10.5	9.6	15.5	18.4	18.2	20.9	22.3	19.0	15.0	11.8	8.5
24	10.8	11.6	9.2	15.5	18.4	17.2	20.1	22.3	19.1	14.6	12.1	11.3
25	9.4	10.0	10.9	14.7	16.0	16.9	20.0	19.2	18.2	12.5	10.8	10.9
26	10.5	7.8	9.0	13.0	15.1	15.3	20.8	19.0	18.8	12.8	9.9	11.4
27	11.0	7.5	9.4	14.0	14.2	16.4	21.7	18.4	18.6	12.8	12.0	11.1
28	11.5	8.9	9.2	14.9	14.8	17.4	21.1	18.6	18.2	13.7	11.8	11.1
29	10.1	9.9	10.3	15.5	17.3	20.2	20.1	18.9	20.6	14.6	12.3	10.0
30	10.0		12.3	14.9	16.2	18.1	22.0	19.0	18.5	14.4	11.7	9.6
31	12.3		11.6		22.7		22.3	18.8	20.0	14.0		7.4

Applegate Monthly Raw Water Temperature Readings

Year **2013**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	Septembe r	October	November	December
1	9.9	10.0	10.5	13.1	15.6	16.8	21.9	20.6	20.2	15.7	10.7	8.6
2	6.7	8.4	11.2	11.9	15.3	20.4	23.3	18.2	19.5	15.3	11.4	9.0
3	9.7	9.5	11.2	13.0	17.9	18.1	25.9	19.6	19.3	13.5	12.7	11.1
4	6.0	10.3	11.3	13.1	16.7	18.6	24.8	21.4	19.1	14.6	10.3	6.9
5	9.3	9.4	10.3	13.8	16.3	19.7	22.9	18.9	18.8	13.3	9.8	8.6
6	8.2	8.0	11.8	13.7	15.9	19.3	20.8	21.5	18.4	14.1	10.8	3.4
7	8.9	7.5	8.2	13.6	14.8	20.6	21.6	20.8	18.7	14.5	11.0	6.7
8	6.8	6.6	8.1	12.2	15.1	21.7	22.8	20.3	19.1	13.6	12.7	5.6
9	8.6	7.2	9.5	10.2	14.7	22.4	22.7	20.0	19.1	13.5	101.4	2.0
10	8.9	7.3	10.1	11.8	16.3	18.7	22.6	18.8	20.8	14.1	12.9	1.8
11	8.0	8.3	10.3	14.2	18.2	17.8	19.8	18.8	19.0	13.7	10.8	4.4
12	8.7	7.4	11.7	13.6	19.1	18.0	19.6	19.6	18.3	12.6	12.0	5.4
13	6.7	9.3	11.2	14.7	17.9	17.1	21.5	18.7	20.3	12.8	12.6	7.6
14	5.8	8.2	12.5	13.6	17.8	18.7	21.6	18.9	20.8	13.1	12.6	5.6
15	6.9	9.9	12.5	13.4	17.2	18.9	21.6	20.8	19.3	13.9	14.6	7.8
16		10.0	12.4	13.5	16.9	18.3	19.2	21.2	19.9	12.4	10.8	8.0
17	8.4	10.4	11.8	13.7	16.2	19.2	21.0	21.0	19.3	12.8	10.3	8.9
18	6.6	10.1	12.3	13.7	15.0	16.8	22.0	20.8	17.8	12.8	10.7	8.9
19	6.3	8.2	11.8	13.4	18.1	17.8	22.4	22.4	16.4	13.0	12.1	9.1
20	8.8	5.8	11.6	15.5	15.9	17.3	21.5	22.9	17.8	13.0	10.5	5.5
21	7.8	9.7	12.3	16.9	15.6	17.3	21.8	22.0	18.3	12.8	12.4	7.6
22	8.9	9.6	11.3	15.3	15.0	18.6	21.0	21.7	16.6	13.5	10.9	5.8
23	9.1	9.4	12.3	17.3	15.0	12.5	21.1	21.6	15.5	12.8	11.3	6.7
24	9.4	7.0	10.7	15.4	12.8	16.9	21.4	20.6	15.7	13.0	7.7	6.8
25	10.4	8.8	12.0	14.5	13.3	17.2	21.8	18.3	14.6	14.5	9.4	8.4
26	9.7	9.3	11.8	14.5	15.7	17.2	22.7	18.5	13.2	12.3	8.9	7.2
27	9.9	7.7	12.3	15.6	14.2	20.0	22.0	22.4	15.5	13.0	8.6	7.0
28	7.0	9.5	13.3	16.0	13.7	20.4	21.3	19.5	15.5	11.4	11.4	8.7
29	9.2		11.7	17.7	15.0	20.4	20.6	21.0	16.4	12.2	9.0	7.4
30	9.0		14.0	18.9	15.2	21.2	21.0	20.1	16.3	10.9	8.8	7.2
31	9.3		13.2		17.7		21.2	19.6		12.3		8.0

Bowman Monthly Raw Water Temperature Readings

Year **2012**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	Septembe r	October	November	December
1	7.2	7.0	6.5	7.7	8.4	11.1	11.4	15.4	16.3	18.8	12.5	11.8
2	7.6	6.3	7.7	7.3	7.4	10.9	12.3	16.5	18.6	18.7	12.0	12.1
3	7.4	5.9	6.6	7.4	8.2	10.6	12.0	17.4	17.0	18.4	12.2	10.5
4	7.6	6.1	7.0	8.0	8.0	9.8	12.7	17.0	17.7	18.0	12.4	11.2
5	7.4	6.3	7.1	6.5	8.4	9.5	13.1	15.4	16.9	18.0	12.5	10.8
6	6.9	6.3	6.9	6.6	7.5	11.4	13.2	15.3	17.9	17.9	13.2	10.9
7	6.7	6.3	4.9	6.8	8.2	10.5	11.9	15.2	18.9	17.4	12.8	9.1
8	7.2	6.7	5.8	6.7	8.7	11.0	13.1	15.8	18.7	17.9	11.5	7.8
9	6.7	6.5	6.5	7.7	8.5	10.4	12.2	16.1	17.7	17.9	8.8	8.8
10	6.7	6.7	7.0	7.5	8.1	10.0	12.9	16.2	17.9	17.8	8.2	8.9
11	7.5	7.0	6.9	8.2	8.1	10.0	13.4	16.1	17.6	17.9	5.8	8.8
12	6.3	6.7	6.8	7.9	8.4	10.1	14.0	16.5	17.7	18.0	6.4	9.0
13	6.6	6.8	7.0	8.5	10.8	10.8	15.4	16.7	18.3	17.7	7.4	8.7
14	6.3	6.3	8.6	8.3	9.0	11.2	13.3	16.9	18.4	17.6	8.8	7.9
15	6.1	6.1	8.4	7.3	11.2	11.0	14.0	17.0	18.6	15.1	8.9	7.9
16	6.5	6.0	8.5	8.4	9.5	11.0	13.7	17.3	18.4	16.7	9.6	8.8
17	4.9	6.0	8.7	7.5	9.0	11.3	13.8	17.6	17.6	17.2	12.6	9.2
18	6.2	6.1	7.3	8.2	10.1	10.7	13.2	17.3	17.7	15.6	12.3	8.7
19	6.4	6.2	7.0	7.4	8.7	10.9	15.0	16.8	17.9	15.6	12.1	7.3
20	7.1	6.6	7.7	8.6	9.2	10.5	15.3	17.0	17.7	15.3	12.1	7.2
21	7.9	6.7	8.2	8.9	9.2	11.2	14.6	16.8	18.0	14.6	12.3	7.8
22	6.6	7.1	8.3	9.7	9.2	11.8	14.7	16.9	18.1	12.3	11.3	8.2
23	7.8	6.3	7.0	9.5	9.6	10.9	14.4	17.5	18.3	11.5	11.6	7.9
24	6.9	6.7	7.3	8.3	9.9	10.5	15.6	17.8	18.1	10.8	11.4	8.4
25	7.1	6.8	7.5	8.7	9.1	10.2	16.0	17.8	17.8	11.3	11.3	7.9
26	7.7	5.3	7.5	8.8	9.2	11.1	16.0	16.3	19.0	10.7	10.9	7.9
27	6.8	6.0	7.5	7.9	8.4	11.2	16.8	16.7	18.7	12.0	11.0	7.0
28	6.5	5.9	7.4	7.7	9.3	11.3	17.2	16.4	18.6	12.1	11.5	6.7
29	6.5	6.3	8.5	8.0	9.5	11.8	15.3	16.5	18.4	12.6	11.8	7.1
30	6.8		8.8	8.0	9.6	11.6	14.6	16.9	18.3	12.4	12.0	6.9
31	6.6		8.9				14.6	18.7		12.3		6.0

Bowman Monthly Raw Water Temperature Readings

Year **2013**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	Septembe r	October	November	December
1	6.0	4.7	4.5	6.0	7.4	11.7	14.8	16.5	19.3	18.1	10.3	10.6
2	5.4	4.7	5.0	5.6	7.4	11.7	16.4	18.2	19.8	18.0	10.7	12.6
3	5.9	4.5	5.3	7.3	7.7	11.4	15.0	18.3	20.4	17.2	10.4	11.3
4	5.9	4.6	5.0	6.1	8.4	11.4	14.6	16.7	19.6	16.9	9.1	8.9
5	6.2	4.6	4.9	6.1	8.3	11.9	15.9	17.3	19.6	16.9	8.8	8.7
6	6.2	4.3	5.5	6.2	8.5	11.8	15.8	17.8	18.9	16.6	9.0	8.4
7	5.7	4.6	4.8	6.1	8.1	11.8	14.8	17.4	19.0	16.6	10.5	8.0
8	5.7	4.1	4.4	5.9	8.1	12.8	14.7	17.9	19.6	16.6	10.2	7.5
9	6.0	3.9	4.6	5.6	8.4	13.4	16.8	17.5	19.7	16.4	10.5	7.6
10	5.3	4.5	4.5	5.8	8.4	12.7	15.2	18.2	19.3	16.4	10.4	7.9
11	4.9	4.4	4.7	6.4	8.6	12.0	15.1	17.4	19.3	16.0	12.3	8.0
12	4.5	4.2	5.0	6.1	9.1	12.4	14.7	17.8	19.1	16.2	12.9	7.9
13	4.4	4.5	5.3	6.7	8.8	12.1	15.3	17.9	19.6	15.6	12.7	7.8
14	4.4	4.8	5.4	6.2	8.9	12.4	15.1	17.7	19.4	15.4	12.6	7.9
15	4.6	4.6	5.4	6.4	9.7	12.7	15.5	19.1	19.0	14.1	12.2	7.9
16	4.5	4.7	5.3	5.6	8.9	12.8	16.6	19.4	18.8	13.0	11.8	8.3
17	4.5	4.6	5.2	5.5	9.2	12.8	15.6	18.7	18.6	12.8	11.6	8.7
18	4.6	4.8	4.9	5.9	9.4	12.8	15.7	19.3	18.4	12.5	11.8	8.8
19	4.6	4.4	5.6	6.3	9.8	12.6	16.4	19.0	18.4	12.8	12.5	8.4
20	4.5	3.6	4.9	6.6	9.8	12.3	17.5	19.3	18.2	12.8	12.8	7.1
21	4.6	4.4	5.8	6.7	10.4	13.5	17.1	19.1	18.6	12.9	12.4	7.6
22	4.5	4.3	5.6	6.9	9.4	13.8	16.3	20.5	17.4	12.8	11.1	7.8
23	4.9	4.9	4.6	6.9	9.7	12.8	15.9	18.7	17.6	12.8	11.7	7.8
24	5.5	3.8	5.6	6.8	10.3	13.3	16.4	19.2	17.9	12.8	11.5	7.9
25	5.4	4.1	5.7	6.9	10.8	13.2	16.7	19.0	18.1	12.3	11.1	7.7
26	5.5	3.9	5.0	7.0	10.4	13.3	17.0	18.9	18.3	12.3	10.8	7.7
27	4.5	4.3	5.8	7.2	10.4	14.1	17.0	19.1	17.6	12.3	11.4	7.7
28	4.1	4.5	5.8	7.3	11.3	13.9	18.6	19.6	18.3	12.4	11.1	7.4
29	4.2		6.1	7.8	11.1	14.1	16.9	19.3	17.8	10.9	11.5	7.5
30	4.6		6.7	7.7	11.2	14.1	16.4	19.1	18.3	9.4	11.2	7.3
31	4.7		6.7		10.9		18.6	19.6		9.5		7.7

Applegate Monthly Raw Water Temperature Readings

Year **2014**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	September	October	November	December
1	8.7	9.5	10.6	10.3	15.5	19.6	21.1	21.7	19.0	15.5	14.7	11.8
2	7.1	8.1	10.4	7.1	14.7	17.3	20.3	21.6	19.3	15.5	11.8	12.1
3	7.6	6.4	9.7	10.5	14.4	19.2	20.4	20.8	19.4	16.4	13.7	11.4
4	9.0	7.9	10.0	10.5	14.1	18.1	20.5	20.7	19.2	16.6	13.3	12.5
5	8.8	5.5	10.9	9.9	13.4	19.3	20.7	20.5	20.1	16.6	12.7	11.8
6	8.9	5.6	11.8	11.4	14.7	18.7	22.5	19.4	20.4	16.8	13.6	11.8
7	6.9	8.5	11.5	12.0	14.6	19.4	20.6	22.8	19.1	16.9	14.1	11.4
8	7.2	7.7	11.6	12.3	12.9	20.6	21.9	21.4	18.5	16.8	13.9	12.7
9	7.5	10.0	11.1	13.1	14.3	20.4	20.7	20.8	17.5	16.9	12.7	11.2
10	8.3	10.3	12.2	12.9	14.6	20.1	20.8	21.0	17.6	16.6	13.7	12.3
11	8.9	10.8	12.1	13.9	13.2	19.4	20.8	20.3	18.2	16.1	12.5	12.2
12	7.8	8.6	11.5	14.7	14.7	19.7	20.0	20.0	25.2	16.2	12.3	12.3
13	8.5	10.2	9.6	15.1	14.4	19.3	22.6	18.9	24.2	15.7	13.1	12.8
14	8.7	10.1	11.4	13.1	16.6	16.4	23.9	19.4	23.6	16.2	13.9	10.6
15	7.5	11.1	11.8	14.2	17.3	16.4	22.4	25.5	23.4	15.9	13.4	8.9
16	9.9	10.9	13.1	14.9	16.6	16.6	22.2	20.2	21.8	15.7	12.9	10.8
17	7.8	9.9	12.5	14.1	15.9	15.9	22.0	19.4	22.5	15.0	10.9	11.4
18	9.3	9.9	12.8	15.0	17.3	16.8	20.2	19.2	18.7	14.7	10.1	10.3
19	7.6	10.6	11.9	16.3	15.6	17.0	20.4	19.0	18.5	15.0	11.9	9.5
20	9.2	10.3	12.2	13.4	14.0	20.4	21.4	21.7	22.4	14.8	12.3	11.5
21	7.0	8.4	12.8	15.4	15.9	18.8	20.5	20.2	17.2	14.6	10.2	10.1
22	9.9	10.6	13.2	14.3	15.5	17.7	20.2	20.4	18.7	13.9	10.7	12.0
23	8.3	11.1	11.3	14.0	16.9	17.8	19.1	20.3	18.5	14.4	12.3	10.0
24	7.8	10.6	12.3	13.4	17.6	18.3	19.1	19.2	17.4	13.9	9.3	11.3
25	10.9	11.6	13.6	12.9	17.8	18.7	20.0	20.1	18.8	14.7	10.6	11.8
26	10.0	11.7	11.8	12.0	19.3	19.2	20.3	19.2	16.0	15.4	10.0	9.8
27	10.0	9.9	11.1	12.8	17.3	17.7	20.8	19.1	19.3	14.1	10.5	5.7
28	9.7	11.6	10.0	11.9	16.8	18.4	20.8	19.6	14.8	12.9	11.6	8.5
29	9.8		11.4	13.4	19.2	18.4	21.1	19.9	15.5	13.2	10.2	8.2
30	9.6		11.1	14.1	16.7	19.7	21.2	19.4	15.5	15.5	11.4	7.4
31	8.6		9.2		16.2		21.8	20.7		13.7		9.6

Applegate Monthly Raw Water Temperature Readings

Year **2015**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	September	October	November	December
1	7.7	10.7	7.5	13.2	16.9	15.5	23.1	21.2	18.2	16.5	15.0	9.3
2		10.3	11.5	12.6	18.2	16.5	23.1	21.6	18.3	16.9	14.1	9.9
3	3.6	10.9	11.8	10.9	15.8	19.2	22.8	21.1	17.7	16.6	14.9	10.3
4	8.2	9.9	10.7	15.4	15.5	19.2	23.2	19.9	18.3	17.8	12.3	9.2
5	5.9		10.7	10.9	18.5	18.8	22.5	18.7	15.7	16.1	13.5	10.1
6	7.9	10.3	9.3	9.4	16.4	17.3	21.2	19.9	15.9	15.8	12.4	9.5
7	9.6	10.5	10.2	11.4	15.6	18.4	20.8	19.5	16.9	16.4	9.9	11.4
8	8.3	11.7	11.2	10.6	15.0	20.0	20.0	19.5	17.1	17.6	11.0	9.0
9	8.7	11.8	12.7	9.1	15.8	21.7	20.7	19.3	18.4	17.8	9.6	9.6
10	8.9	11.6	13.0	12.2	14.3	19.6	18.5	21.6	19.4	off	8.6	11.4
11	9.7	11.6	13.1	12.6	14.9	20.0		19.2	23.3	17.0	9.0	9.1
12	8.8	11.5	11.9	12.8	14.1	21.2	18.7	18.4	19.8	18.0	9.5	11.4
13	9.8	11.1	12.3	12.9	12.5	21.4	18.7	18.7	19.7	17.5	9.4	7.8
14	10.7	12.8	14.1	13.9	15.4	20.1	19.2	19.9	19.1	19.1	9.6	8.8
15	7.8	11.4	13.3	14.7	14.8	20.0	20.0	18.9	17.4	18.2	11.1	9.5
16	9.2	11.6	13.4	13.6	14.3	20.3		19.2	18.4	17.2	11.6	5.0
17	8.9	11.8	14.3	12.1	14.0	19.7	21.7	20.0	15.2	17.8	11.4	8.3
18	9.4	12.2	12.7	18.2	13.9	19.2	21.8	20.4	17.5	16.3	8.4	8.5
19	10.8	12.1	12.5	13.7	12.0	25.0	19.8	19.6	16.4	15.8	11.3	8.5
20	9.3	11.8	12.5	15.2	15.3	18.8	20.6	19.4	17.0	16.4	12.5	8.5
21	10.5	12.0	12.9	15.9	14.0	18.4	21.6	21.2	17.3	15.0	11.3	8.9
22	10.8	10.5	13.2	16.3	15.0	17.6	20.9	21.0	19.1	16.1	11.1	9.7
23	7.8	8.5	13.0	14.6	15.5	18.1	19.0	19.5	16.0	16.4	10.7	10.5
24	8.9	10.6	11.8	15.5	14.6	19.2	20.4	19.5	16.8	14.6	12.4	9.3
25	9.5	11.8	12.8	13.1	15.5	25.4	20.6	19.6	19.2	14.5		10.8
26	11.0	8.7	13.9	12.7	15.9	21.0	18.9	20.8	19.3	15.5	11.0	6.6
27	10.2	10.0	14.8	15.1	17.8	21.6	19.1	20.4	18.1	15.3	6.0	7.2
28	9.3	9.9	14.9	15.9	16.5	21.0	20.0	20.4	17.8	15.6	5.6	7.8
29			14.8	17.6	17.7	21.0	20.4	20.0	18.4	15.7	9.2	8.2
30	9.5		14.9	17.9	20.5	21.9	21.5	18.5	16.5	14.6	8.3	8.2
31	9.2		15.0		17.8		22.5	17.8		13.4		4.8

Bowman Monthly Raw Water Temperature Readings

Year **2014**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	September	October	November	December
1	17.1	6.1	7.9	6.8	9.1	10.5	14.7	15.0	17.1	18.4	10.6	12.7
2	18.1	6.4	7.8	7.6	9.7	10.8	11.7	14.7	18.1	16.9	9.9	12.2
3	17.3	6.6	7.8	7.6	10.0	10.9	11.8	14.1	17.3	18.0	9.2	12.6
4	17.0	6.2	8.1	7.7	10.0	11.2	11.8	14.5	17.0	18.2	9.6	11.9
5	17.3	6.0	8.4	7.4	10.2	11.6	12.0	14.7	17.3	18.5	10.5	12.2
6	17.8	6.7	10.3	7.9	10.3	12.5	12.6	15.6	17.8	17.6	13.2	12.6
7	16.7	7.4	7.7	8.2	9.0	11.9	12.3	16.4	16.7	17.8	11.5	11.4
8	17.3	7.7	7.7	9.0	10.3	11.5	12.9	16.8	17.3	17.5	12.7	11.3
9	17.7	9.7	8.4	8.4	11.2	11.6	12.5	14.7	17.7	17.3	12.0	11.1
10	17.4	9.1	8.9	9.0	10.1	11.4	12.5	16.2	17.4	17.8	11.9	11.1
11	18.4	7.9	7.5	8.2	9.7	11.8	12.3	15.0	18.4	18.7	11.4	11.4
12	17.9	7.8	7.4	8.3	10.5	11.5	13.0	15.2	17.9	16.8	11.8	10.2
13	17.0	8.2	7.6	8.3	11.0	11.2	13.3	16.4	17.0	16.7	11.6	10.4
14	17.7	8.4	7.8	8.2	11.5	11.5	13.5	16.9	17.7	17.1	12.5	9.9
15	17.0	8.2	8.0	9.2	10.0	10.7	13.3	16.7	17.0	17.1	10.2	9.7
16	18.2	8.2	8.2	8.5	10.6	11.8	13.6	15.9	18.2	14.6	8.7	10.0
17	18.7	7.2	8.0	8.9	12.0	10.7	12.9	15.1	18.7	14.2	12.7	10.0
18	18.0	7.1	7.1	8.3	11.2	11.4	13.2	15.6	18.0	13.5	12.5	10.0
19	17.6	7.8	7.8	9.1	9.8	11.4	14.4	15.9	17.6	14.6	12.9	9.7
20	18.1	7.0	8.1	8.2	9.6	11.6	13.0	15.9	18.1	14.3	13.3	10.2
21	17.8	6.9	7.7	8.7	10.5	12.7	13.5	15.8	17.8	12.8	12.9	10.3
22	17.7	7.0	7.8	8.6	10.4	12.6	14.0	15.7	17.7	12.4	12.8	9.7
23	17.8	2.3	7.9	8.0	13.0	11.8	12.7	17.3	17.8	13.2	12.1	9.5
24	17.5	7.1	8.1	8.5	11.0	11.7	13.8	17.0	17.5	14.6	11.8	9.2
25	17.6	7.7	7.8	8.8	11.4	12.8	13.6	15.9	17.6	13.2	12.6	7.8
26	17.3	7.9	8.0	8.9	11.2	12.2	13.4	16.2	17.3	12.5	12.3	7.4
27	18.0	8.3	8.1	8.4	11.6	12.5	14.1	16.3	18.0	11.4	12.6	7.8
28	17.4	7.9	8.2	8.2	10.5	11.3	14.8	17.0	17.4	11.3	11.9	7.7
29	16.9		8.4	8.8	10.6	12.2	14.2	16.9	16.9	12.3	12.8	7.1
30	18.2		7.8	9.0	11.0	12.5	14.4	17.0	18.2	13.7	12.7	6.9
31			7.8		10.5		16.0	17.1		13.2		6.3

Bowman Monthly Raw Water Temperature Readings

Year **2015**

Day	Daily Temperature in Degrees Celicus											
	Janurary	February	March	April	May	June	July	August	September	October	November	December
1	6.7	6.5	6.4	7.1	10.2	10.1	13.2	15.5	17.8	17.8	13.1	9.4
2	6.5	7.1	6.7	6.7	10.1	10.5	12.5	15.3	16.9	17.6	12.4	9.8
3	6.6	7.2	6.8	7.4	9.0	10.4	12.7	15.3	16.4	17.5	10.2	9.8
4	6.9	7.2	6.4	7.1	9.3	10.6	13.4	14.9	16.6	17.0	9.2	9.9
5	6.9	7.3	6.9	7.7	9.3	11.3	12.8	14.7	16.5	16.9	8.2	8.9
6	7.3	7.3	7.0	6.8	9.5	11.3	13.6	14.6	16.2	17.3	8.5	9.5
7	7.2	8.4	7.3	7.1	8.9	10.8	13.3	16.4	16.4	17.6	8.7	10.5
8	7.2	7.8	6.9	8.6	9.8	11.4	12.7	15.8	16.9	17.7	9.1	10.3
9	7.8	8.4	7.0	7.1	10.6	11.7	12.5	16.1	18.0	18.2	8.9	10.0
10	7.7	6.9	7.8	7.8	8.7	10.9	12.6	16.1	17.8	18.7	7.2	10.4
11	7.2	7.2	8.2	7.6	9.7	11.1	12.8	16.2	17.9	17.3	7.4	9.5
12	7.3	7.3	7.4	7.8	9.2	11.3	12.8	16.1	17.2	17.5	7.0	8.7
13	6.9	7.4	7.8	8.0	8.8	12.3	13.2	16.1	17.2	17.4	7.7	9.1
14	6.8	7.5	8.7	7.3	8.7	11.7	12.9	16.3	17.2	17.3	12.5	8.2
15	7.0	7.4	8.0	7.2	8.5	11.8	13.0	17.2	17.1	17.5	11.6	7.3
16	7.3	7.3	7.8	8.4	8.9	12.0	13.3	16.7	16.7	16.5	11.0	7.2
17	7.4	7.2	7.8	9.7	9.1	12.4	13.5	16.7	16.7	17.2	10.4	8.6
18	7.3	7.8	9.0	8.0	8.9	12.6	13.3	16.9	16.8	15.2	11.7	7.8
19	7.4	7.2	7.8	8.4	9.5	12.8	13.8	17.1	16.5	13.8	11.6	8.2
20	7.0	7.7	9.1	8.6	9.8	11.4	14.1	17.1	16.5	13.4	11.8	7.4
21	6.3	7.4	7.8	8.3	9.6	11.1	14.3	17.0	17.3	14.1	11.7	8.0
22	7.1	6.7	7.8	8.2	10.3	11.0	13.8	17.8	17.9	14.2	11.7	9.1
23	6.4	6.4	8.1	8.3	10.1	11.3	13.7	17.0	16.7	14.2	11.7	8.4
24	7.5	6.5	8.1	8.8	9.8	11.8	13.2	17.1	17.2	14.6	11.4	7.2
25	6.9	6.8	7.5	8.5	10.9	12.6	13.3	17.6	17.4	14.1	10.5	6.5
26	7.1	6.5	8.0	8.0	10.6	12.1	13.5	17.4	17.6	12.7	9.7	5.8
27	7.3	6.8	8.0	8.5	10.9	14.6	13.6	17.6	17.5	13.1	9.4	6.4
28	6.7	7.1	8.2	9.0	11.0	12.1	14.1	17.4	18.5	13.2	9.1	7.0
29	6.8		7.8	8.9	10.7	12.3	14.3	18.1	17.3	12.8	8.8	5.7
30	7.1		7.8	9.9	10.7	13.2	14.6	16.8	17.1	11.4	9.5	5.7
31	7.1		7.7		10.9		15.0	19.0		12.1		5.5

	Cascade Shores			Loma Rica			Elizabeth George			Lake of the Pines			Lake Wildwood			North Auburn			Smartville		
Date	Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water		Peak Raw Water Turbidity	Daily Average Treated Water	
Jan-11	1.2	0.04		1.5	0.03		2.8	0.02		19.5	0.02		8.8	0.03		39.7	0.04		5.5	0.03	
Feb-11	1.4	0.04		1.5	0.03		6	0.03		9	0.03		7	0.03		18.1	0.04		7.1	0.04	
Mar-11	1.6	0.04		3	0.02		11.1	0.03		15.7	0.03		19.2	0.04		27.9	0.04		8.3	0.04	
Apr-11	1.5	0.04		3.8	0.03		7.1	0.04		16.8	0.02		10.4	0.03		23.9	0.04		5.1	0.04	
May-11	1.1	0.04		4.1	0.02		7.5	0.04		5.4	0.03		9.1	0.03		6.6	0.05		6.2	0.04	
Jun-11	1.3	0.05		2.7	0.03		7.7	0.03		6.2	0.03		6.8	0.03		4	0.06		7.2	0.04	
Jul-11	1.5	0.04		3.2	0.04		9.4	0.03		6.7	0.03		6.9	0.03		3.6	0.05		7.3	0.04	
Aug-11	1.4	0.04		3.3	0.03		9.4	0.04		5.8	0.03		4.8	0.03		3.9	0.05		5.2	0.04	
Sep-11	1.4	0.05		3.1	0.05		6.3	0.03		4.5	0.03		3.4	0.03		10.3	0.04		6.4	0.04	
Oct-11	1.3	0.04		2.3	0.03		7.1	0.03		4.4	0.03		5.1	0.03		11.3	0.04		2.9	0.05	
Nov-11	1	0.03		1.4	0.03		7.6	0.03		2.4	0.03		3	0.04		6.1	0.03		2.1	0.05	
Dec-11	1	0.02		1	0.05		7.2	0.03		2.5	0.03		4.2	0.04		4.1	0.03		1.9	0.04	
Jan-12	1.4	0.03		2.1	0.05		off			4.6	0.03		5.7	0.03		9.4	0.04		5.9	0.04	
Feb-12	1	0.02		1.4	0.03		off			6.7	0.03		7.7	0.04		9.6	0.03		4.7	0.04	
Mar-12	2	0.02		3.4	0.04		10.7	0.04		11.6	0.03		11.4	0.04		33.1	0.04		8.9	0.05	
Apr-12	2.1	0.03		5.2	0.04		9.6	0.04		10	0.03		10.7	0.05		21.5	0.04		9.5	0.05	
May-12	1.3	0.02		4.2	0.03		6.5	0.04		7.1	0.03		7.8	0.05		10.8	0.04		4.2	0.04	
Jun-12	1	0.03		4.5	0.05		9.8	0.03		5.4	0.03		7	0.04		13.8	0.05		2.9	0.05	
Jul-12	1	0.03		3.9	0.06		12.8	0.03		5.6	0.04		6.4	0.03		17.9	0.04		2.1	0.04	
Aug-12	1	0.02		3.2	0.04		8.7	0.03		4.5	0.04		6.3	0.03		9.6	0.04		2.6	0.04	
Sep-12	1	0.02		2.8	0.04		6.3	0.03		3.9	0.04		5.4	0.03		8.2	0.04		3.7	0.05	
Oct-12	1.1	0.02		2.7	0.04		4.8	0.04		3.5	0.05		4.5	0.04		6.9	0.05		3.6	0.05	
Nov-12	2	0.02		3.4	0.03		5.2	0.04		2.6	0.05		4.8	0.05		9.9	0.05		2.7	0.05	
Dec-12	1.9	0.03		5.3	0.03		7.1	0.05		12.3	0.05		9.9	0.05		31.5	0.07		8.7	0.04	
Jan-13	1.1	0.03		2.2	0.03		2.9	0.05		11.7	0.05		8.3	0.04		22.5	0.06		3.4	0.03	
Feb-13	1	0.03		3.4	0.03		2.7	0.04		5.4	0.03		3.4	0.04		17.2	0.05		2.7	0.03	
Mar-13	1.1	0.03		4.7	0.03		3.3	0.04		4.2	0.03		3.5	0.04		8.5	0.05		4.6	0.04	
Apr-13	1.2	0.03		3.1	0.05		6.2	0.05		5.2	0.04		6.4	0.04		6.6	0.05		5.2	0.06	
May-13	1.4	0.03		4	0.04		5.6	0.04		4.7	0.03		8.1	0.03		5	0.06		3	0.04	
Jun-13	1	0.03		2.9	0.02		3	0.05		5.6	0.03		6.4	0.03		5.7	0.05		2.3	0.04	
Jul-13	1.1	0.03		2.7	0.03		3.2	0.04		8.4	0.03		6.3	0.03		9.2	0.05		1.4	0.04	
Aug-13	1	0.03		2.2	0.03		2.4	0.04		6.3	0.03		7.7	0.03		9	0.04		2.4	0.04	
Sep-13	1	0.03		2.6	0.03		2.4	0.05		4.7	0.03		3.8	0.06		14.1	0.04		3.7	0.04	
Oct-13	1	0.03		2.8	0.03		1.7	0.04		5.4	0.03		3.1	0.05		12.9	0.04		2.2	0.03	
Nov-13	1.2	0.03		2.1	0.04		2.8	0.05		3.2	0.03		3	0.04		5.8	0.04		1.9	0.03	
Dec-13	1	0.03		off			2.6	0.04		2.7	0.03		2.8	0.04		5	0.04		1.8	0.03	
Jan-14	1	0.03		2.3	0.02		2.7	0.04		3	0.03		3.5	0.04		3.3	0.04		3	0.03	
Feb-14	1.1	0.03		4.8	0.03		3.2	0.04		15.8	0.03		6.1	0.06		30.1	0.04		5.4	0.04	
Mar-14	1.3	0.03		3.8	0.04		6.1	0.03		6.6	0.03		8.9	0.06		14.7	0.04		9	0.04	
Apr-14	1.1	0.03		3.1	0.05		3.7	0.04		5.3	0.03		5.6	0.06		6.8	0.04		5.9	0.04	
May-14	1	0.02		2.4	0.03		2.9	0.05		4.3	0.03		4.8	0.03		3	0.04		4.5	0.04	
Jun-14	0.7	0.02		1.9	0.04		1.3	0.06		4.3	0.03		4.6	0.04		3.4	0.03		4	0.04	
Jul-14	0.9	0.02		2.9	0.03		1.5	0.05		3.1	0.03		4.8	0.04		3.6	0.03		5	0.03	
Aug-14	1	0.02		2	0.02		1.4	0.04		3.8	0.03		4.1	0.03		3.3	0.03		5.5	0.03	
Sep-14	1.4	0.03		1.6	0.02		1.7	0.04		3.2	0.03		3.9	0.03		5.5	0.04		5.3	0.03	
Oct-14	1	0.03		6.5	0.04		1.4	0.03		3.2	0.03		3.1	0.04		14.6	0.05		2.8	0.03	
Nov-14	1.3	0.03		off			1.7	0.03		3.8	0.03		4	0.03		8.7	0.04		3.5	0.03	
Dec-14	2	0.03		off			3.1	0.04		6.4	0.02		6.7	0.05		14.7	0.04		16.1	0.06	
Jan-15	1	0.03		1	0.03		1.7	0.03		1.7	0.03		3.4	0.04		6.6	0.04		5.2	0.03	
Feb-15	2.3	0.05		1.3	0.03		1.2	0.04		2.5	0.02		3.9	0.04		7.3	0.04		6.6	0.03	
Mar-15	1.2	0.04		1.2	0.04		1.5	0.03		1.7	0.04		2.2	0.04		2.4	0.06		7.2	0.03	
Apr-15	3.1	0.03		off			2.2	0.03		2.1	0.05		2.8	0.04		2.5	0.07		12.2	0.04	
May-15	4.3	0.04		off			1.7	0.05		2.2	0.04		2.6	0.05		3.5	0.08		6.3	0.03	
Jun-15	1.2	0.03		1.5	0.05		2	0.04		3	0.05		2.7	0.04		5	0.06		4.4	0.03	
Jul-15	2.3	0.02		1.8	0.03		2.1	0.03		2	0.05		2.2	0.03		5.9	0.04		14.1	0.04	
Aug-15	2.6	0.02		2.3	0.03		2.5	0.04		2.3	0.04		2.1	0.03		6.1	0.04		9.8	0.03	
Sep-15	1.1	0.03		1.7	0.04		2.1	0.03		2.1	0.04		1.8	0.04		4.5	0.04		7.6	0.03	
Oct-15	6.2	0.03		1.9	0.04		3	0.04		3.1	0.03		1.6	0.04		10.7	0.04		6.9	0.03	
Nov-15	1.7	0.03		1.6	0.04		1.3	0.04		2.5	0.02		1.7	0.03		7.6	0.04		7.8	0.03	
Dec-15	2.6	0.04		off			2.6	0.04		3	0.02		8.3	0.04		11.2	0.04		7.7	0.04	
			% rem			% rem			% rem			% rem			% rem			% rem			% rem
min	0.7	0.02		1	0.02		1.2	0.02		1.7	0.02		1.6	0.03		2.4	0.03		1.4	0.03	
max	6.2	0.05		6.5	0.06		12.8	0.06		19.5	0.05		19.2	0.06		39.7	0.08		16.1	0.06	
average	1.5	0.03	97.9%	2.8	0.03	98.8%	4.6	0.04	99.2%	5.6	0.03	99.4%	5.6	0.04	99.3%	10.8	0.04	99.6%	5.4	0.04	99.3%
median	1.2	0.03		2.7	0.03		3.05	0.04		4.5	0.03		4.8	0.04		8.35	0.04		5.15	0.04	
95th	2.6	0.0		4.9	0.1		9.9	0.1		15.7	0.1		10.4	0.1		30.2	0.1		9.9	0.1	

Cascade Shores

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
2/7/11	18	1.20	1.20	0.0%
5/9/11	14	0.75	0.57	24.0%
8/8/11	10	1.30	1.00	23.1%
11/8/11	12	1.20	0.88	26.7%
2/8/12	14	1.40	0.82	41.4%
5/9/12	11	1.40	1.00	28.6%
8/7/12	12	1.40	1.20	14.3%
11/19/12	12	1.60	1.20	25.0%
2/13/13	14	1.30	0.87	33.1%
5/14/13	12	1.70	1.30	23.5%
8/7/13	13	1.40	0.82	41.4%
11/18/13	14	1.60	1.40	12.5%
2/11/14	14	1.50	1.40	6.7%
5/13/14	12	1.60	1.10	31.3%
8/12/14	12	1.30	1.00	23.1%
11/11/14	16	1.20	1.10	8.3%
2/17/15	13	1.80	1.10	38.9%
5/27/15	12	1.50	1.10	26.7%
8/12/15	14	1.50	1.20	20.0%
11/17/15	15	1.60	0.94	41.3%
ave	13	1.4	1.1	24%
median		1.60		
min		0.75		
max		1.80		
95th		1.705		

Loma Rica

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
2/7/11	9	1.1	0.69	37.3%
5/9/11	13	0.8	0.49	36.4%
8/8/11	10	2.3	2.00	13.0%
11/8/11	12	1.4	0.87	37.9%
2/8/12	11	1.3	0.86	33.8%
5/9/12	12	1.5	1.10	26.7%
8/7/12	13	1.3	1.40	-7.7%
11/19/12	16	1.6	0.96	40.0%
2/13/13	14	1.3	1.20	7.7%
5/15/13	12	1.7	1.10	35.3%
8/7/13	14	1.4	1.10	21.4%
2/11/14	23	1.5	0.82	45.3%
5/13/14	12	1.8	1.20	33.3%
8/12/14	12	1.5	1.00	33.3%
2/17/15	13	1.7	1.20	29.4%
6/23/15	12	1.6	1.30	18.8%
8/12/15	14	1.6	1.30	18.8%
11/17/15	17	1.3	1.10	15.4%
ave	13	1.5	1.1	26%
median		1.5		
min		0.8		
max		2.3		
95th		1.875		

Elizabeth George

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
2/7/11	16	1.10	0.67	39.1%
5/9/11	13	0.75	0.55	26.7%
8/8/11	9	1.80	1.10	38.9%
11/8/11	13	1.20	0.90	25.0%
3/12/12	11	1.30	0.84	35.4%
5/9/12	11	1.50	1.20	20.0%
8/7/12	13	1.60	0.97	39.4%
11/19/12	23	1.80	1.10	38.9%
2/20/13	14	1.40	0.92	34.3%
5/15/13	12	1.50	1.30	13.3%
8/7/13	17	1.50	1.10	26.7%
11/13/13	21	0.92	0.76	17.4%
2/11/14	14	1.40	0.85	39.3%
5/13/14	12	1.70	1.30	23.5%
8/12/14	12	1.50	1.20	20.0%
11/11/14	16	1.10	0.94	14.5%
2/17/15	14	1.60	1.00	37.5%
5/27/15	12	1.70	1.20	29.4%
8/12/15	13	1.60	1.30	18.8%
11/17/15	17	1.40	0.70	50.0%
ave	14	1.4	1.0	29%
median		1.50		
min		0.75		
max		1.80		
95th		1.8		

Lake of the Pines

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
2/8/11	22	1.20	0.87	27.5%
5/10/11	17	0.99	0.71	28.3%
8/8/11	12	2.10	2.10	0.0%
11/8/11	18	1.20	0.86	28.3%
2/8/12	25	1.70	1.20	29.4%
5/9/12	19	1.40	1.30	7.1%
8/7/12	16	1.50	1.30	13.3%
11/19/12	22	1.40	0.98	30.0%
2/13/13	17	1.60	1.10	31.3%
5/14/13	21	1.90	1.40	26.3%
8/7/13	17	1.10	1.10	0.0%
11/13/13	21	1.10	0.86	21.8%
2/11/14	23	1.80	1.00	44.4%
5/13/14	22	1.40	1.10	21.4%
8/12/14	15	1.40	1.10	21.4%
11/12/14	17	1.40	1.10	21.4%
2/17/15	21	1.70	1.30	23.5%
5/27/15	18	1.60	1.20	25.0%
8/12/15	18	1.50	1.30	13.3%
11/17/15	27	1.40	0.99	29.3%
ave	19	1.5	1.1	22%
median		1.40		
min		0.99		
max		2.10		
95th		1.91		

Lake Wildwood

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)
2/8/11	25	1.40
5/9/11	14	1.00
8/8/11	21	1.90
11/8/11	27	1.30
2/8/12	34	1.10
5/9/12	24	1.20
8/7/12	28	1.10
11/19/12	33	1.00
2/12/13	23	1.00
5/15/13	27	1.40
8/7/13	22	0.91
11/13/13	37	0.83
2/11/14	39	1.30
5/13/14	28	1.00
8/12/14	16	0.95
11/11/14	28	1.80
2/17/15	30	1.90
5/27/15	18	1.20
8/12/15	16	1.30
11/17/15	20	1.10
ave	26	1.2
median		1.15
min		0.83
max		1.90
95th		1.9

Treated Water TOC (mg/L)	Percent Removal
1.00	28.6%
0.85	15.0%
1.80	5.3%
0.85	34.6%
0.96	12.7%
1.20	0.0%
1.30	-18.2%
0.77	23.0%
0.87	13.0%
1.30	7.1%
0.81	11.0%
0.60	27.7%
1.00	23.1%
1.00	0.0%
0.95	0.0%
1.10	38.9%
1.60	15.8%
0.96	20.0%
1.10	15.4%
0.84	23.6%
1.0	15%

North Auburn

Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
2/8/11	21	1.30	0.93	28.5%
5/10/11	15	0.88	0.72	18.2%
8/8/11	12	2.10	1.90	9.5%
11/8/11	18	1.20	0.89	25.8%
2/8/12	18	1.10	0.70	36.4%
5/9/12	15	1.70	1.10	35.3%
8/7/12	15	1.60	1.20	25.0%
11/19/12	22	1.40	1.10	21.4%
2/13/13	17	1.60	0.98	38.8%
5/14/13	18	1.70	1.40	17.6%
8/7/13	22	1.10	1.10	0.0%
11/12/13	17	1.10	0.84	23.6%
2/11/14	28	2.40	2.10	12.5%
5/13/14	22	1.50	1.20	20.0%
8/12/14	13	1.40	1.00	28.6%
11/12/14	17	1.30	1.10	15.4%
2/17/15	13	1.70	1.20	29.4%
5/27/15	21	2.10	1.50	28.6%
8/12/15	17	1.60	1.40	12.5%
11/17/15	24	0.90	0.83	7.8%
ave	18	1.5	1.2	22%
median		1.45		
min		0.88		
max		2.40		
95th		2.115		

Smartsville

	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
1/13/2011	59	1.6	1.1	31.3%
2/8/2011	84	1.7	1.1	35.3%
3/9/2011	35	2.0	1.6	20.0%
4/4/2011	56	1.8	1.1	38.9%
5/9/2011	57	2.3	1.2	47.8%
6/7/2011	67	2.5	1.5	40.0%
7/11/2011	62	2.2	1.3	40.9%
8/8/2011	49	1.7	2.1	-23.5%
9/13/2011	42	1.7	1.4	17.6%
10/12/2011	46	3.8	2.2	42.1%
11/8/2011	73	2.2	1.3	40.9%
12/6/2011	83	2.6	1.0	61.5%
1/10/2012	90	1.5	1.1	26.7%
2/8/2012	83	1.6	1.0	37.5%
3/12/2012	88	2.0	1.3	35.0%
4/9/2012	64	2.6	1.6	38.5%
5/9/2012	70	1.9	1.1	42.1%
6/11/2012	60	3.6	1.4	61.1%
7/17/2012	47	2.0	1.1	45.0%
8/7/2012	41	2.1	1.6	23.8%
9/10/2012	35	1.5	0.9	38.0%
10/9/2012	41	1.2	0.9	21.7%
11/19/2012	44	8.5	3.0	64.7%
12/11/2012	43	2.7	2.1	22.2%
1/9/2013	66	2.0	1.1	45.0%
2/12/2013	79	1.2	1.1	8.3%
3/13/2013	82	1.5	1.1	26.7%
4/10/2013	79	2.6	1.5	42.3%
5/15/2013	77	2.5	1.6	36.0%
6/13/2013	56	2.2	1.1	50.0%
7/16/2013	46	1.7	0.8	54.1%
8/7/2013	44	1.3	0.9	34.6%
9/11/2013	42	1.2	1.0	19.2%
10/16/2013	45	1.1	0.8	24.5%
11/13/2013	74	1.1	0.7	32.7%
12/11/2013	71	1.2	0.9	29.2%
1/8/2014	86	1.1	0.7	40.9%
2/11/2014	57	8.4	5.1	39.3%
3/12/2014	50	3.4	2.0	41.2%
4/15/2014	74	2.0	1.4	30.0%
5/13/2014	77	2.0	1.4	30.0%
6/16/2014	50	1.7	1.3	23.5%
7/9/2014	44	2.0	1.2	40.0%
8/12/2014	52	8.8	1.3	85.2%
10/14/2014	40	1.3	0.6	53.8%
11/11/2014	70	1.4	1.1	21.4%
12/1/2014	77	5.4	2.1	61.1%
1/12/2015	72	3.8	2.4	36.8%
2/17/2015	110	3.4	2.6	23.5%
3/11/2015	86	1.7	1.2	29.4%
4/14/2015	78	2.1	1.3	38.1%
5/27/2015	62	2.1	1.2	42.9%
6/16/2015	48	1.7	1.1	35.3%
7/14/2015	48	2.5	1.5	40.0%
8/12/2015	39	3.1	1.2	61.3%
9/22/2015	36	1.8	1.2	33.3%
10/7/2015	39	1.8	1.2	33.3%
11/17/2015	58	3.0	1.1	63.3%
12/15/2015	68	2.7	1.3	51.9%
average	61	2.4	1.4	37.4%
median		2.0		
min		1.1		
max		8.8		
95th		5.7		

Cascade Shores

	Total Colif	E. coli
1/12/11	107.6	28.5
1/27/11	54.7	6.3
2/15/11	108.1	7.4
2/23/11	45.5	8.5
3/9/11	17.5	2.0
3/23/11	23.8	5.2
4/7/11	35.9	2.0
4/22/11	61.3	0.0
5/5/11	71.2	2.0
5/19/11	21.8	0.0
6/8/11	56.3	1.0
6/23/11	0.0	0.0
7/12/11	186.0	5.2
7/28/11	325.5	24.3
8/10/11	47.1	5.2
8/25/11	89.1	1.0
9/13/11	344.8	2.0
9/27/11	233.3	2.0
10/8/11	1413.6	9.8
10/27/11	344.8	4.1
11/4/11	313.0	3.1
11/16/11	165.8	0.0
12/6/11	209.8	1.0
12/26/11	67.7	0.0
1/5/12	55.6	2.0
1/28/12	43.5	1.0
2/9/12	13.4	0.0
2/23/12	9.8	0.0
3/6/12	15.8	0.0
3/22/12	30.1	3.1
4/6/2012	59.4	2.0
#######	78.5	0.0
5/9/12	148.3	0.0
5/24/12	161.6	0.0
6/7/12	307.6	0.0
6/28/12	307.6	1.0
7/10/12	488.4	2.0
7/24/12	517.2	4.1
8/14/12	547.5	1.0
8/28/12	2419.2	4.1
9/5/12	1046.2	2.0
9/20/12	517.2	47.1
10/2/12	325.5	2.0
10/23/12	1413.6	111.2
11/29/12	218.7	5.2
11/29/12	218.7	6.2
12/4/12	166.4	4.1
12/23/12	44.3	2.0
1/17/13	22.6	5.2
1/25/13	45.0	0.0
2/9/13	33.5	2.0
2/23/13	37.3	0.0
3/7/13	35.0	2.0
3/22/13	27.5	1.0
4/4/13	27.8	0.0
4/25/13	456.9	4.1
5/15/13	328.2	1.0
5/25/13	387.3	2.0
6/13/13	137.6	4.1
6/26/13	436.0	4.1
7/15/13	1299.7	30.9
7/25/13	1203.3	18.5
8/4/13	920.8	1.0
8/29/13	1119.9	4.1
9/5/13	517.2	30.5
9/26/13	325.5	1.0
10/3/13	0.0	0.0
10/18/13	248.1	2.0
11/12/13	613.1	3.1
11/27/13	517.2	16.0
12/3/13	118.7	3.1
12/19/13	90.5	1.0
1/7/14	85.7	1.0
1/23/14	78.5	1.0
2/6/14	23.1	0.0
2/18/14	31.4	5.2
3/6/14	17.1	2.0
3/18/14	73.8	4.1
4/15/14	228.2	1.0
4/24/14	344.8	5.2
5/13/14	260.2	1.0
5/23/14	135.4	2.0
6/3/14	75.2	0.0
6/22/14	770.1	20.1
7/10/14	1732.9	43.5
7/27/14	816.4	8.6
8/11/14	1011.1	6.3
8/24/14	1986.3	4.1
9/7/14	1011.1	3.1
9/18/14	727.0	28.1
10/13/14	648.8	7.3
10/23/14	285.1	2.0
11/10/14	224.7	1.0
11/23/14	65.1	17.3
12/4/14	829.7	52.8
12/22/14	116.9	0.0
1/17/15	101.9	1.0
1/27/15	12.2	4.1
2/9/15	488.4	17.8
2/23/15	266.7	2.0
3/9/15	172.3	1.0
3/24/15	11.1	1.0
4/6/15	260.2	0.0
4/20/15	613.1	3.0
5/5/15	648.8	20.3
5/18/15	261.3	7.3
6/2/15	261.3	0.0
6/22/15	488.4	2.0
7/7/15	770.1	4.1
7/21/15	1119.9	21.6
8/13/15	1553.1	0.0
8/26/15	1203.3	4.1
9/9/15	574.4	3.1
9/30/15	1119.9	27.2
10/19/15	920.8	4.1
10/26/15	461.1	3.0
11/2/15 >	2419.2	24.3
11/28/15	727.0	2.0
12/7/15	579.4	7.4
12/21/15	435.2	8.5

min	0.0	0.0
max	2419.2	111.2
ave	412.5	7.0
median	240.7	2.0
95th	1413.6	28.6

Monthly medians	Total	E. coli	RAA			
Jan-11	81.2	17.4		1	Jan-11	17.4
Feb-11	76.8	8.0		1	Jan-12	1.5
Mar-11	20.7	3.6		1	Jan-13	2.6
Apr-11	48.6	1.0		1	Jan-14	1.0
May-11	46.5	1.0		1	Jan-15	2.6
Jun-11	28.2	0.5		2	Feb-11	8.0
Jul-11	255.8	14.8		2	Feb-12	0.0
Aug-11	68.1	3.1		2	Feb-13	1.0
Sep-11	289.1	2.0		2	Feb-14	2.6
Oct-11	879.2	7.0		2	Feb-15	9.9
Nov-11	239.4	1.6		3	Mar-11	3.6
Dec-11	138.8	0.5	5.0	3	Mar-12	1.6
Jan-12	49.6	1.5	3.7	3	Mar-13	1.5
Feb-12	11.6	0.0	3.0	3	Mar-14	3.1
Mar-12	23.0	1.6	2.9	3	Mar-15	1.0
Apr-12	69.0	1.0	2.9	4	Apr-11	1.0
May-12	155.0	0.0	2.8	4	Apr-12	1.0
Jun-12	307.6	0.5	2.8	4	Apr-13	2.1
Jul-12	502.8	3.1	1.8	4	Apr-14	3.1
Aug-12	1483.4	2.6	1.8	4	Apr-15	1.5
Sep-12	781.7	24.6	3.6	5	May-11	1.0
Oct-12	869.6	56.6	7.8	5	May-12	0.0
Nov-12	218.7	5.7	8.1	5	May-13	1.5
Dec-12	105.4	3.1	8.3	5	May-14	1.5
Jan-13	33.8	2.6	8.4	5	May-15	13.8
Feb-13	35.4	1.0	8.5	6	Jun-11	0.5
Mar-13	31.3	1.5	8.5	6	Jun-12	0.5
Apr-13	242.4	2.1	8.6	6	Jun-13	4.1
May-13	357.8	1.5	8.7	6	Jun-14	10.1
Jun-13	286.8	4.1	9.0	6	Jun-15	1.0
Jul-13	1251.5	24.7	10.8	7	Jul-11	14.8
Aug-13	1020.4	2.6	10.8	7	Jul-12	3.1
Sep-13	421.4	15.8	10.1	7	Jul-13	24.7
Oct-13	124.1	1.0	5.5	7	Jul-14	26.1
Nov-13	565.2	9.6	5.8	7	Jul-15	12.9
Dec-13	104.6	2.1	5.7	8	Aug-11	3.1
Jan-14	82.1	1.0	5.6	8	Aug-12	2.6
Feb-14	27.3	2.6	5.7	8	Aug-13	2.6
Mar-14	45.5	3.1	5.8	8	Aug-14	5.2
Apr-14	286.5	3.1	5.9	8	Aug-15	2.1
May-14	197.8	1.5	5.9	9	Sep-11	2.0
Jun-14	422.7	10.1	6.4	9	Sep-12	24.6
Jul-14	1274.7	26.1	6.5	9	Sep-13	15.8
Aug-14	1498.7	5.2	6.7	9	Sep-14	15.6
Sep-14	869.1	15.6	6.7	9	Sep-15	15.2
Oct-14	467.0	4.7	7.0	10	Oct-11	7.0
Nov-14	144.9	9.2	7.0	10	Oct-12	56.6
Dec-14	473.3	26.4	9.0	10	Oct-13	1.0
Jan-15	57.1	2.6	9.2	10	Oct-14	4.7
Feb-15	377.6	9.9	9.8	10	Oct-15	3.6
Mar-15	91.7	1.0	9.6	11	Nov-11	1.6
Apr-15	436.7	1.5	9.5	11	Nov-12	5.7
May-15	455.1	13.8	10.5	11	Nov-13	9.6
Jun-15	374.9	1.0	9.7	11	Nov-14	9.2
Jul-15	945.0	12.9	8.6	11	Nov-15	13.2
Aug-15	1378.2	2.1	8.4	12	Dec-11	0.5
Sep-15	847.2	15.2	8.3	12	Dec-12	3.1
Oct-15	691.0	3.6	8.2	12	Dec-13	2.1
Nov-15	1573.1	13.2	8.6	12	Dec-14	26.4
Dec-15	507.3	8.0	7.0	12	Dec-15	8.0
		min	1.8			
		max	10.8			

	Cascade Shores	Loma Rica	E. George
Jan	2.6	10.65	5.5
Feb	2.6	4.3	9.2
Mar	1.6	1.55	6.3
Apr	1.5	8.9	6.9
May	1.5	3.6	8.1
June	1.0	5.7	19.6
July	14.8	7.55	13.4
Aug	2.6	12.8	11.5
Sept	15.6	10.35	6.0
Oct	4.7	23.4	18.2
Nov	9.2	9.15	13.9
Dec	3.1	18.45	57.4

Loma Rica

	Total coliform	E. coli
1/12/11	217.8	83.6
1/27/11	160.7	1.0
2/15/11	82.0	8.6
2/23/11	19.9	0.0
3/9/11	25.6	0.0
3/23/11	61.0	0.0
4/7/11	143.9	2.0
4/22/11	166.4	2.0
5/5/11	214.2	4.1
5/19/11	193.5	2.0
6/8/11	140.1	4.0
6/23/11	648.8	9.7
7/12/11	365.4	7.4
7/28/11	866.4	7.4
8/10/11	866.4	16.0
8/25/11	517.2	108.1
9/13/11	307.6	6.3
9/27/11	579.4	14.8
10/8/11	1413.6	38.2
10/27/11	387.3	8.6
11/4/11	920.8	14.2
11/16/11	137.6	4.1
12/6/11	184.2	1.0
12/26/11	95.9	18.7
1/5/12	93.2	5.2
1/28/12	52.0	16.1
2/9/12	31.3	11.0
2/23/12	33.1	9.8
3/6/12	30.5	1.0
3/22/12	13.5	1.0
4/6/12	224.7	3.0
4/19/12	235.9	14.8
5/9/12	387.3	7.3
5/24/12	209.8	4.1
6/7/12	816.4	5.1
6/29/12	547.5	6.3
7/12/12	1732.9	2.0
7/24/12	920.8	4.1
8/14/12	648.8	19.3
8/28/12	501.2	6.3
9/5/12	448.4	4.1
9/20/12	648.1	12.1
10/2/12	613.1	3.0
10/23/12	1732.9	50.4
11/8/12	>2419.2	32.3
11/29/12	396.8	7.3
12/4/12	1553.1	58.3
12/23/12	162.4	14.8
1/17/13	17.1	8.6
1/25/13	53.7	4.1
2/9/13	27.8	1.0
2/23/13	27.5	2.0
3/7/13	56.5	3.1
3/22/13	313.0	5.2
4/4/13	160.7	2.0
4/25/13	150.0	1.0
5/15/13	325.0	6.3
5/25/13	238.2	2.0
6/13/13	770.1	16.1
6/26/13	913.9	21.6
7/15/13	1986.3	18.3
7/25/13	866.4	19.7
8/4/2013	727.0	29.9
#######	686.7	11.0
9/5/2013	816.4	34.1
#######	325.5	2.0
10/3/13 >	2419.2	67.0
10/18/13	547.5	1.0
11/27/13	32.8	0.0
11/12/13	686.7	27.5
12/3/13	150.0	36.9
12/19/13	117.8	0.0
1/7/14	71.7	4.1
1/23/14	45.9	5.2
2/6/14	30.9	1.0
2/18/14	29.3	0.0
3/6/14	214.3	8.6
3/18/14	365.4	27.8
4/15/14	365.4	31.1
4/24/14	290.9	7.4
5/13/14	107.6	3.1
5/23/14	341.5	4.1
6/3/14	1986.3	4.1
6/22/14	686.7	3.0
7/10/14	1413.6	12.0
7/27/14	365.4	3.1
8/11/14	727.0	19.7
8/24/14	7.6	4.1
9/7/14	298.7	1.0
9/18/14	613.1	19.7
10/13/14	517.2	3.0
10/23/14	2419.2	11.0
11/10/14	365.4	1.0
11/28/14	187.3	14.8
12/4/14	372.5	78.9
12/22/14	131.3	8.5
1/17/15	72.3	40.8
1/27/15	110.6	8.6
2/9/15	101.7	19.7
2/23/15	108.1	6.3
3/9/15	245.8	0.0
3/24/15	143.9	3.1
4/6/15	727.0	42.8
4/20/15	372.5	12.1
5/5/15	410.6	3.1
5/18/15	410.6	4.1
6/2/15	1986.3	2.0
6/22/15	290.9	6.3
7/7/15	686.7	24.0
7/21/15	648.8	4.1
8/13/15	228.2	2.0
8/26/15	866.4	14.8
9/9/15	307.6	4.1
9/30/15	1553.1	3.1
10/19/15 >	2419.2	23.1
10/26/15	648.8	6.3
11/2/15	770.1	9.8
11/28/15 >	2419.2	2.0
12/7/15	235.9	6.2
12/21/15	290.9	18.3

min	7.6	0.0
max	2419.2	108.1
ave	514.1	12.7
median	325.0	6.3
95th	1986.3	43.18

Monthly medians	Total	E. coli	RAA		Monthly medians	
Jan-11	189.3	42.3		1	Jan-11	42.3
Feb-11	51.0	4.3		1	Jan-12	10.65
Mar-11	43.3	0.0		1	Jan-13	6.35
Apr-11	155.2	2.0		1	Jan-14	4.65
May-11	203.9	3.1		1	Jan-15	24.7
Jun-11	394.5	6.9		2	Feb-11	4.3
Jul-11	615.9	7.4		2	Feb-12	10.4
Aug-11	691.8	62.1		2	Feb-13	1.5
Sep-11	443.5	10.6		2	Feb-14	0.5
Oct-11	900.5	23.4		2	Feb-15	13
Nov-11	529.2	9.2		3	Mar-11	0
Dec-11	140.1	9.9	15.1	3	Mar-12	1
Jan-12	72.6	10.7	12.4	3	Mar-13	4.15
Feb-12	32.2	10.4	12.9	3	Mar-14	18.2
Mar-12	22.0	1.0	13.0	3	Mar-15	1.55
Apr-12	230.3	8.9	13.6	4	Apr-11	2
May-12	298.6	5.7	13.8	4	Apr-12	8.9
Jun-12	682.0	5.7	13.7	4	Apr-13	1.5
Jul-12	1326.9	3.1	13.4	4	Apr-14	19.25
Aug-12	575.0	12.8	9.3	4	Apr-15	27.45
Sep-12	548.3	8.1	9.1	5	May-11	3.05
Oct-12	1173.0	26.7	9.3	5	May-12	5.7
Nov-12	396.8	19.8	10.2	5	May-13	4.15
Dec-12	857.8	36.6	12.4	5	May-14	3.6
Jan-13	35.4	6.4	12.1	5	May-15	3.6
Feb-13	27.7	1.5	11.3	6	Jun-11	6.85
Mar-13	184.8	4.2	11.6	6	Jun-12	5.7
Apr-13	155.4	1.5	11.0	6	Jun-13	18.85
May-13	281.6	4.2	10.9	6	Jun-14	3.55
Jun-13	842.0	18.9	12.0	6	Jun-15	4.15
Jul-13	1426.4	19.0	13.3	7	Jul-11	7.4
Aug-13	706.9	20.5	13.9	7	Jul-12	3.05
Sep-13	571.0	18.1	14.8	7	Jul-13	19
Oct-13	1483.4	34.0	15.4	7	Jul-14	7.55
Nov-13	359.8	13.8	14.9	7	Jul-15	14.05
Dec-13	133.9	18.5	13.4	8	Aug-11	62.05
Jan-14	58.8	4.7	13.2	8	Aug-12	12.8
Feb-14	30.1	0.5	13.1	8	Aug-13	20.45
Mar-14	289.9	18.2	14.3	8	Aug-14	11.9
Apr-14	328.2	19.3	15.8	8	Aug-15	8.4
May-14	224.6	3.6	15.7	9	Sep-11	10.55
Jun-14	1336.5	3.6	14.5	9	Sep-12	8.1
Jul-14	889.5	7.6	13.5	9	Sep-13	18.05
Aug-14	367.3	11.9	12.8	9	Sep-14	10.35
Sep-14	455.9	10.4	12.1	9	Sep-15	3.6
Oct-14	1468.2	7.0	9.9	10	Oct-11	23.4
Nov-14	276.4	7.9	9.4	10	Oct-12	26.7
Dec-14	251.9	43.7	11.5	10	Oct-13	34
Jan-15	91.5	24.7	13.2	10	Oct-14	7
Feb-15	104.9	13.0	14.2	10	Oct-15	14.7
Mar-15	194.9	1.6	12.8	11	Nov-11	9.15
Apr-15	549.8	27.5	13.5	11	Nov-12	19.8
May-15	410.6	3.6	13.5	11	Nov-13	13.75
Jun-15	1138.6	4.2	13.6	11	Nov-14	7.9
Jul-15	667.8	14.1	14.1	11	Nov-15	5.9
Aug-15	547.3	8.4	13.8	12	Dec-11	9.85
Sep-15	930.4	3.6	13.3	12	Dec-12	36.55
Oct-15	1534.0	14.7	13.9	12	Dec-13	18.45
Nov-15	1594.7	5.9	13.7	12	Dec-14	43.7
Dec-15	263.4	12.3	11.1	12	Dec-15	12.25
		min	9.1			
		max	15.775			

E. George

	Total Colif	E. coli
1/12/2011	288.2	13.4
1/27/2011	108.1	3.1
2/15/2011	178.2	19.5
2/23/2011	77.1	45.7
3/9/2011	71.7	9.8
3/23/2011	165.8	53.7
4/7/2011	117.8	6.3
4/22/2011	151.5	18.3
5/5/2011	770.1	5.2
5/19/2011	238.2	10.9
6/8/2011	201.4	40.5
6/23/2011	325.5	9.8
7/14/2011	307.6	15.6
7/28/2011	307.6	56.5
8/10/2011	547.5	15.6
8/25/2011	461.1	7.4
9/13/2011	1119.9	35.4
9/27/2011	727	80.9
10/8/2011	1011.1	209.8
10/27/2011	816.4	32.8
11/4/2011	579.4	21.6
11/16/2011	166.4	12.2
12/6/2011	125.9	3.1
12/26/2011	313	185
1/5/12	80.5	27.8
1/28/12	19.7	1.0
2/9/12	488.4	5.2
2/23/12	41.9	6.3
3/6/12	261.3	40.4
3/22/12	172.3	35.4
4/6/2012	37.9	5.2
4/19/2012	224.7	8.5
5/9/2012	218.7	10.9
5/24/2012	261.3	7.4
6/7/12	517.2	113.0
6/28/12	547.5	7.4
7/10/12	225.8	5.2
7/24/12	920.8	21.6
8/14/12	1119.9	36.9
8/28/12	816.4	131.3
9/5/12	1553.1	36.4
9/20/12	866.4	18.1
10/2/12	517.2	5.2
10/23/12	1119.9	66.3
11/8/12	686.7	28.5
11/29/12	648.8	66.3
12/4/12	512.2	83.9
12/23/12	686.7	107.6
1/17/13	29.5	0.0
1/25/13	109.2	11.0
2/9/13	166.4	8.4
2/23/13	81.3	16.0
3/7/13	78.9	4.1
3/22/13	137.6	8.5
4/4/13	222.4	4.1
4/25/13	648.8	0.0
5/15/13	313.0	6.3
5/25/13	517.2	9.7
6/13/13	547.5	13.5
6/26/13	>2419.2	25.6
7/15/13	1119.9	12.0
7/26/13	1203.3	12.2
8/4/13	920.8	18.5
8/29/13	866.4	7.4
9/5/13	387.3	11.0
9/26/13	235.9	1.0
10/3/13	816.4	36.4
10/18/13	187.2	0.0
11/12/13	432.2	5.2
11/27/13	2419.2	1.0
12/3/13	770.1	3.1
12/19/13	139.6	0.0
1/7/14	118.7	3.1
7/23/14	43.5	5.2
2/6/14	24.3	0.0
2/18/14	11.0	0.0
3/6/14	82.0	1.0
3/18/14	135.4	8.6
4/15/14	387.3	3.1
4/24/14	178.9	13.4
5/13/14	191.8	0.0
5/23/14	206.3	2.0
6/3/14	270.0	4.1
6/22/14	866.4	4.1
7/10/14	1119.9	11.0
7/27/14	344.8	5.2
8/11/14	613.1	7.4
8/24/14	524.7	5.2
9/7/14	435.2	3.1
9/18/14	290.9	1.0
10/13/14	461.1	1.0
10/23/14	1413.6	10.9
11/10/14	365.4	5.2
11/23/14	172.9	22.6
12/4/14	126.7	101.2
12/22/14	172.3	13.5
1/17/15	35.4	4.1
1/27/15	50.4	3.0
2/9/15	214.3	13.2
2/23/15	111.9	5.2
3/9/15	55.7	2.0
3/24/15	9.2	1.0
4/6/15	133.3	6.3
4/20/15	307.6	0.0
5/5/15	198.9	16.1
5/18/15	150.0	2.0
6/2/15	2419.2	3.1
6/22/15	307.6	10.8
7/7/15	435.2	22.6
7/21/15	648.8	8.5
8/13/15	344.8	3.1
8/26/15	980.4	13.5
9/9/15	461.1	0.0
9/30/15	266.7	0.0
10/19/15	1413.6	13.2
10/26/15	686.7	5.2
11/2/15	613.1	14.3
11/28/15	204.6	5.2
12/7/15	209.8	16.1
12/21/15	248.1	13.4

min	9.2	0.0
max	2419.2	209.8
ave	446.5	20.1
median	307.6	8.6
95th	1128.24	84.765

Monthly medians	Total	E. coli	RAA		Monthly medians	
Jan-11	198.2	8.3		1	Jan-11	8.3
Feb-11	127.7	32.6		1	Jan-12	14.4
Mar-11	118.8	31.8		1	Jan-13	5.5
Apr-11	134.7	12.3		1	Jan-14	4.2
May-11	504.2	8.1		1	Jan-15	3.6
Jun-11	263.5	25.2		2	Feb-11	32.6
Jul-11	307.6	36.1		2	Feb-12	5.8
Aug-11	504.3	11.5		2	Feb-13	12.2
Sep-11	923.5	58.2		2	Feb-14	0.0
Oct-11	913.8	121.3		2	Feb-15	9.2
Nov-11	372.9	16.9		3	Mar-11	31.8
Dec-11	219.5	94.1	38.0	3	Mar-12	37.9
Jan-12	50.1	14.4	38.5	3	Mar-13	6.3
Feb-12	265.2	5.8	36.3	3	Mar-14	4.8
Mar-12	216.8	37.9	36.8	3	Mar-15	1.5
Apr-12	131.3	6.9	36.3	4	Apr-11	12.3
May-12	240.0	9.2	36.4	4	Apr-12	6.9
Jun-12	532.4	60.2	39.4	4	Apr-13	2.1
Jul-12	573.3	13.4	37.5	4	Apr-14	8.3
Aug-12	968.2	84.1	43.5	4	Apr-15	3.2
Sep-12	1209.8	27.3	40.9	5	May-11	8.1
Oct-12	818.6	35.8	33.8	5	May-12	9.2
Nov-12	667.8	47.4	36.4	5	May-13	8.0
Dec-12	599.5	95.8	36.5	5	May-14	1.0
Jan-13	69.4	5.5	35.8	5	May-15	9.1
Feb-13	123.9	12.2	36.3	6	Jun-11	25.2
Mar-13	108.3	6.3	33.7	6	Jun-12	60.2
Apr-13	435.6	2.1	33.3	6	Jun-13	19.6
May-13	415.1	8.0	33.2	6	Jun-14	4.1
Jun-13	547.5	19.6	29.8	6	Jun-15	7.0
Jul-13	1161.6	12.1	29.7	7	Jul-11	36.1
Aug-13	893.6	13.0	23.7	7	Jul-12	13.4
Sep-13	311.6	6.0	22.0	7	Jul-13	12.1
Oct-13	501.8	18.2	20.5	7	Jul-14	8.1
Nov-13	1425.7	3.1	16.8	7	Jul-15	15.6
Dec-13	454.9	1.6	9.0	8	Aug-11	11.5
Jan-14	81.1	4.2	8.8	8	Aug-12	84.1
Feb-14	17.7	0.0	7.8	8	Aug-13	13.0
Mar-14	108.7	4.8	7.7	8	Aug-14	6.3
Apr-14	283.1	8.3	8.2	8	Aug-15	8.3
May-14	199.1	1.0	7.6	9	Sep-11	58.2
Jun-14	568.2	4.1	6.4	9	Sep-12	27.3
Jul-14	732.4	8.1	6.0	9	Sep-13	6.0
Aug-14	568.9	6.3	5.5	9	Sep-14	2.1
Sep-14	363.1	2.1	5.1	9	Sep-15	0.0
Oct-14	937.4	6.0	4.1	10	Oct-11	121.3
Nov-14	269.2	13.9	5.0	10	Oct-12	35.8
Dec-14	149.5	57.4	9.7	10	Oct-13	18.2
Jan-15	42.9	3.6	9.6	10	Oct-14	6.0
Feb-15	163.1	9.2	10.4	10	Oct-15	9.2
Mar-15	32.5	1.5	10.1	11	Nov-11	16.9
Apr-15	220.5	3.2	9.7	11	Nov-12	47.4
May-15	174.5	9.1	10.4	11	Nov-13	3.1
Jun-15	1363.4	7.0	10.6	11	Nov-14	13.9
Jul-15	542.0	15.6	11.2	11	Nov-15	9.8
Aug-15	662.6	8.3	11.4	12	Dec-11	94.1
Sep-15	363.9	0.0	11.2	12	Dec-12	95.8
Oct-15	1050.2	9.2	11.5	12	Dec-13	1.6
Nov-15	408.9	9.8	11.1	12	Dec-14	57.4
Dec-15	229.0	14.8	7.6	12	Dec-15	14.8
		min	4.1			
		max	43.5			

Lake Wildwood

	Total Colif	E. coli
1/12/11	290.9	7.2
1/27/11	87.8	4.1
2/15/11	63.8	6.3
2/23/11	214.3	13.4
3/9/11	410.6	12.2
3/23/11	2419.2	218.7
4/7/11	178.9	24.6
4/22/11	357.8	101.9
5/5/11	547.5	105.0
5/19/11	579.4	48.1
6/8/11	235.9	38.4
6/23/11	960.6	41.9
7/12/11	1986.3	30.5
7/28/11	1553.1	35.0
8/10/11	435.2	18.3
8/25/11	727.0	9.6
9/16/11	1046.2	28.2
9/27/11	816.4	156.5
10/8/11	1732.9	56.3
10/27/11	344.8	34.1
11/4/11	198.9	28.8
11/16/11	47.9	9.7
12/6/11	95.6	17.5
12/26/11	52.1	14.9
1/5/12	62.0	5.2
1/28/12	343.6	25.9
2/9/12	129.1	7.4
2/23/12	51.2	0.0
3/6/12	147.0	1.0
3/22/12	410.6	13.2
4/6/12	866.4	25.0
4/19/12	770.1	7.4
5/9/12	201.4	3.0
5/24/12	524.7	26.9
6/7/12	1413.6	39.3
6/28/12	116.9	3.0
7/10/12	435.2	11.0
7/24/12	613.1	37.3
8/14/12	547.5	26.5
8/28/12	410.6	32.3
9/5/12	206.3	22.1
9/20/12	613.1	53.8
10/2/12	214.3	29.9
10/23/12	866.4	113.0
11/8/12	517.2	93.4
11/29/12	461.1	4.1
12/4/12	328.2	64.4
12/27/12	727.0	65.7
1/17/13	22.6	8.6
1/25/13	27.2	15.8
2/9/13	31.4	6.1
2/23/13	108.1	2.0
3/7/13	44.1	5.2
3/22/13	66.3	2.0
4/4/13	260.2	4.1
4/27/13	517.2	35.2
5/16/13	272.3	23.0
5/25/13	727.0	19.9
6/13/13	980.4	36.4
6/26/13	1011.1	84.2
7/15/13	1046.2	146.7
7/25/13	1299.1	135.4
8/4/13	1203.3	78.9
8/29/13	920.8	78.0
9/5/13	2419.2	41.9
9/26/13	579.4	41.6
10/3/13	290.9	41.3
10/18/13	275.5	13.1
11/12/13	248.1	16.1
11/27/13	108.6	7.4
1/7/14	53.7	8.5
1/23/14	57.3	2.0
2/6/14	488.4	48.0
2/18/14	1203.3	4.1
3/6/14	2419.2	43.5
3/18/14	365.4	13.4
4/15/14	1553.1	77.6
4/24/14	>2419.2	1.0
5/13/14	325.5	2.0
5/23/14	416.0	2.0
6/3/14	1046.2	162.4
6/22/14	1203.3	27.5
7/10/14	1732.9	43.5
7/27/14	816.4	8.6
8/11/14	158.5	39.3
8/24/14	648.8	90.6
9/7/14	1046.2	387.3
9/18/14	488.4	73.3
10/13/14	770.1	178.9
10/23/14	1986.3	816.4
11/10/14	151.5	22.6
11/28/14	613.1	203.5
12/6/14	249.5	27.8
12/22/14	330.0	63.1
1/17/15	130.9	23.3
1/27/15	69.7	7.4
2/9/15	648.8	34.1
2/23/15	201.4	3.1
3/9/15	866.4	12.0
3/24/15	40.5	2.0
4/6/15	166.4	6.3
4/20/15	2419.2	4.1
5/5/15	101.9	9.7
5/18/15	387.3	34.1
6/2/15	248.9	18.3
6/22/15	435.2	8.6
7/7/15	517.2	4.1
7/21/15	206.3	6.3
8/13/15	260.2	42.6
8/26/15	770.1	178.2
9/9/15	387.3	155.3
9/30/15	206.3	93.3
10/19/15	2419.2	23.1
10/26/15	648.8	6.3
11/2/15	770.1	9.8
11/28/15	2419.2	2.0
12/7/15	235.9	6.2
12/21/15	290.9	18.3

min	22.6	0.0
max	2419.2	816.4
ave	613.6	48.1
median	410.6	23.2
95th	2072.88	164.77

Monthly M
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edians

Total	E coli	RAA
189.4	5.7	
139.1	9.9	
1414.9	115.5	
268.4	63.3	
563.5	76.6	
598.3	40.2	
1769.7	32.8	
581.1	14.0	
931.3	92.4	
1038.9	45.2	
123.4	19.3	
73.9	16.2	44.2
202.8	15.6	45.0
90.2	3.7	44.5
278.8	7.1	35.5
818.3	16.2	31.6
363.1	15.0	26.4
765.3	21.2	24.9
524.2	24.2	24.1
479.1	29.4	25.4
409.7	38.0	20.9
540.4	71.5	23.1
489.2	48.8	25.5
527.6	65.1	29.6
24.9	12.2	29.3
69.8	4.1	29.4
55.2	3.6	29.1
388.7	19.7	29.4
499.7	21.5	29.9
995.8	60.3	33.2
1172.7	141.1	42.9
1062.1	78.5	47.0
1499.3	41.8	47.3
283.2	27.2	43.6
178.4	11.8	40.5
		38.3
55.5	5.3	37.7
845.9	26.1	39.7
1392.3	28.5	41.9
1553.1	39.3	43.7
370.8	2.0	42.0
1124.8	95.0	45.1
1274.7	26.1	34.7
403.7	65.0	33.4
767.3	230.3	50.6
1378.7	497.7	93.3
382.3	113.1	102.5
289.8	45.5	97.8
100.3	15.4	98.6
425.1	18.6	98.0
453.5	7.0	96.2
1292.8	5.2	93.4
244.6	21.9	95.0
342.1	13.5	88.2
361.8	5.2	86.5
515.2	110.4	90.3
296.8	124.3	81.5
1534.0	14.7	41.2
1594.7	5.9	32.3
263.4	12.3	29.5
	min	20.9
	max	102.5

1	Jan-11	5.7
1	Jan-12	15.6
1	Jan-13	12.2
1	Jan-14	5.3
1	Jan-15	15.4
2	Feb-11	9.9
2	Feb-12	3.7
2	Feb-13	4.1
2	Feb-14	26.1
2	Feb-15	18.6
3	Mar-11	115.5
3	Mar-12	7.1
3	Mar-13	3.6
3	Mar-14	28.5
3	Mar-15	7.0
4	Apr-11	63.3
4	Apr-12	16.2
4	Apr-13	19.7
4	Apr-14	39.3
4	Apr-15	5.2
5	May-11	76.6
5	May-12	15.0
5	May-13	21.5
5	May-14	2.0
5	May-15	21.9
6	Jun-11	40.2
6	Jun-12	21.2
6	Jun-13	60.3
6	Jun-14	95.0
6	Jun-15	13.5
7	Jul-11	32.8
7	Jul-12	24.2
7	Jul-13	141.1
7	Jul-14	26.1
7	Jul-15	5.2
8	Aug-11	14.0
8	Aug-12	29.4
8	Aug-13	78.5
8	Aug-14	65.0
8	Aug-15	110.4
9	Sep-11	92.4
9	Sep-12	38.0
9	Sep-13	41.8
9	Sep-14	230.3
9	Sep-15	124.3
10	Oct-11	45.2
10	Oct-12	71.5
10	Oct-13	27.2
10	Oct-14	497.7
10	Oct-15	14.7
11	Nov-11	19.3
11	Nov-12	48.8
11	Nov-13	11.8
11	Nov-14	113.1
11	Nov-15	5.9
12	Dec-11	16.2
12	Dec-12	65.1
12	Dec-13	
12	Dec-14	45.5
12	Dec-15	12.3

Wildwood	e (Towne)	e (Meade)
12.2	36.5	124.6
9.9	83.0	118.3
7.1	101.2	116.0
19.7	118.5	243.3
21.5	94.7	176.1
40.2	42.0	61.4
26.1	35.5	52.0
65.0	36.0	36.0
92.4	38.8	36.5
45.2	105.0	63.0
19.3	246.0	96.6
30.8	115.5	174.5

Smartville Towne

	Total Colif	E. coli
1/4/11	2419.2	30.9
1/27/11	686.7	10.9
2/15/11	275.0	110.0
2/23/11	1553.1	71.9
3/9/11	2419.2	55.6
3/23/11	2419.2	146.7
4/7/11	723.0	10.0
4/22/11	1106.0	31.0
5/5/11	1553.1	145.3
5/19/11	2419.2	44.1
6/8/11	1413.6	32.7
6/23/11	2419.2	37.3
7/14/11	3654.0	20.0
7/28/11	2419.2	15.6
8/10/11	3873.0	0.0
8/26/11	2723.0	31.0
9/13/11	3873.0	31.0
9/27/10	6131.0	20.0
10/8/11	2723.0	1450.0
10/27/11	2755.0	10.0
11/4/11	2143.0	10.0
11/16/11	2282.0	1669.0
12/6/11	464.0	63.0
12/26/11	537.0	168.0
1/5/12	2481.0	1401.0
1/28/12	601.0	0.0
2/9/12	2419.2	46.4
2/23/12	1299.7	547.5
3/6/12	776.0	285.0
3/22/12	3873.0	31.0
4/6/12	842.0	62.0
4/19/12	933.0	175.0
5/9/12	3873.0	97.0
5/24/12	1723.0	31.0
6/7/12	2613.0	63.0
6/28/12	6488.0	20.0
7/10/12	6131.0	10.0
7/24/12	5794.0	183.0
8/14/12	5794.0	110.0
8/28/12	2723.0	41.0
9/5/12	2382.0	41.0
9/20/12	4884.0	20.0
10/2/12	3255.0	52.0
10/23/12	2014.0	158.0
11/8/12	5794.0	41.0
11/29/12	9208.0	213.0
12/4/12	410.6	20.1
12/23/12	19863.0	556.0
1/17/13	488.4	231.0
1/27/13	331.0	10.0
2/9/13	1119.9	77.6
2/23/13	122.0	10.0
3/7/13	471.0	10.0
3/22/13	631.0	41.0
4/4/13	2723.0	644.0
4/25/13	1081.0	85.0
5/15/13	6488.0	1162.0
5/25/13	275.5	0.0
6/13/13	2419.2	19.9
6/26/13	488.8	183.0
7/15/13	4884.0	63.0
7/25/13	3784.0	52.0
8/4/13	3255.0	52.0
8/29/13	7701.0	20.0
9/5/13	6867.0	98.0
9/26/13	24192.0	0.0
10/3/13	2755.0	122.0
10/18/13	2359.0	74.0
11/12/13	1141.0	488.0
11/27/13	601.0	228.0
12/3/13	10111.0	145.0
12/19/13	201.0	20.0
1/7/14	231.0	10.0
1/23/14	435.0	63.0
2/6/14	1576.0	156.0
2/18/14	399.0	10.0
3/6/14	9208.0	426.0
3/18/14	2419.2	18.5
4/15/14	249.5	8.6
4/24/14	24192.0	0.0
5/13/14	866.4	69.7
5/23/14	24192.0	5.2
6/3/14	816.4	8.4
6/22/14	4352.0	98.0
7/10/14	4352.0	51.0
7/27/14	2359.0	20.0
8/11/14	2495.0	20.0
8/24/14	3654.0	428.0
9/7/14	3441.0	63.0
9/18/14	3255.0	86.0
10/13/14	2400.0	1137.0
10/23/14	4106.0	275.0
11/11/14	6488.0	259.0
11/28/14	1160.0	233.0
12/4/14	24192.0	2382.0
12/22/14	2480.0	98.0
1/17/15	461.1	34.1
1/27/15	435.2	7.4
2/11/15	214.3	5.2
2/23/15	1732.9	123.6
3/9/15	839.0	10.0
3/24/15	820.0	62.0
4/6/15	1935.0	31.0
4/20/15	2481.0	410.0
5/5/15	3654.0	295.0
5/18/15	1664.0	20.0
6/2/15	2098.0	74.0
6/22/15	4352.0	10.0
7/7/15	2419.2	34.5
7/21/15	2419.2	35.0
8/13/15	2851.0	10.0
8/26/15	1986.3	33.6
9/9/15	2419.2	33.5
9/30/15	2419.2	44.1
10/19/15	2419.2	61.7
10/27/15	1732.9	35.9
11/8/15	2143.0	0.0
11/28/15	2014.0	31.0
12/8/15	1539.0	20.0
12/29/15	571.0	20.0
min	122.0	0.0
max	24192.0	2382.0
ave	3404.9	163.5
median	2419.2	44.1
95th	9253.15	668.65

	Total	E. coli
Jan-11	1553.0	20.9
Feb-11	914.1	91.0
Mar-11	2419.2	101.2
Apr-11	914.5	20.5
May-11	1986.2	94.7
Jun-11	1916.4	35.0
Jul-11	3036.6	17.8
Aug-11	3298.0	15.5
Sep-11	5002.0	25.5
Oct-11	2739.0	730.0
Nov-11	2212.5	839.5
Dec-11	500.5	115.5
Jan-12	1541.0	700.5
Feb-12	1859.5	297.0
Mar-12	2324.5	158.0
Apr-12	887.5	118.5
May-12	2798.0	64.0
Jun-12	4550.5	41.5
Jul-12	5962.5	96.5
Aug-12	4258.5	75.5
Sep-12	3633.0	30.5
Oct-12	2634.5	105.0
Nov-12	7501.0	127.0
Dec-12	10136.8	288.1
Jan-13	409.7	120.5
Feb-13	621.0	43.8
Mar-13	551.0	25.5
Apr-13	1902.0	364.5
May-13	3381.8	581.0
Jun-13	1454.0	101.5
Jul-13	4334.0	57.5
Aug-13	5478.0	36.0
Sep-13	15529.5	49.0
Oct-13	2557.0	98.0
Nov-13	871.0	358.0
Dec-13	5156.0	82.5
Jan-14	333.0	36.5
Feb-14	987.5	83.0
Mar-14	5813.6	222.3
Apr-14	12220.8	4.3
May-14	12529.2	37.5
Jun-14	2584.2	53.2
Jul-14	3355.5	35.5
Aug-14	3074.5	224.0
Sep-14	3348.0	74.5
Oct-14	3253.0	706.0
Nov-14	3824.0	246.0
Dec-14	13336.0	1240.0
Jan-15	448.2	20.8
Feb-15	973.6	64.4
Mar-15	829.5	36.0
Apr-15	2208.0	220.5
May-15	2659.0	157.5
Jun-15	3225.0	42.0
Jul-15	2419.2	34.8
Aug-15	2418.7	21.8
Sep-15	2419.2	38.8
Oct-15	2076.1	48.8
Nov-15	2078.5	15.5
Dec-15	1055.0	20.0

Monthly Medians

1.0	Jan-11	20.9
1.0	Jan-12	700.5
1.0	Jan-13	120.5
1.0	Jan-14	36.5
1.0	Jan-15	20.8
2.0	Feb-11	91.0
2.0	Feb-12	297.0
2.0	Feb-13	43.8
2.0	Feb-14	83.0
2.0	Feb-15	64.4
3.0	Mar-11	101.2
3.0	Mar-12	158.0
3.0	Mar-13	25.5
3.0	Mar-14	222.3
3.0	Mar-15	36.0
4.0	Apr-11	20.5
4.0	Apr-12	118.5
4.0	Apr-13	364.5
4.0	Apr-14	4.3
4.0	Apr-15	220.5
5.0	May-11	94.7
5.0	May-12	64.0
5.0	May-13	581.0
5.0	May-14	37.5
5.0	May-15	157.5
6.0	Jun-11	35.0
6.0	Jun-12	41.5
6.0	Jun-13	101.5
6.0	Jun-14	53.2
6.0	Jun-15	42.0
7.0	Jul-11	17.8
7.0	Jul-12	96.5
7.0	Jul-13	57.5
7.0	Jul-14	35.5
7.0	Jul-15	34.8
8.0	Aug-11	15.5
8.0	Aug-12	75.5
8.0	Aug-13	36.0
8.0	Aug-14	224.0
8.0	Aug-15	21.8
9.0	Sep-11	25.5
9.0	Sep-12	30.5
9.0	Sep-13	49.0
9.0	Sep-14	74.5
9.0	Sep-15	38.8
10.0	Oct-11	730.0
10.0	Oct-12	105.0
10.0	Oct-13	98.0
10.0	Oct-14	706.0
10.0	Oct-15	48.8
11.0	Nov-11	839.5
11.0	Nov-12	127.0
11.0	Nov-13	358.0
11.0	Nov-14	246.0
11.0	Nov-15	15.5
12.0	Dec-11	115.5
12.0	Dec-12	288.1
12.0	Dec-13	82.5
12.0	Dec-14	1240.0
12.0	Dec-15	20.0

Smartville Meade

		Total Colif	E. coli
1/4/11		2419.2	45.7
1/27/11	>	2419.2	203.5
2/15/11		820.0	332.0
2/23/11		1553.1	59.1
3/9/11		1732.9	290.9
3/23/11		1299.7	435.2
4/7/11		609.0	145.0
4/22/11		960.0	41.0
5/5/11		456.9	24.3
5/19/11		866.4	86.2
6/8/11	>	2419.2	85.5
6/23/11	>	2419.2	37.3
7/12/11		1664.0	0.0
7/28/11	>	2419.2	15.6
8/10/11		2755.0	0.0
8/25/11		4106.0	134.0
9/13/11		4884.0	20.0
9/27/11		2310.0	31.0
10/8/11		2187.0	1.0
10/27/11		373.0	10.0
11/4/11		1850.0	20.0
11/16/11		1723.0	63.0
12/6/11		97.0	10.0
12/26/11		1723.0	161.0
1/5/12		3448.0	1850.0
1/28/12		552.0	10.0
2/9/12		307.6	24.6
2/23/12		1046.2	307.6
3/6/12		2282.0	201.0
3/22/12		1565.0	31.0
4/6/12		5475.0	211.0
4/19/12	>	2419.2	275.5
5/9/12		1935.0	576.0
5/24/12		5492.0	10.0
6/7/12		2247.0	691.0
6/28/12		4106.0	0.0
7/10/12		4884.0	20.0
7/24/12		3255.0	10.0
8/14/12		1201.0	0.0
8/28/12		5794.0	20.0
9/5/12		2755.0	10.0
9/20/12		5475.0	63.0
10/2/12		3076.0	109.0
10/23/12		8164.0	1223.0
11/8/12		5475.0	86.0
11/29/12		3654.0	256.0
12/4/12		488.4	16.0
12/23/12		4106.0	336.0
1/17/13		290.9	204.6
1/25/13		488.0	182.0
2/9/13		980.4	81.6
2/23/13		1467.0	155.0
3/7/13		520.0	0.0
3/22/13		1467.0	158.0
4/4/13		5172.0	723.0
4/25/13		2014.0	960.0
5/15/13		3448.0	109.0
5/25/13		686.7	43.5
6/13/13		2419.2	275.5
6/26/13		331.0	10.0
7/15/13		2098.0	0.0
7/25/13		6131.0	122.0
8/4/13		17329.0	96.0
8/29/13		3044.0	30.0
9/5/13		6131.0	63.0
9/26/13		3873.0	0.0
10/3/13		5172.0	41.0
10/18/13		1354.0	85.0
11/12/13		613.0	31.0
11/29/13		448.4	33.1
12/3/13		146.0	31.0
12/19/13		231.0	10.0
1/7/14		231.0	10.0
1/23/14		435.0	63.0
2/6/14		336.0	52.0
2/18/14		135.0	20.0
3/6/14		41.0	0.0
3/18/14	>	2419.2	3.1
4/15/14		1732.9	156.5
4/24/14	>	2419.2	0.0
5/13/14	>	2419.2	344.8
5/23/14	>	2419.2	7.4
6/3/14		435.2	6.3
6/22/14		5794.0	10.0
7/10/14		5475.0	84.0
7/27/14		3282.0	20.0
8/11/14		8164.0	31.0
8/24/14		10462.0	41.0
9/7/14		2282.0	41.0
9/18/14		3076.0	52.0
10/13/14		1515.0	41.0
10/23/14		2400.0	31.0
11/10/14		933.0	310.0
11/23/14		354.0	121.0
12/4/14		15531.0	794.0
12/22/14		1860.0	41.0
1/17/15		461.0	64.4
2/11/15		290.9	29.2
2/25/15		616.0	20.0
3/9/15		1313.0	275.0
3/24/15		238.0	121.0
4/6/15		1210.0	189.0
4/20/15		2613.0	472.0
5/5/15		2755.0	1376.0
5/18/15		1500.0	171.0
6/2/15		2489.0	63.0
6/22/15		1850.0	10.0
7/7/15	>	2419.2	58.1
7/21/15	>	2419.2	51.2
8/13/15		6867.0	31.0
8/26/15		549.2	4.1
9/9/15		1732.9	1.0
9/30/15		2419.2	127.4
10/19/15	>	2419.2	18.5
10/26/15		1986.3	127.4
11/2/15	>	2419.2	111.2
11/28/15		1043.0	82.0
12/7/15		3654.0	74.0
12/29/15		1553.0	275.0
min		41.0	0.0
max		17329.0	1850.0
ave		2589.0	151.8
median		2098.0	52.0
95th		6204.6	694.2

	Total	E coli	RAA
Jan-11	2419.2	124.6	
Feb-11	1186.6	195.6	
Mar-11	1516.3	363.1	
Apr-11	784.5	93.0	
May-11	661.7	55.3	
Jun-11	2419.2	61.4	
Jul-11	2041.6	7.8	
Aug-11	3430.5	67.0	
Sep-11	3597.0	25.5	
Oct-11	1280.0	5.5	
Nov-11	1786.5	41.5	
Dec-11	910.0	85.5	93.8
Jan-12	2000.0	930.0	160.9
Feb-12	676.9	166.1	158.5
Mar-12	1923.5	116.0	137.9
Apr-12	3947.1	243.3	150.4
May-12	3713.5	293.0	170.2
Jun-12	3176.5	345.5	193.9
Jul-12	4069.5	15.0	194.5
Aug-12	3497.5	10.0	189.7
Sep-12	4115.0	36.5	190.7
Oct-12	5620.0	666.0	245.7
Nov-12	4564.5	171.0	256.5
Dec-12	2297.2	176.0	264.0
Jan-13	389.5	193.3	202.6
Feb-13	1223.7	118.3	198.7
Mar-13	993.5	79.0	195.6
Apr-13	3593.0	841.5	245.4
May-13	2067.4	76.3	227.4
Jun-13	1375.1	142.8	210.5
Jul-13	4114.5	61.0	214.3
Aug-13	10186.5	63.0	218.7
Sep-13	5002.0	31.5	218.3
Oct-13	3263.0	63.0	168.1
Nov-13	530.7	32.1	156.5
Dec-13	188.5	20.5	143.5
Jan-14	333.0	36.5	130.4
Feb-14	235.5	36.0	123.6
Mar-14	1230.1	1.6	117.1
Apr-14	2076.1	78.3	53.5
May-14	2419.2	176.1	61.9
Jun-14	3114.6	8.2	50.6
Jul-14	4378.5	52.0	49.9
Aug-14	9313.0	36.0	47.6
Sep-14	2679.0	46.5	48.9
Oct-14	1957.5	36.0	46.6
Nov-14	643.5	215.5	61.9
Dec-14	8695.5	417.5	95.0
Jan-15	461.0	64.4	97.3
Feb-15	453.5	24.6	96.4
Mar-15	775.5	198.0	112.8
Apr-15	1911.5	330.5	133.8
May-15	2127.5	773.5	183.6
Jun-15	2169.5	36.5	185.9
Jul-15	2419.2	54.7	186.1
Aug-15	3708.1	17.6	184.6
Sep-15	2076.1	64.2	186.1
Oct-15	2202.8	73.0	189.2
Nov-15	1731.1	96.6	179.2
Dec-15	2603.5	174.5	159.0
		min	46.6
		max	264.029

LOP

1	Jan-11	124.6
1	Jan-12	930.0
1	Jan-13	193.3
1	Jan-14	36.5
1	Jan-15	64.4
2	Feb-11	195.6
2	Feb-12	166.1
2	Feb-13	118.3
2	Feb-14	36.0
2	Feb-15	24.6
3	Mar-11	363.1
3	Mar-12	116.0
3	Mar-13	79.0
3	Mar-14	1.6
3	Mar-15	198.0
4	Apr-11	93.0
4	Apr-12	243.3
4	Apr-13	841.5
4	Apr-14	78.3
4	Apr-15	330.5
5	May-11	55.3
5	May-12	293.0
5	May-13	76.3
5	May-14	176.1
5	May-15	773.5
6	Jun-11	61.4
6	Jun-12	345.5
6	Jun-13	142.8
6	Jun-14	8.2
6	Jun-15	36.5
7	Jul-11	7.8
7	Jul-12	15.0
7	Jul-13	61.0
7	Jul-14	52.0
7	Jul-15	54.7
8	Aug-11	67.0
8	Aug-12	10.0
8	Aug-13	63.0
8	Aug-14	36.0
8	Aug-15	17.6
9	Sep-11	25.5
9	Sep-12	36.5
9	Sep-13	31.5
9	Sep-14	46.5
9	Sep-15	64.2
10	Oct-11	5.5
10	Oct-12	666.0
10	Oct-13	63.0
10	Oct-14	36.0
10	Oct-15	73.0
11	Nov-11	41.5
11	Nov-12	171.0
11	Nov-13	32.1
11	Nov-14	215.5
11	Nov-15	96.6
12	Dec-11	85.5
12	Dec-12	176.0
12	Dec-13	20.5
12	Dec-14	417.5
12	Dec-15	174.5

		Total Coliform	E. coli
1/12/11		488.4	27.2
1/27/11		727.0	31.3
2/15/11		275.5	24.3
2/23/11		248.1	6.2
3/9/11		1986.3	648.8
3/23/11		1986.3	206.3
4/15/11		325.5	6.3
4/22/11		547.5	101.2
5/5/11		387.3	16.9
5/19/11		1732.9	172.5
6/8/11		307.6	23.7
6/23/11		1203.3	146.7
7/12/11		1046.2	33.6
7/28/11		1553.1	178.5
8/10/11		488.4	20.1
8/25/11		920.8	31.1
9/13/11		658.6	50.4
9/27/11		920.8	46.2
10/8/11		791.5	122.3
10/27/11		2419.2	8.5
11/4/11		1299.7	260.2
11/16/11		613.1	105.0
12/6/11		410.6	21.6
12/26/11		260.2	12.1
1/5/12		275.5	4.1
1/28/12		866.4	40.4
2/10/12		648.8	11.0
2/23/12		1119.9	10.9
3/9/12		461.1	13.4
3/22/12		579.4	28.8
4/6/12		1299.7	90.5
4/19/12		1553.1	15.8
5/9/12	>	2419.2	54.6
5/24/12	>	2419.2	81.6
6/7/12	>	2419.2	21.3
6/28/12		980.4	13.2
7/10/12		960.6	56.3
7/24/12	>	2419.2	5.2
8/14/12		1553.1	60.5
8/28/12		1299.7	48.8
9/5/12		1119.9	7.4
9/20/12		866.4	11.0
10/2/12		727.0	9.7
10/23/12	>	2419.2	275.5
11/8/12		1119.9	18.7
11/29/12		866.4	73.8
12/4/12	>	2419.2	416.0
12/23/12	>	2419.2	2419.2
1/17/13	>	2419.2	461.1
1/21/13	>	2419.2	816.4
2/9/13		770.1	58.1
2/23/13		770.1	123.6
3/7/13		524.7	86.2
3/22/13		387.3	34.1
4/4/13		365.4	11.0
4/25/13	>	2419.2	8.5
5/15/13	>	2419.2	17.1
5/25/13	>	2419.2	27.8
6/13/13		1986.3	248.1
6/26/13		261.3	99.1
7/19/13	>	2419.2	48.0
7/26/13		2419.2	33.1
8/4/13		920.8	5.2
8/29/13		1119.9	59.4
9/5/13	>	2419.2	172.3
9/26/13		1986.3	27.8
10/3/13		980.4	155.3
10/18/13		307.6	47.2
11/12/13		387.3	25.6
11/29/13		488.4	33.1
12/3/13		248.9	17.1
12/19/13		156.5	17.3
1/7/14		178.9	12.2
1/23/14		107.6	24.0
2/6/14		56.5	31.3
2/18/14		2419.2	920.8
3/4/14	>	2419.2	816.4
3/20/14		172.3	10.9
4/13/14		275.5	261.3
4/24/14		727.0	52.8
5/2/14		920.8	156.5
5/23/14		248.1	30.9
6/3/14		1732.9	5.2
6/22/14		1986.3	101.4
7/11/14		1986.3	36.4
7/27/14		579.4	7.4
8/11/14		26.9	1.0
8/24/14		1119.9	81.6
9/7/14		920.8	72.7
9/18/14	>	2419.2	40.8
10/13/14		686.7	13.1
10/23/14		770.1	98.7
11/10/14		547.5	26.9
11/23/14		866.4	53.8
12/4/14		1011.1	1011.1
12/22/14		275.5	35.9
1/17/15		93.3	9.8
1/27/15		108.6	18.7
2/9/15		517.2	38.8
2/22/15		613.1	28.1
3/8/15		980.4	13.4
3/24/15		435.2	6.3
4/5/15		1413.6	36.4
4/19/15		648.8	13.5
5/5/15		2419.2	19.7
5/18/15		1299.7	11.0
6/2/15		1203.3	53.8
6/22/15		579.4	16.1
7/7/15		214.3	8.5
7/20/15		980.4	18.7
8/12/15		920.8	210.5
8/26/15		1046.2	32.7
9/9/15		488.4	12.1
9/30/15		2419.2	38.4
10/19/15	>	2419.2	85.5
10/26/15		1413.6	166.9
11/3/15		1299.7	185.0
11/28/15		387.3	63.1
12/7/15		209.8	40.8
12/20/15		488.4	135.4
min		26.9	1.0
max		2419.2	2419.2
ave		1090.8	115.7
median		920.8	33.9
95th		2419.2	470.485

Precip

	Total	E. coli	Precipitation
Jan-11	607.7	29.3	2.8
Feb-11	261.8	15.3	7.02
Mar-11	1986.3	427.6	19.6
Apr-11	436.5	53.8	2.53
May-11	1060.1	94.7	3.53
Jun-11	755.5	85.2	2.41
Jul-11	1299.7	106.1	0
Aug-11	704.6	25.6	0
Sep-11	789.7	48.3	0
Oct-11	1605.4	65.4	4.2
Nov-11	956.4	182.6	1.99
Dec-11	335.4	16.9	0.17
Jan-12	571.0	22.3	7.37
Feb-12	884.4	11.0	4.11
Mar-12	520.3	21.1	17.86
Apr-12	1426.4	53.2	8.79
May-12	2419.2	68.1	0.41
Jun-12	1699.8	17.3	1.73
Jul-12	1689.9	30.8	0.03
Aug-12	1426.4	54.7	0.05
Sep-12	993.2	9.2	0
Oct-12	1573.1	142.6	2.97
Nov-12	993.2	46.3	12.52
Dec-12	2419.2	1417.6	18.05
Jan-13	2419.2	638.8	1.45
Feb-13	770.1	90.9	1.01
Mar-13	456.0	60.2	3.15
Apr-13	1392.3	9.8	2.37
May-13	2419.2	22.5	1.1
Jun-13	1123.8	173.6	1.95
Jul-13	2419.2	40.6	0
Aug-13	1020.4	32.3	0.01
Sep-13	2202.8	100.1	2.61
Oct-13	644.0	101.3	0.39
Nov-13	437.9	29.4	1.89
Dec-13	202.7	17.2	0.57
Jan-14	143.3	18.1	1.49
Feb-14	1237.9	476.1	14.86
Mar-14	1295.8	413.7	9.6
Apr-14	501.3	157.1	3.38
May-14	584.5	93.7	0.72
Jun-14	1859.6	53.3	0
Jul-14	1282.9	21.9	0.02
Aug-14	573.4	41.3	0.06
Sep-14	1670.0	56.8	0.87
Oct-14	728.4	55.9	1.61
Nov-14	707.0	40.4	5.25
Dec-14	643.3	523.5	14.87
Jan-15	101.0	14.3	0.11
Feb-15	565.2	33.5	5.86
Mar-15	707.8	9.9	1.01
Apr-15	1031.2	25.0	2.99
May-15	1859.5	15.4	0.09
Jun-15	891.4	35.0	0.18
Jul-15	597.4	13.6	0.04
Aug-15	983.5	121.6	0
Sep-15	1453.8	25.3	0.09
Oct-15	1916.4	126.2	0.7
Nov-15	843.5	124.1	5.73
Dec-15	349.1	88.1	12.3

Monthly Medians

		RAA
Jan-11	29.3	
Feb-11	15.3	
Mar-11	427.6	
Apr-11	53.8	
May-11	94.7	
Jun-11	85.2	
Jul-11	106.1	
Aug-11	25.6	
Sep-11	48.3	
Oct-11	65.4	
Nov-11	182.6	
Dec-11	16.9	95.9
Jan-12	22.3	95.3
Feb-12	11.0	94.9
Mar-12	21.1	61.1
Apr-12	53.2	61.0
May-12	68.1	58.8
Jun-12	17.3	53.1
Jul-12	30.8	46.9
Aug-12	54.7	49.3
Sep-12	9.2	46.0
Oct-12	142.6	52.5
Nov-12	46.3	41.1
Dec-12	1417.6	157.8
Jan-13	638.8	209.2
Feb-13	90.9	215.9
Mar-13	60.2	219.1
Apr-13	9.8	215.5
May-13	22.5	211.7
Jun-13	173.6	224.7
Jul-13	40.6	225.5
Aug-13	32.3	223.7
Sep-13	100.1	231.2
Oct-13	101.3	227.8
Nov-13	29.4	226.4
Dec-13	17.2	109.7
Jan-14	18.1	58.0
Feb-14	476.1	90.1
Mar-14	413.7	119.5
Apr-14	157.1	131.8
May-14	93.7	137.7
Jun-14	53.3	127.7
Jul-14	21.9	126.2
Aug-14	41.3	126.9
Sep-14	56.8	123.3
Oct-14	55.9	119.5
Nov-14	40.4	120.4
Dec-14	523.5	162.6
Jan-15	14.3	162.3
Feb-15	33.5	125.4
Mar-15	9.9	91.8
Apr-15	25.0	80.8
May-15	15.4	74.2
Jun-15	35.0	72.7
Jul-15	13.6	72.0
Aug-15	121.6	78.7
Sep-15	25.3	76.1
Oct-15	126.2	81.9
Nov-15	124.1	88.9
Dec-15	88.1	52.6
	min	41.1
	max	231.2

North Auburn

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10/19/15
10/27/15
11/2/15
11/28/15
12/7/15
12/21/15
min
max
ave
median
95th

	Total	*E. coli*
	1119.9	21.1
	2419.2	27.2
	36.4	2.0
	156.5	8.5
	387.3	7.4
	456.9	10.9
	248.1	35.0
	325.5	64.5
	275.5	9.8
	261.3	11.0
	920.8	26.2
	1732.9	13.5
	920.8	5.2
	344.8	32.8
	1553.1	143.0
	1413.6	25.8
	791.5	2.0
	960.6	45.5
	816.4	27.2
	344.1	7.3
	365.4	18.9
	185.0	13.4
	261.3	34.5
	488.4	67.7
	1553.1	32.3
	260.2	2.0
	162.4	4.1
	920.8	17.3
	1413.6	30.1
	131.3	4.1
	313.0	12.0
	517.2	7.4
	547.5	4.1
	579.4	8.5
	1413.6	5.2
	1413.6	7.4
	829.7	6.1
	1203.3	8.5
	1046.2	20.3
	579.4	21.6
	920.8	44.1
>	2419.2	48.0
	816.4	36.4
	137.6	3.1
	816.4	21.8
	436.0	18.5
>	2419.2	166.9
	214.3	7.4
	38.4	6.3
	1203.3	21.3
	57.8	4.1
	416.0	7.4
	172.2	10.9
	85.7	3.1
	133.3	12.1
	365.4	16.0
	410.6	3.1
	920.8	10.8
	913.9	24.9
>	2419.2	15.3
	1986.3	24.6
>	2419.2	18.5
>	2419.2	24.3
>	2419.2	39.9
>	2419.2	45.9
>	2419.2	12.1
	579.4	39.9
	290.9	10.8
	648.8	9.7
	461.1	16.9
	461.1	16.9
	307.6	7.4
	218.7	5.2
	290.9	1.0
	344.8	23.3
	920.8	38.8
	488.4	5.2
	225.4	8.5
	161.6	9.8
	290.0	3.1
	579.4	12.2
	435.2	6.3
>	2419.2	30.1
>	2419.2	3.1
>	2419.2	11.0
	2419.2	51.2
	1299.7	72.7
	1299.7	29.2
	1986.3	19.9
	579.4	4.1
	648.8	8.6
	365.4	2.0
>	2419.2	119.8
	913.9	190.4
	344.8	28.8
	4.1	1.0
	95.9	14.6
	987.3	39.9
	529.8	1.0
	166.4	6.3
	1203.3	7.4
	365.4	4.1
	325.5	5.2
	866.4	5.2
	980.4	10.8
	1203.3	11.0
>	2419.2	28.8
	1732.9	5.2
>	2419.2	23.1
	1986.3	18.3
	1732.9	18.5
	2419.2	3.0
	727.0	20.2
	1986.3	14.6
	770.1	17.1
	1553.1	52.1
>	2419.2	54.7
	613.1	51.2
	214.3	24.6
	4.1	1.0
	2419.2	190.4
	949.8	22.9
	648.8	13.5
	2419.2	64.82

Monthly Medians

	Total	E. coli	RAA
Jan-11	1119.9	21.1	
Feb-11	1227.8	14.6	
Mar-11	271.9	8.0	
Apr-11	352.5	23.0	
May-11	300.5	37.2	
Jun-11	591.1	18.6	
Jul-11	1326.9	9.4	
Aug-11	949.0	87.9	
Sep-11	1102.6	13.9	
Oct-11	888.5	36.4	
Nov-11	354.8	13.1	
Dec-11	223.2	24.0	25.6
Jan-12	1020.8	50.0	28.0
Feb-12	211.3	3.1	27.0
Mar-12	1167.2	23.7	28.3
Apr-12	222.2	8.1	27.1
May-12	532.4	5.8	24.5
Jun-12	996.5	6.9	23.5
Jul-12	1121.7	6.8	23.3
Aug-12	1124.8	14.4	17.2
Sep-12	750.1	32.9	18.7
Oct-12	1617.8	42.2	19.2
Nov-12	477.0	12.5	19.2
Dec-12	1427.6	92.7	24.9
Jan-13	126.4	6.9	21.3
Feb-13	630.6	12.7	22.1
Mar-13	294.1	9.2	20.9
Apr-13	109.5	7.6	20.9
May-13	388.0	9.6	21.2
Jun-13	917.4	17.9	22.1
Jul-13	2202.8	20.0	23.2
Aug-13	2419.2	21.4	23.8
Sep-13	2419.2	42.9	24.6
Oct-13	1499.3	26.0	23.3
Nov-13	469.9	10.3	23.1
Dec-13	461.1	16.9	16.8
Jan-14	263.2	6.3	16.7
Feb-14	317.9	12.2	16.7
Mar-14	704.6	22.0	17.7
Apr-14	193.5	9.2	17.9
May-14	434.7	7.7	17.7
Jun-14	1427.2	18.2	17.7
Jul-14	2419.2	7.1	16.7
Aug-14	1859.5	62.0	20.0
Sep-14	1643.0	24.6	18.5
Oct-14	614.1	6.4	16.9
Nov-14	1392.3	60.9	21.1
Dec-14	629.4	109.6	28.8
Jan-15	50.0	7.8	28.9
Feb-15	758.6	20.5	29.6
Mar-15	684.9	6.9	28.4
Apr-15	345.5	4.7	28.0
May-15	923.4	8.0	28.0
Jun-15	1811.3	19.9	28.2
Jul-15	2076.1	14.2	28.8
Aug-15	1859.6	18.4	25.1
Sep-15	1573.1	11.6	24.1
Oct-15	1378.2	15.9	24.8
Nov-15	1986.2	53.4	24.2
Dec-15	413.7	37.9	18.2
		min	16.7
		max	29.6375

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance Stage 1 (in μg/L or ppb)

System Name: Cascade Shores System No.: 2910007 Year: 2012 Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/13	5/7	8/12	11/10	2/10	5/6	8/11	11/18	2/11	5/11	8/10	11/9	2/7	5/9	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	21.0	27.0	40.0	36.0	32.0	38.0	52.0	24.0	24.0	35.0	50.0	62.0	20.0	16.0	48.0	31.0	27.0	40.0	42.0	35.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	21.0	27.0	40.0	36.0	32.0	38.0	52.0	24.0	24.0	35.0	50.0	62.0	20.0	16.0	48.0	31.0	27.0	40.0	42.0	35.0
Running Annual Average	20.0	30.0	30.3	31.0	33.8	36.5	39.5	36.5	34.5	33.8	33.3	42.8	41.8	37.0	36.5	28.8	30.5	36.5	35.0	36.0
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	16844 Pasquale Road
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance Stage 1 (in µg/L or ppb)

System Name: Cascade Shores System No.: 2910007 Year: 2012 Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/13	5/7	8/12	11/10	2/10	5/6	8/11	11/17	2/11	5/11	8/10	11/9	2/7	5/9	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	23.0	23.0	26.0	39.0	28.0	28.0	30.0	28.0	27.0	31.0	48.0	53.0	26.0	20.0	49.0	31.0	33.0	48.0	49.0	41.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	23.0	23.0	26.0	39.0	28.0	28.0	30.0	28.0	27.0	31.0	48.0	53.0	26.0	20.0	49.0	31.0	33.0	48.0	49.0	41.0
Running Annual Average	20.0	30.5	32.3	27.8	29.0	30.3	31.3	28.5	28.3	29.0	33.5	39.8	39.5	36.8	37.0	31.5	33.3	40.3	40.3	42.8
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	16844 Pasquale Road
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Public Health

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Cascade Shores System No.: 2910007 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/14	8/7	11/12	2/11	5/12	8/12	11/11	2/17	5/26	8/12	11/16	2/17			
#	Monitoring Location	TTHM Results (ug/L)																			
1	16844 Pasquale Rd	27.0	40.0	42.0	35.0	24.0	48.0	42.0	29.0	28.0	62.0	58.0	32.0	45.0	72.0	62.0	39.0	49.0			
2	12875 Summit Ridge	28.0	33.0	47.0	35.0	24.0	51.0	44.0	35.0	26.0	60.0	59.0	38.0	43.0	58.0	48.0	32.0	44.0			
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
#	Monitoring Location	TTHM OEL (ug/L)																			
1	16844 Pasquale Rd			37.8	38.0	31.3	38.8	39.0	37.0	31.8	45.3	51.5	46.0	45.0	55.3	60.3	53.0	49.8			
2	12875 Summit Ridge			38.8	37.5	32.5	40.3	40.8	41.3	32.8	45.3	51.0	48.8	45.8	49.3	49.3	42.5	42.0			
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	16844 Pasquale Rd	27.0	33.5	36.3	36.0	35.3	37.3	37.3	35.8	36.8	40.3	44.3	45.0	49.3	51.8	52.8	54.5	55.5			
2	12875 Summit Ridge	28.0	30.5	36.0	35.8	34.8	39.3	38.5	38.5	39.0	41.3	45.0	45.8	50.0	49.5	46.8	45.3	45.5			
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No			
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Public Health

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Cascade Shores System No.: 2910007 Year: 2016 Quarter: 1st HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/14	8/7	11/12	2/11	5/12	8/12	11/11	2/17	5/26	8/12	11/16	2/17			
#	Monitoring Location	HAA5 Results (ug/L)																			
1	16844 Pasquale Rd	33.0	48.0	49.0	41.0	24.0	39.0	34.0	24.0	28.0	64.0	45.0	26.0	43.0	46.0	23.0	29.0	47.0			
2	12875 Summit Ridge	36.0	48.0	34.0	26.0	25.0	45.0	26.0	20.0	27.0	67.0	31.0	20.0	48.0	46.0	23.0	26.0	45.0			
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	16844 Pasquale Rd			44.8	44.8	34.5	35.8	32.8	30.3	28.5	45.0	45.5	40.3	39.3	40.3	33.8	31.8	36.5			
2	12875 Summit Ridge			38.0	33.5	27.5	35.3	30.5	27.8	25.0	45.3	39.0	34.5	36.8	40.0	35.0	30.3	34.8			
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	16844 Pasquale Rd	33.0	40.5	43.3	42.8	40.5	38.3	34.5	30.3	31.3	37.5	40.3	40.8	44.5	40.0	34.5	35.3	36.3			
2	12875 Summit Ridge	36.0	42.0	39.3	36.0	33.3	32.5	30.5	29.0	29.5	35.0	36.3	36.3	41.5	36.3	34.3	35.8	35.0			
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No			
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Loma Rica System No.: 2910006 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

#	Year:	2011				2012				2013				2014				2015			
	Quarter:	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
	Sample Date (month/day):	3/9	6/7	9/13	12/6	3/13	6/12	9/10	12/11	3/13	6/12	9/11	12/11	3/12	6/16	9/23	12/11	3/11	6/16	9/14	12/15
#	Monitoring Location	TTHM Results (ug/L)																			
1	16607 Annie Dr.	33.0	47.0	51.0	29.0	42.0	65.0	66.0	65.0	68.0	54.0	61.0	41.0	74.0	70.0	35.0	51.0	58.0	79.0	64.0	36.0
2	Alta Sierra Res. Eff.	32.0	50.0	45.0	26.0	40.0	57.0	57.0	57.0	60.0	49.0	60.0	23.0	68.0	70.0	31.0	47.0	50.0	73.0	56.0	30.0
3	17473 Colfax Hwy	31.0	42.0	41.0	22.0	40.0	56.0	55.0	55.0	60.0	50.0	58.0	24.0	72.0	62.0	33.0	47.0	62.0	74.0	59.0	37.0
4	10495 Oak Dr	36.0	52.0	62.0	39.0	45.0	63.0	69.0	63.0	64.0	63.0	55.0	29.0	67.0	65.0	45.0	67.0	66.0	85.0	68.0	36.0
	Number of Samples Taken	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
#	Monitoring Location	TTHM OEL (ug/L)																			
1	16607 Annie Dr.			45.5	39.0	41.0	50.3	59.8	65.3	66.8	60.3	61.0	49.3	62.5	63.8	53.5	51.8	50.5	66.8	66.3	53.8
2	Alta Sierra Res. Eff.			43.0	36.8	37.8	45.0	52.8	57.0	58.5	53.8	57.3	38.8	54.8	57.8	50.0	48.8	44.5	60.8	58.8	47.3
3	17473 Colfax Hwy			38.8	31.8	35.8	43.5	51.5	55.3	57.5	53.8	56.5	39.0	56.5	55.0	50.0	47.3	51.0	64.3	63.5	51.8
4	10495 Oak Dr			53.0	48.0	47.8	52.5	61.5	64.5	65.0	63.3	59.3	44.0	54.5	56.5	55.5	61.0	61.0	75.8	71.8	56.3
	Is OEL ≤ MCL for all monitoring locations?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	If no, list monitoring location # where MCL not met (a)																				
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	16607 Annie Dr.	33.0	40.0	43.7	40.0	42.3	46.8	50.5	59.5	66.0	63.3	62.0	56.0	57.5	61.5	55.0	57.5	53.5	55.8	63.0	59.3
2	Alta Sierra Res. Eff.	32.0	41.0	42.3	38.3	40.3	42.0	45.0	52.8	57.8	55.8	56.5	48.0	50.0	55.3	48.0	54.0	49.5	50.3	56.5	52.3
3	17473 Colfax Hwy	31.0	36.5	38.0	34.0	36.3	39.8	43.3	51.5	56.5	55.0	55.8	48.0	51.0	54.0	47.8	53.5	51.0	54.0	60.5	58.0
4	10495 Oak Dr	36.0	44.0	50.0	47.3	49.5	52.3	54.0	60.0	64.8	64.8	61.3	52.8	53.5	54.0	51.5	61.0	60.8	65.8	71.5	63.8
	Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	If no, list monitoring location # where MCL not met (b)																				
	Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	If yes, list monitoring location # where MCL not met (b)																				

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Public Health

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Loma Rica System No.: 2910006 Year: 2015 Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2011				2012				2013				2014				2015			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		3/9	6/7	9/13	12/6	3/13	6/12	9/10	12/11	3/13	6/12	9/11	12/11	3/12	6/16	9/23	12/11	3/11	6/16	9/14	12/15
#	Monitoring Location	HAA5 Results (ug/L)																			
1	16607 Annie Dr.	29.0	25.0	22.0	20.0	35.0	38.0	26.0	38.0	42.0	35.0	28.0	19.0	54.0	39.0	20.0	17.0	52.0	31.0	26.0	29.0
2	Alta Sierra Res. Eff.	29.0	29.0	23.0	19.0	35.0	43.0	27.0	32.0	45.0	37.0	49.0	21.0	62.0	54.0	20.0	19.0	58.0	34.0	25.0	29.0
3	17473 Colfax Hwy	28.0	28.0	25.0	18.0	38.0	40.0	33.0	40.0	46.0	36.0	44.0	20.0	63.0	45.0	20.0	18.0	38.0	35.0	26.0	27.0
4	10495 Oak Dr	25.0	22.0	22.0	19.0	24.0	35.0	24.0	39.0	29.0	29.0	50.0	19.0	31.0	45.0	20.0	17.0	33.0	28.0	24.0	23.0
Number of Samples Taken		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	16607 Annie Dr.			24.5	21.8	28.0	32.8	31.3	35.0	37.0	37.5	33.3	25.3	38.8	37.8	33.3	23.3	35.3	32.8	33.8	28.8
2	Alta Sierra Res. Eff.			26.0	22.5	28.0	35.0	33.0	33.5	37.3	37.8	45.0	32.0	48.5	47.8	39.0	28.0	38.8	36.3	35.5	29.3
3	17473 Colfax Hwy			26.5	22.3	29.8	34.0	36.0	38.3	41.3	39.5	42.5	30.0	47.5	43.3	37.0	25.3	28.5	31.5	31.3	28.8
4	10495 Oak Dr			22.8	20.5	22.3	28.3	26.8	34.3	30.3	31.5	39.5	29.3	32.8	35.0	29.0	24.8	25.8	26.5	27.3	24.5
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	16607 Annie Dr.	29.0	27.0	25.3	24.0	25.5	28.8	29.8	34.3	36.0	35.3	35.8	31.0	34.0	35.0	33.0	32.5	32.0	30.0	31.5	34.5
2	Alta Sierra Res. Eff.	29.0	29.0	27.0	25.0	26.5	30.0	31.0	34.3	36.8	35.3	40.8	38.0	42.3	46.5	39.3	38.8	37.8	32.8	34.0	36.5
3	17473 Colfax Hwy	28.0	28.0	27.0	24.8	27.3	30.3	32.3	37.8	39.8	38.8	41.5	36.5	40.8	43.0	37.0	36.5	30.3	27.8	29.3	31.5
4	10495 Oak Dr	25.0	23.5	23.0	22.0	21.8	25.0	25.5	30.5	31.8	30.3	36.8	31.8	32.3	36.3	28.8	28.3	28.8	24.5	25.5	27.0
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: **Nevada I.D. E. George** System No.: **2910004** Year: **2015** Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2011				2012				2013				2014				2015			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		1/12	4/5	7/6	10/12	1/11	4/9	7/17	10/9	1/9	4/10	7/16	10/16	1/8	4/15	7/9	10/15	1/12	4/15	7/14	10/7
#	Monitoring Location	TTHM Results (ug/L)																			
1	Hidden Valley PRV	14.0	17.0	34.0	40.0	30.0	25.0	53.0	34.0	13.0	27.0	59.0	43.0	31.0	33.0	64.0	36.0	43.0	38.0	72.0	47.0
2	10364 Willow Valley	13.0	10.0	33.0	27.0	24.0	21.0	46.0	29.0	9.6	30.0	62.0	43.0	25.0	28.0	59.0	27.0	31.0	31.0	52.0	33.0
3	Country Ln & Indian Flt	32.0	21.0	32.0	39.0	27.0	27.0	48.0	44.0	29.0	40.0	43.0	47.0	26.0	42.0	72.0	43.0	36.0	36.0	78.0	53.0
4	12405 Ridge Road	13.0	12.0	30.0	25.0	23.0	21.0	45.0	28.0	9.4	21.0	62.0	32.0	24.0	30.0	53.0	29.0	30.0	29.0	55.0	34.0
Number of Samples Taken		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
#	Monitoring Location	TTHM OEL (ug/L)																			
1	Hidden Valley PRV			24.8	32.8	33.5	30.0	40.3	36.5	28.3	25.3	39.5	43.0	41.0	35.0	48.0	42.3	46.5	38.8	56.3	51.0
2	10364 Willow Valley			22.3	24.3	27.0	23.3	34.3	31.3	23.6	24.7	40.9	44.5	38.8	31.0	42.8	35.3	37.0	30.0	41.5	37.3
3	Country Ln & Indian Flt			29.3	32.8	31.3	30.0	37.5	40.8	37.5	38.3	38.8	44.3	35.5	39.3	53.0	50.0	46.8	37.8	57.0	55.0
4	12405 Ridge Road			21.3	23.0	25.3	22.5	33.5	30.5	23.0	19.9	43.0	36.8	35.5	29.0	40.0	35.3	35.5	29.3	42.3	38.0
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	Hidden Valley PRV	14.0	15.5	21.7	26.3	30.3	32.3	37.0	35.5	31.3	31.8	33.3	35.5	40.0	41.5	42.8	41.0	44.0	45.3	47.3	50.0
2	10364 Willow Valley	13.0	11.5	18.7	20.8	23.5	26.3	29.5	30.0	26.4	28.7	32.7	36.2	40.0	39.5	38.8	34.8	36.3	37.0	35.3	36.8
3	Country Ln & Indian Flt	32.0	26.5	28.3	31.0	29.8	31.3	35.3	36.5	37.0	40.3	39.0	39.8	39.0	39.5	46.8	45.8	48.3	46.8	48.3	50.8
4	12405 Ridge Road	13.0	12.5	18.3	20.0	22.5	24.8	28.5	29.3	25.9	25.9	30.1	31.1	34.8	37.0	34.8	34.0	35.5	35.3	35.8	37.0
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: **Nevada I.D. E. George** System No.: **2910004** Year: **2015** Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

	Year:	2011				2012				2013				2014				2015			
	Quarter:	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
	Sample Date (month/day):	1/12	4/5	7/6	10/12	1/11	4/9	7/17	10/9	1/9	4/10	7/16	10/16	1/8	4/15	7/9	10/15	1/12	4/15	7/14	10/7
#	Monitoring Location	HAA5 Results (ug/L)																			
1	Hidden Valley PRV	20.0	15.0	20.0	22.0	21.0	16.0	24.0	25.0	14.0	26.0	46.0	30.0	25.0	29.0	39.0	20.0	22.0	20.0	30.0	18.0
2	10364 Willow Valley	20.0	11.0	22.0	21.0	21.0	16.0	24.0	30.0	13.0	32.0	42.0	25.0	23.0	30.0	43.0	16.0	22.0	22.0	38.0	25.0
3	Country Ln & Indian Flt	20.0	17.0	19.0	18.0	21.0	18.0	27.0	22.0	19.0	33.0	29.0	23.0	24.0	39.0	37.0	16.0	20.0	18.0	32.0	20.0
4	12405 Ridge Road	18.0	13.0	21.0	23.0	18.0	15.0	27.0	21.0	12.0	22.0	43.0	28.0	23.0	32.0	43.0	16.0	23.0	21.0	39.0	25.0
	Number of Samples Taken	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	Hidden Valley PRV			18.8	19.8	21.0	18.8	21.3	22.5	19.3	22.8	33.0	33.0	31.5	28.3	33.0	27.0	25.8	20.5	25.5	21.5
2	10364 Willow Valley			18.8	18.8	21.3	18.5	21.3	25.0	20.0	26.8	32.3	31.0	28.3	27.0	34.8	26.3	25.8	20.5	30.0	27.5
3	Country Ln & Indian Flt			18.8	18.0	19.8	18.8	23.3	22.3	21.8	26.8	27.5	27.0	25.0	31.3	34.3	27.0	23.3	18.0	25.5	22.5
4	12405 Ridge Road			18.3	20.0	20.0	17.8	21.8	21.0	18.0	19.3	30.0	30.3	29.3	28.8	35.3	26.8	26.3	20.3	30.5	27.5
	Is OEL ≤ MCL for all monitoring locations?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	If no, list monitoring location # where MCL not met (a)																				
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	Hidden Valley PRV	20.0	17.5	18.3	19.3	19.5	19.8	20.8	21.5	19.8	22.3	27.8	29.0	31.8	32.5	30.8	28.3	27.5	25.3	23.0	22.5
2	10364 Willow Valley	20.0	15.5	17.7	18.5	18.8	20.0	20.5	22.8	20.8	24.8	29.3	28.0	30.5	30.0	30.3	28.0	27.8	25.8	24.5	26.8
3	Country Ln & Indian Flt	20.0	18.5	18.7	18.5	18.8	19.0	21.0	22.0	21.5	25.3	25.8	26.0	27.3	28.8	30.8	29.0	28.0	22.8	21.5	22.5
4	12405 Ridge Road	18.0	15.5	17.3	18.8	18.8	19.3	20.8	20.3	18.8	20.5	24.5	26.3	29.0	31.5	31.5	28.5	28.5	25.8	24.8	27.0
	Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	If no, list monitoring location # where MCL not met (b)																				
	Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	If yes, list monitoring location # where MCL not met (b)																				

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance Stage 1 (in µg/L or ppb)

System Name: Lake of the Pines | System No.: 2910014 | Year: 2012 | Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/12	5/6	8/11	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	11/9	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	50.0	39.0	46.0	32.0	51.0	58.0	67.0	38.0	47.0	47.0	67.0	63.0	27.0	37.0	42.0	43.0	36.0	35.0	64.0	36.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	50.0	39.0	46.0	32.0	51.0	58.0	67.0	38.0	47.0	47.0	67.0	63.0	27.0	37.0	42.0	43.0	36.0	35.0	64.0	36.0
Running Annual Average	35.0	38.0	44.7	41.8	42.0	46.8	52.0	53.5	52.5	49.8	49.8	56.0	51.0	48.5	42.3	37.3	39.5	39.0	44.5	42.8
Meets Standard?* (check box)	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☐ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	10961 Combie Road
2	
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Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

3/28/02

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance Stage 1 (in μg/L or ppb)

System Name: Lake of the Pines   System No.: 2910014   Year: 2012   Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/12	5/6	8/11	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	11/9	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	31.0	15.0	21.0	18.0	23.0	24.0	25.0	20.0	44.0	27.0	23.0	30.0	25.0	17.0	20.0	18.0	32.0	26.0	27.0	24.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	31.0	15.0	21.0	18.0	23.0	24.0	25.0	20.0	44.0	27.0	23.0	30.0	25.0	17.0	20.0	18.0	32.0	26.0	27.0	24.0
Running Annual Average	46.0	36.0	31.3	21.3	19.3	21.5	22.5	23.0	28.3	29.0	28.5	31.0	26.3	23.8	23.0	20.0	21.8	24.0	25.8	27.3
Meets Standard?* (check box)	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☐ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	10961 Combie Road
2	
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Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: **Nevada I.D. Lake of the Pines** System No.: 2910014 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/14	8/7	11/12	2/11	5/12	8/12	11/12	2/17	5/26	8/12	11/16				
#	Monitoring Location	TTHM Results (ug/L)																			
1	10961 Combie Road	36.0	35.0	64.0	36.0	46.0	60.0	44.0	43.0	33.0	65.0	56.0	52.0	55.0	68.0	62.0	45.0				
2	Dark Horse Pump Stat.	37.0	42.0	45.0	39.0	50.0	56.0	44.0	27.0	44.0	48.0	56.0	41.0	62.0	73.0	63.0	36.0				
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	TTHM OEL (ug/L)																			
1	10961 Combie Road			49.8	42.8	48.0	50.5	48.5	47.5	38.3	51.5	52.5	56.3	54.5	60.8	61.8	55.0				
2	Dark Horse Pump Stat.			42.3	41.3	46.0	50.3	48.5	38.5	39.8	41.8	51.0	46.5	55.3	62.3	65.3	52.0				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	10961 Combie Road	36.0	35.5	45.0	42.8	45.3	51.5	46.5	48.3	45.0	46.3	49.3	51.5	57.0	57.8	59.3	57.5				
2	Dark Horse Pump Stat.	37.0	39.5	41.3	40.8	44.0	47.5	47.3	44.3	42.8	40.8	43.8	47.3	51.8	58.0	59.8	58.5				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: **Nevada I.D. Lake of the Pines** System No.: 2910014 Year: 2015 Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/14	8/7	11/12	2/11	5/12	8/12	11/12	2/17	5/26	8/12	11/16				
#	Monitoring Location	HAA5 Results (ug/L)																			
1	10961 Combie Road	32.0	26.0	27.0	24.0	52.0	28.0	28.0	34.0	33.0	65.0	23.0	24.0	35.0	24.0	32.0	22.0				
2	Dark Horse Pump Stat.	47.0	32.0	34.0	27.0	48.0	36.0	30.0	26.0	47.0	50.0	25.0	25.0	40.0	23.0	27.0	23.0				
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	10961 Combie Road			28.0	25.3	38.8	33.0	34.0	31.0	32.0	49.3	36.0	34.0	29.3	26.8	30.8	25.0				
2	Dark Horse Pump Stat.			36.8	30.0	39.3	36.8	36.0	29.5	37.5	43.3	36.8	31.3	32.5	27.8	29.3	24.0				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	10961 Combie Road	32.0	29.0	28.3	27.3	32.3	32.8	33.0	35.5	30.8	40.0	38.8	36.3	36.8	26.5	28.8	28.3				
2	Dark Horse Pump Stat.	47.0	39.5	37.7	35.0	35.3	36.3	35.3	35.0	34.8	38.3	37.0	36.8	35.0	28.3	28.8	28.3				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance Stage 1 (in μg/L or ppb)

System Name: Lake Wildwood System No.: 2910023 Year: 2012 Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/13	5/7	8/12	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	11/9	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	65.0	41.0	42.0	55.0	58.0	54.0	40.0	38.0	66.0	96.0	54.0	64.0	43.0	58.0	48.0	36.0	41.0	62.0	41.0	59.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	65.0	41.0	42.0	55.0	58.0	54.0	40.0	38.0	66.0	96.0	54.0	64.0	43.0	58.0	48.0	36.0	41.0	62.0	41.0	59.0
Running Annual Average	55.0	45.5	42.3	50.8	49.0	52.3	51.8	47.5	49.5	60.0	63.5	70.0	64.3	54.8	53.3	46.3	45.8	46.8	45.0	50.8
Meets Standard?* (check box)	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐	Yes☑ No☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	10257 Horton Street
2	
3	
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8	
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance Stage 1 (in μg/L or ppb)

System Name: Lake Wildwood System No.: 2910023 Year: 2012 Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/13	5/7	8/12	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	11/9	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	100.0	18.0	20.0	28.0	70.0	26.0	21.0	26.0	68.0	41.0	20.0	29.0	32.0	25.0	26.0	19.0	41.0	38.0	22.0	48.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	100.0	18.0	20.0	28.0	70.0	26.0	21.0	26.0	68.0	41.0	20.0	29.0	32.0	25.0	26.0	19.0	41.0	38.0	22.0	48.0
Running Annual Average	42.0	39.0	34.3	41.5	34.0	36.0	36.3	35.8	35.3	39.0	38.8	39.5	30.5	26.5	28.0	25.5	27.8	31.0	30.0	37.3
Meets Standard?* (check box)	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	10257 Horton Street
2	
3	
4	
5	
6	
7	
8	
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10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Lake Wildwood System No.: 2910023 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/15	8/7	11/12	2/11	5/12	8/12	11/11	2/17	5/26	8/12	11/16				
#	Monitoring Location	TTHM Results (ug/L)																			
1	18367 Fair Oaks	35.0	38.0	33.0	36.0	28.0	66.0	41.0	34.0	49.0	61.0	38.0	40.0	53.0	68.0	43.0	39.0				
2	17593 Penn Valley Dr.	37.0	64.0	45.0	62.0	45.0	72.0	42.0	59.0	45.0	71.0	65.0	66.0	49.0	49.0	62.0	51.0				
3																					
4																					
Number of Samples Taken		2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	TTHM OEL (ug/L)																			
1	18367 Fair Oaks			34.8	35.8	31.3	49.0	44.0	43.8	43.3	51.3	46.5	44.8	46.0	57.3	51.8	47.3				
2	17593 Penn Valley Dr.			47.8	58.3	49.3	62.8	50.3	58.0	47.8	61.5	61.5	67.0	57.3	53.3	55.5	53.3				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	18367 Fair Oaks	35.0	36.5	35.3	35.5	33.8	40.8	42.8	42.3	47.5	46.3	45.5	47.0	48.0	49.8	51.0	50.8				
2	17593 Penn Valley Dr.	37.0	50.5	48.7	52.0	54.0	56.0	55.3	54.5	54.5	54.3	60.0	61.8	62.8	57.3	56.5	52.8				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Public Health

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Lake Wildwood System No.: 2910023 Year: 2015 Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		2/8	5/9	8/7	11/19	2/13	5/15	8/7	11/12	2/11	5/12	8/12	11/11	2/17	5/26	8/12	11/16				
#	Monitoring Location	HAA5 Results (ug/L)																			
1	18367 Fair Oaks	38.0	26.0	28.0	43.0	24.0	28.0	18.0	35.0	49.0	59.0	16.0	30.0	45.0	23.0	25.0	56.0				
2	17593 Penn Valley Dr.	40.0	39.0	21.0	43.0	47.0	55.0	21.0	31.0	32.0	44.0	22.0	31.0	32.0	25.0	22.0	32.0				
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	18367 Fair Oaks			30.0	35.0	29.8	30.8	22.0	29.0	37.8	50.5	35.0	33.8	34.0	30.3	29.5	40.0				
2	17593 Penn Valley Dr.			30.3	36.5	39.5	50.0	36.0	34.5	29.0	37.8	30.0	32.0	29.3	28.3	25.3	27.8				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	18367 Fair Oaks	38.0	32.0	30.7	33.8	30.3	30.8	28.3	26.3	32.5	40.3	39.8	38.5	37.5	28.5	30.8	37.3				
2	17593 Penn Valley Dr.	40.0	39.5	33.3	35.8	37.5	41.5	41.5	38.5	34.8	32.0	32.3	32.3	32.3	27.5	27.5	27.8				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance Stage 1 (in µg/L or ppb)

System Name: North Auburn   System No.: 3110026   Year: 2012   Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/12	5/6	8/11	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	12/13	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	25.0	20.0	37.0	31.0	31.0	43.0	44.0	35.0	28.0	42.0	45.0	61.0	29.0	37.0	37.0	48.0	36.0	32.0	41.0	38.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	25.0	20.0	37.0	31.0	31.0	43.0	44.0	35.0	28.0	42.0	45.0	61.0	29.0	37.0	37.0	48.0	36.0	32.0	41.0	38.0
Running Annual Average	28.0	31.0	36.0	28.3	29.8	35.5	37.3	38.3	37.5	37.3	37.5	44.0	44.3	43.0	41.0	37.8	39.5	38.3	39.3	36.8
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	1418 Live Oak Lane
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance Stage 1 (in μg/L or ppb)

System Name: North Auburn System No.: 3110026 Year: 2012 Quarter: 4th

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/12	5/6	8/11	11/10	2/10	5/6	8/11	11/17	2/8	5/11	8/10	12/13	2/8	5/10	8/8	11/8	2/8	5/9	8/7	11/19
Site 1	25.0	16.0	30.0	20.0	29.0	30.0	30.0	17.0	35.0	27.0	39.0	44.0	31.0	31.0	35.0	18.0	37.0	33.0	32.0	30.0
Site 2																				
Site 3						Standard Montioring Sampling Timeframe														
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	25.0	16.0	30.0	20.0	29.0	30.0	30.0	17.0	35.0	27.0	39.0	44.0	31.0	31.0	35.0	18.0	37.0	33.0	32.0	30.0
Running Annual Average	34.0	33.5	34.0	22.8	23.8	27.3	27.3	26.5	28.0	27.3	29.5	36.3	35.3	36.3	35.3	28.8	30.3	30.8	30.0	33.0
Meets Standard?* (check box)	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Identify the sample locations in the table below.

Site	Sample Location
1	1418 Live Oak Lane
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. North Auburn System No.: 3110026 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		3/15	5/9	8/7	11/19	2/13	5/14	8/7	11/12	2/11	5/12	8/12	11/12	2/17	5/26	8/12	11/16				
#	Monitoring Location	TTHM Results (ug/L)																			
1	11325 Edgewood	25.0	42.0	37.0	48.0	48.0	58.0	44.0	38.0	41.0	71.0	70.0	47.0	65.0	62.0	62.0	91.0				
2	Mt Vernon & Old Post	28.0	39.0	38.0	55.0	47.0	62.0	44.0	35.0	48.0	76.0	66.0	51.0	68.0	62.0	59.0	56.0				
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	TTHM OEL (ug/L)																			
1	11325 Edgewood			35.3	43.8	45.3	53.0	48.5	44.5	41.0	55.3	63.0	58.8	61.8	59.0	62.8	76.5				
2	Mt Vernon & Old Post			35.8	46.8	46.8	56.5	49.3	44.0	43.8	58.8	64.0	61.0	63.3	60.8	62.0	58.3				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	11325 Edgewood	25.0	33.5	34.7	38.0	43.8	47.8	49.5	47.0	45.3	48.5	55.0	57.3	63.3	61.0	59.0	70.0				
2	Mt Vernon & Old Post	28.0	33.5	35.0	40.0	44.8	50.5	52.0	47.0	47.3	50.8	56.3	60.3	65.3	61.8	60.0	61.3				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. North Auburn System No.: 3110026 Year: 2015 Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2012				2013				2014				2015				2016			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		3/15	5/9	8/7	11/19	3/13	5/14	8/7	11/12	2/11	5/12	8/12	11/12	2/17	5/26	8/12	11/16				
#	Monitoring Location	HAA5 Results (ug/L)																			
1	11325 Edgewood	41.0	46.0	44.0	28.0	61.0	43.0	34.0	29.0	28.0	62.0	25.0	25.0	55.0	27.0	39.0	34.0				
2	Mt Vernon & Old Post	35.0	43.0	54.0	27.0	56.0	44.0	36.0	28.0	27.0	60.0	27.0	23.0	42.0	36.0	36.0	32.0				
3																					
4																					
Number of Samples Taken		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	11325 Edgewood			43.8	36.5	48.5	43.8	43.0	33.8	29.8	45.3	35.0	34.3	40.0	33.5	40.0	33.5				
2	Mt Vernon & Old Post			46.5	37.8	48.3	42.8	43.0	34.0	29.5	43.8	35.3	33.3	33.5	34.3	37.5	34.0				
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	11325 Edgewood	41.0	43.5	43.7	39.8	44.8	44.0	41.5	41.8	33.5	38.3	36.0	35.0	41.8	33.0	36.5	38.8				
2	Mt Vernon & Old Post	35.0	39.0	44.0	39.8	45.0	45.3	40.8	41.0	33.8	37.8	35.5	34.3	38.0	32.0	34.3	36.5				
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

State of California
Drinking Water Program

Department of Public Health

Stage 2 DDBPR Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D. Smartsville System No.: 5810005 Year: 2015 Quarter: 4th TTHM MCL = 0.080 mg/L or 80 ug/L

Year:		2011				2012				2013				2014				2015			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		1/19	5/9	8/8	11/14	2/8	5/9	8/7	11/19	2/13	5/15	8/7	11/18	2/19	5/12	8/12	11/11	2/17	5/26	8/12	11/16
#	Monitoring Location	TTHM Results (ug/L)																			
1	8447 O'Brien Street	27.0	38.0	54.0	29.0	41.0	40.0	54.0	25.0	32.0	44.0	42.0	33.0	70.0	66.0	59.0	47.0	75.0	57.0	42.0	36.0
2																					
3																					
4																					
Number of Samples Taken		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
#	Monitoring Location	TTHM OEL (ug/L)																			
1	8447 O'Brien Street			43.3	37.5	41.3	37.5	47.3	36.0	35.8	36.3	40.0	38.0	53.8	58.8	63.5	54.8	64.0	59.0	54.0	42.8
2																					
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	TTHM LRAA (ug/L)																			
1	8447 O'Brien Street	27.0	32.5	39.7	37.0	40.5	41.0	41.0	40.0	37.8	38.8	35.8	37.8	47.3	52.8	57.0	60.5	61.8	59.5	55.3	52.5
2																					
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds theTTHM MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the TTHM MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the TTHM MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Stage 2 DDBPR Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: Nevada I.D.Smartsville System No.: 5810005 Year: 2015 Quarter: 4th HAA5 MCL = 0.060 mg/L or 60 ug/L

Year:		2011				2012				2013				2014				2015			
Quarter:		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sample Date (month/day):		1/19	5/9	8/8	11/14	2/8	5/9	8/7	11/19	2/13	5/15	8/7	11/18	2/19	5/12	8/12	11/11	2/17	5/26	8/12	11/16
#	Monitoring Location	HAA5 Results (ug/L)																			
1	8447 O'Brien Street	20.0	39.0	35.0	30.0	36.0	34.0	35.0	26.0	18.0	31.0	22.0	20.0	47.0	56.0	29.0	30.0	72.0	38.0	31.0	30.0
2																					
3																					
4																					
Number of Samples Taken		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
#	Monitoring Location	HAA5 OEL (ug/L)																			
1	8447 O'Brien Street			32.3	33.5	34.3	33.5	35.0	30.3	24.3	26.5	23.3	23.3	34.0	44.8	40.3	36.3	50.8	44.5	43.0	32.3
2																					
3																					
4																					
Is OEL ≤ MCL for all monitoring locations?				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (a)																					
#	Monitoring Location	HAA5 LRAA (ug/L)																			
1	8447 O'Brien Street	20.0	29.5	31.3	31.0	35.0	33.8	33.8	32.8	28.3	27.5	24.3	22.8	30.0	36.3	38.0	40.5	46.8	42.3	42.8	42.8
2																					
3																					
4																					
Meets standard for all monitoring locations (i.e., LRAA ≤ MCL)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If no, list monitoring location # where MCL not met (b)																					
Will LRAA calc based on <4 qtrs of data be >MCL regardless of the monitoring results of subsequent qtrs, for all mon. locations? (c)		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
If yes, list monitoring location # where MCL not met (b)																					

(a) If the OEL exceeds the HAA5 MCL, system must conduct an operational evaluation and submit a report to CDPH no later than 90 days after being notified of the analytical result that caused the OEL exceedance.

(b) If LRAA exceeds the HAA5 MCL, system must conduct public notification. For the initial 3 qtrs of monitoring, system must meet the following: (1) Average of First Qtr Result is ≤4 MCL, (2) Average of 1st and 2nd Qtr Results is ≤ 2MCL, and (3) Average of 1st, 2nd, and 3rd Qtr Results is ≤1.33 MCL.

(c) If any individual quarter's result will cause the LRAA to exceed the HAA5 MCL, the system is out of compliance at the end of that quarter.

Comments:

Signature

Date

Loma Rica Raw Water Temperatures 2011												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Date	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**
1	off	8	4	10	11	11	14	17	18	17	13.2	off
2	off	4	5	10	11	10	15	16	18	17	12	off
3	off	4	5	11	12	12	16	16	18	16	12	off
4	off	7	7	11	12	11	16	18	18	16	11	off
5	off	7	6	12	13	11	16	17	18	14	11	off
6	off	8	6	12	14	10	16	17	18	13	8	off
7	off	8	6	12	14	10	16	17	18	12	8	off
8	off	8	6	10	13	11	16	17	18	12	8	off
9	off	8	6	9	12	11	16	17	18	13	8	off
10	off	8	6	10	12	15	16	17	18	13	9	off
11	off	7	8	off	12	16	15	17	18	14	10	off
12	off	7	8	off	12.4	16	15	17	18	14	9	off
13	off	7	8	off	13	16	15	17	19	14	9	off
14	off	7	9	off	14	16	15	17	19	15	10	off
15	off	7	9	off	11.6	16	15	17	18	15	10	off
16	off	7	9	off	9.1	16	14	17	18	16	10	off
17	off	6	8	off	11	15	15	17	18	16	10	off
18	off	6	9	off	8.2	15	15	17	17	16	10	off
19	off	4	6	off	9	15	15	17	18	16	9	off
20	off	4	6	12	11	15	15	18	18	16	off	5
21	off	4	5	12	12	16	15	18	18	16	off	5
22	off	4	5	13	13	16	16	17	18	15	off	5
23	off	5	6	10	15	16	16	17	18	15	off	5
24	off	off	5	9	13	16	16	18	18	15	off	5
25	off	off	4	9	13	15	16	18	18	15	off	5
26	8	off	4	9	11	15	16	19	18	14	off	5
27	8	off	5	9	11	15	16	19	17	13	off	5
28	8	off	5	11	11	15	16	19	17	13	off	5
29	8		7	10	10	13	16	19	17	13	off	6
30	8		8	10	10	13	17	19	18	13	off	7
31	8		10		10		17	19		13		7

Loma Rica Raw Water Temperatures 2012												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	7	7	4	off	15	16	18	20	20	19	off	11
2	7	7	4	off	15	17	18	20	19	19	off	11
3	7	7	4	off	14	17	18	20	20	19	off	11
4	7	7	5	off	13	17	19	20	20	19	off	11
5	8	6	6	off	13	14	19	20	20	19	off	11
6	7	6	6	off	13	13	20	21	20	18	off	11
7	7	6	6	off	13	15	18	21	20	18	off	11
8	7	7	6	off	14	15	18	21	21	17	off	11
9	7	7	7	off	15	15	19	21	23	17	off	11
10	7	7	7	off	15	15	19	21	20	17	12	11
11	7	7	8	off	15	16	19	21	20	17	11	10
12	7	8	8	off	15	16	19	21	20	16	11	10
13	7	7	8	off	15	17	19	21	20	16	11	10
14	7	7	8	off	15	17	19	22	20	16	11	9
15	7	6	8	off	15	18	19	22	20	17	12	8
16	6	6	8	off	15	18	19	22	20	17	12	8
17	5	6	8	off	15	19	18	22	20	17	12	8
18	4	7	8	off	15	19	18	22	20	17	12	8
19	4	6	7	off	14	18	18	21	20	17	12	7
20	5	6	8	off	15	18	18	21	20	17	11	7
21	6	7	8	off	15	18	19	21	19	17	11	7
22	6	7	10	off	15	18	19	21	19	15	10	7
23	6	7	9	off	15	18	20	21	19	13	10	7
24	6	7	11	off	15	16	20	20	19	12	11	7
25	6	7	10	off	14	15	20	20	19	12	11	7
26	6	7	off	15	13	16	20	20	19	12	10	7
27	6	7	off	14	12	16	20	20	19	13	10	6
28	6	7	off	15	13	16	20	20	19	13	11	7
29	6	5	off	14	14	17	20	20	19	14	11	7
30	7		off	14	14	17	20	20	19	14	11	7
31	7		off		16		20	20		off		7

Loma Rica Raw Water Temperatures 2013												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	7	6	7	off	14	15	21	20	20	16	13	off
2	7	7	7	off	13	16	21	20	20	16	13	off
3	6	7	9	off	13	17	24	20	20	16	13	off
4	7	7	9	off	14	17	22	21	20	14	13	off
5	7	7	9	off	14	18	22	21	20	14	off	off
6	8	7	9	off	14	18	22	21	20	14	13	off
7	7	7	9	off	13	18	20	21	20	15	12	off
8	8	6	9	off	13	18	20	21	20	15	13	off
9	8	6	7	off	13	19	20	20	20	15	13	off
10	8	5	7	off	13	18	20	20	20	15	13	off
11	7	5	7	off	14	16	20	21	20	15	off	off
12	6	5	7	off	15	19	20	21	20	15	off	off
13	6	5	7	off	16	17	20	21	20	14	off	off
14	4	6	7	off	16	18	20	21	20	14	off	off
15	6	6	11	off	16	18	20	21	20	14	off	off
16	7	6	11	off	15	17	20	21	19	14	off	off
17	6	7	11	off	15	17	21	21	19	14	off	off
18	6	7	11	off	14	17	20	22	18	14	off	off
19	7	7	11	off	14	16	20	22	18	15	off	off
20	7	5	11	off	14	16	21	22	18	15	off	off
21	8	5	10	off	15	16	22	22	18	15	off	off
22	6	6	10	off	14	17	21	22	18	15	off	off
23	5	6	off	off	14	17	21	21	16	15	11	off
24	6	6	off	off	14	16	22	21	17	15	off	off
25	6	6	off	off	14	16	22	20	17	14	off	off
26	7	7	off	off	14	16	22	20	16	14	off	off
27	6	8	off	off	14	17	22	20	17	14	off	off
28	6	8	off	off	14	17	22	20	15	14	off	off
29	6		off	15	14	19	22	20	15	14	off	off
30	6		off	15	14	20	21	20	16	14	off	off
31	6		off		15		21	20		12		off

Loma Rica Raw Water Temperatures 2014												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	off	8	12	off	12	15	17	20	20	off	off	off
2	off	8	12	off	13	14	18	20	20	off	off	off
3	9	8	12	off	14	14	18	20	21	off	off	off
4	9	8	11	off	13	14	19	20	off	off	off	off
5	9	8	12	off	13	15	19	17	off	off	off	off
6	9	8	12	off	12	15	17	18	off	off	off	off
7	8	7	12	off	12	15	17	18	off	off	off	off
8	9	8	12	off	12	16	17	20	off	off	off	off
9	8	7	10	off	11	16	17	20	off	off	off	off
10	8	7	10	off	12	16	17	20	off	off	off	off
11	8	7	10	off	11	16	18	20	off	off	off	off
12	8	7	10	off	11	16	18	19	off	off	off	off
13	8	10	10	off	12	15	18	19	off	off	off	off
14	8	11	10	10	12	15	18	19	off	off	off	off
15	9	11	10	13	12	14	19	19	off	off	off	off
16	9	11	11	13	13	14	19	20	off	off	off	off
17	9	11	11	14	13	14	19	20	off	off	off	off
18	9	11	11	14	13	14	18	20	off	off	off	off
19	9	11	off	13	13	14	19	20	off	off	off	off
20	9	11	off	13	13	14	19	20	off	off	off	off
21	9	11	off	12	13	15	18	20	off	off	off	off
22	9	11	off	12	13	15	17	20	19	off	off	off
23	8	12	off	12	13	15	17	20	off	15	off	off
24	9	12	off	12	14	15	18	20	off	15	off	off
25	9	12	off	12	14	15	18	20	off	15	off	off
26	9	12	off	12	15	15	18	20	off	15	off	off
27	9	12	off	12	15	15	19	20	off	14	off	off
28	9	12	off	10	14	16	19	20	off	14	off	off
29	9		off	11	14	16	19	19	off	off	off	off
30	9		off	12	14	17	19	20	off	off	off	off
31	9		11		14		19	20		off		off

Loma Rica Raw Water Temperatures 2015												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	off	9	9	off	off	off	23	22	19	18	14	off
2	off	9	9	off	off	off	23	22	20	16	13	off
3	off	9	8	off	off	off	23	23	21	17	13	off
4	off	9	9	off	off	off	24	23	22	16	11	off
5	off	10	9	off	off	off	24	23	18	16	11	off
6	off	10	10	off	off	off	25	23	18	16	11	off
7	off	off	9	off	off	off	24	19	18	16	11	off
8	off	off	10	off	off	off	21	18	18	16	11	off
9	8	off	12	off	off	off	22	18	19	17	10	off
10	8	off	12	off	off	off	21	18	20	17	10	off
11	off	off	12	off	off	off	19	19	21	17	10	off
12	9	10	11	off	off	off	20	22	20	17	9	off
13	9	off	12	off	off	off	20	18	25	17	9	off
14	9	off	12	off	off	off	20	19	25	17	9	off
15	9	off	13	off	off	off	21	18	18	17	9	off
16	9	off	13	off	off	off	21	21	17	17	9	off
17	8	off	13	off	off	off	21	19	17	17	9	off
18	8	10	12	off	off	off	21	19	17	17	9	off
19	9	11	off	off	off	off	21	20	17	16	9	off
20	9	12	off	off	off	19	21	20	18	16	9	off
21	9	11	off	off	off	18	21	21	18	16	9	off
22	9	11	off	off	off	19	22	20	18	15	9	off
23	9	11	off	off	off	19	22	19	18	15	9	off
24	9	11	off	off	off	21	22	19	18	15	off	off
25	off	9	off	off	off	21	21	20	18	15	9	off
26	off	10	off	off	off	23	22	19	18	14	off	off
27	10	10	off	off	off	22	22	20	18	14	off	off
28	9	9	off	off	off	23	22	21	18	14	off	off
29	10		off	off	off	23	22	20	18	15	off	off
30	10		off	off	off	23	22	20	17	16	off	off
31	10		off		off		22	20		14		off

Lake of the Pines Raw Water Temperatures 2011												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Date	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**
1	8	8	8	10	13	12	16	17	19	20	15	9
2	8	8	7	10	11	12	17	17	19	20	14	9
3	8	8	8	11	14	12	17	18	19	20	14	9
4	8	9	8	10	14	11	17	18	19	19	13	8
5	8	8	8	11	14	12	18	18	19	18	12	7
6	8	8	9	11	15	11	18	18	19	17	12	7
7	8	8	9	11	15	12	18	18	19	17	11	7
8	8	8	9	11	15	12	17	18	19	17	10	8
9	8	8	9	11	13	13	18	18	20	16	11	7
10	6	8	9	9	12	13	18	17	20	16	10	7
11	7	8	9	10	12	14	18	17	20	16	10	7
12	7	8	9	12	13	17	18	18	19	16	11	6
13	8	8	9	9	13	16	18	18	19	16	11	6
14	7	8	9	9	13	17	18	18	20	17	11	6
15	8	8	10	10	14	16	18	18	20	17	11	6
16	8	8	9	10	14	17	17	18	20	17	11	6
17	8	9	9	10	12	17	17	18	19	17	11	6
18	8	8	11	10	11	17	17	19	19	17	11	6
19	8	8	9	11	10	16	17	18	19	18	11	6
20	8	8	9	11	11	17	17	18	19	18	11	6
21	8	7	9	11	11	17	18	18	19	17	11	6
22	9	7	9	12	13	17	17	18	19	17	11	5
23	8	8	9	12	12	17	17	19	19	17	10	6
24	8	7	9	12	13	17	17	19	20	17	10	5
25	8	7	9	11	12	17	17	19	20	17	10	5
26	8	7	9	11	12	17	17	18	20	16	10	5
27	8	7	9	11	12	17	17	18	20	16	10	5
28	8	7	10	12	12	17	17	19	20	15	10	5
29	8		9	11	12	16	17	19	20	15	10	5
30	9		10	11	12	16	17	20	20	15	10	6
31	8		10		12		18	20		17		6

Lake of the Pines Raw Water Temperatures 2012												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	6	8	9	11	14	16	21	24	22	22	16	13
2	6	8	9	11	14	16	21	24	22	22	16	13
3	6	8	9	11	14	16	21	24	22	22	16	13
4	6	7	9	11	14	17	22	24	22	22	16	13
5	6	7	9	10	14	16	22	24	22	22	16	13
6	7	7	9	10	14	16	22	24	22	22	16	14
7	6	7	9	10	15	17	22	24	20	21	16	14
8	7	7	10	10	16	16	22	24	23	20	16	14
9	6	8	9	10	15	18	23	24	22	20	15	12
10	6	8	9	10	16	18	23	24	22	20	14	12
11	6	9	10	12	16	18	23	24	22	19	14	13
12	6	9	10	12	16	20	23	24	22	19	13	12
13	6	9	10	11	15	20	25	24	23	18	13	11
14	6	9	10	11	15	20	24	24	23	18	13	11
15	6	9	10	11	16	20	23	25	23	18	13	11
16	6	9	10	11	16	21	23	25	23	18	13	10
17	6	9	11	11	16	21	22	25	23	19	13	11
18	5	9	10	11	16	21	22	25	22	18	13	10
19	5	8	10	11	16	21	22	24	23	19	14	8
20	6	9	9	12	18	21	22	24	22	19	14	10
21	6	9	10	12	17	21	23	24	22	18	14	9
22	6	9	10	13	17	21	23	24	22	17	13	10
23	7	9	10	14	16	21	23	24	23	16	13	10
24	7	9	10	14	17	20	23	23	22	17	13	10
25	7	10	10	14	16	20	23	24	22	15	13	10
26	7	9	10	14	15	20	24	23	22	15	12	10
27	8	9	10	14	15	20	24	23	22	15	12	8
28	7	8	10	14	15	20	24	23	22	15	12	9
29	7	9	10	13	15	20	24	23	22	15	13	9
30	7		10	13	15	20	24	23	22	16	13	9
31	7		11		16		24	23		16		9

Lake of the Pines Raw Water Temperatures 2013												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	9	10	8	13	18	19	23	25	24	20	14	10
2	10	9	8	12	19	20	24	25	24	19	13	10
3	9	9	9	12	19	21	24	24	24	19	13	10
4	8	10	9	13	19	21	25	24	23	19	13	9
5	9	10	9	13	19	21	24	24	23	18	13	9
6	9	10	8	13	19	21	24	24	23	18	12	8
7	9	10	9	13	18	22	25	24	23	18	12	8
8	8	10	8	12	18	22	25	24	23	18	13	7
9	9	9	8	13	18	23	25	24	23	17	12	6
10	9	9	9	13	17	23	25	23	24	16	13	6
11	9	9	9	13	17	22	25	23	23	17	12	6
12	9	9	10	14	18	23	24	23	23	17	13	6
13	8	9	10	15	18	22	24	23	23	17	12	6
14	8	9	13	15	18	22	24	23	24	16	12	6
15	7	9	12	15	19	22	24	23	24	16	12	6
16	7	10	11	15	19	22	24	24	24	16	12	6
17	8	10	11	14	19	22	24	23	23	16	12	6
18	7	10	11	15	19	22	24	23	23	15	11	7
19	8	10	11	15	19	22	24	24	22	15	12	7
20	8	10	11	16	20	22	24	24	22	15	12	8
21	8	10	11	16	20	22	24	24	22	16	12	8
22	8	9	10	16	20	22	24	24	21	16	11	7
23	8	9	10	16	19	22	24	24	21	16	11	7
24	9	10	10	16	20	22	24	24	20	15	11	7
25	10	7	10	16	19	22	24	24	20	15	11	7
26	9	7	11	17	19	20	24	24	20	15	10	7
27	9	7	10	17	19	20	25	24	20	15	10	7
28	9	8	10	18	19	20	25	24	19	15	10	7
29	9		12	18	19	21	25	24	19	14	10	7
30	10		12	18	19	21	25	24	19	14	10	7
31	9		12		19		25	24		13		7

Lake of the Pines Raw Water Temperatures 2014												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	7	10	13	14	14	21	22	24	27	20	15	12
2	8	10	13	14	16	21	22	24	23	20	15	12
3	7	10	13	14	16	20	23	24	26	20	14	12
4	7	9	13	14	16	20	23	24	23	20	14	12
5	7	9	13	13	17	21	23	23	23	20	14	12
6	7	9	14	14	18	22	23	23	23	20	14	12
7	7	10	13	15	19	22	23	23	23	20	14	12
8	8	9	13	15	14	22	23	23	23	20	14	12
9	8	10	13	16	15	23	22	23	22	20	14	12
10	8	10	13	15	16	23	23	23	22	20	15	12
11	8	11	13	18	16	23	23	24	22	20	15	12
12	8	10	13	15	17	22	23	24	23	19	15	12
13	8	11	14	15	20	22	23	24	23	19	14	11
14	8	11	14	15	21	22	24	23	23	19	14	11
15	8	11	14	15	18	21	24	23	23	19	14	11
16	8	11	14	15	18	21	24	23	23	18	13	11
17	8	12	14	14	14	21	23	23	23	18	13	11
18	8	12	14	14	18	20	25	23	23	18	13	11
19	8	12	14	14	19	21	24	23	22	17	13	11
20	8	12	15	15	15	21	24	23	22	17	12	11
21	8	12	15	13	15	21	24	23	22	17	12	11
22	8	12	15	14	16	21	23	23	22	17	12	11
23	8	13	15	14	19	21	23	23	22	17	12	11
24	8	12	15	15	20	22	23	23	21	17	11	11
25	10	13	15	14	20	25	23	23	21	17	11	11
26	9	13	15	13	20	22	23	23	21	16	11	10
27	9	13	15	13	21	22	24	23	21	16	11	9
28	9	13	15	14	22	22	24	23	20	16	11	9
29	10		15	14	21	22	24	23	20	16	11	8
30	10		15	14	21	22	24	23	20	16	11	8
31	10		15		21		24	23		16		7

Lake of the Pines Raw Water Temperatures 2015												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	7	10	12	17	21	23	27	28	23	20	16	8
2	7	10	11	16	22	23	27	28	23	19	16	8
3	7	10	12	16	21	23	27	29	23	19	15	8
4	7	10	12	17	21	23	28	29	22	19	14	8
5	7	11	11	17	21	23	28	26	23	19	13	8
6	7	11	12	17	22	24	27	26	22	19	13	8
7	7	11	12	16	21	24	27	26	22	19	13	9
8	9	11	12	16	20	24	27	26	22	19	13	9
9	8	12	13	15	21	24	27	26	22	19	12	9
10	8	12	13	16	21	24	27	25	22	20	12	9
11	9	12	14	16	21	24	27	26	22	20	11	9
12	9	11	12	16	21	25	26	23	22	20	11	9
13	9	11	13	17	20	25	26	24	22	20	11	9
14	9	12	13	17	20	25	27	24	22	20	11	9
15	9	13	17	17	20	26	27	23	22	20	11	8
16	10	13	16	17	20	25	27	23	21	20	11	8
17	9	13	15	17	20	25	27	24	21	20	10	8
18	11	13	15	18	20	25	27	24	21	19	10	8
19	11	13	14	18	20	26	27	24	21	19	10	8
20	10	13	15	18	21	25	26	24	20	18	10	8
21	10	12	15	19	21	25	28	24	21	18	11	8
22	10	12	15	19	21	25	28	24	21	18	11	8
23	9	12	15	19	21	26	28	24	21	18	11	8
24	9	11	15	19	21	25	28	24	21	17	11	9
25	9	11	15	20	22	25	28	24	21	17	10	8
26	9	11	15	19	22	26	28	24	21	17	9	7
27	9	12	16	20	22	26	28	24	21	17	9	7
28	10	12	16	20	22	27	27	24	21	17	9	7
29	10		16	20	23	27	27	23	21	16	8	7
30	10		17	20	23	27	28	23	20	16	8	7
31	10		16		23		28	23		16		6

North Auburn Raw Water Temperatures 2011												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Date	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**
1	9	6	9	13	12	12	12	14	16	18	16	10
2	10	6	10	12	13	12	12	14	16	18	15	11
3	10	8	9	11	13	11	15	14	16	18	14	9
4	9	9	7	11	14	11	12	14	15	17	13	9
5	9	8	7	11	13	13	13	14	16	17	13	10
6	9	8	9	12	13	12	12	14	15	15	12	9
7	9	8	9	9	13	14	13	16	15	16	12	9
8	9	8	11	10	13	14	13	14	16	15	13	7
9	8	7	12	10	11	13	12	14	16	15	11	7
10	6	6	12	10	13	12	13	14	16	16	11	7
11	8	8	7	10	14	12	14	14	17	15	11	7
12	7	8	9	10	12	14	14	14	17	16	12	10
13	8	8	9	10	13	11	12	14	16	17	12	8
14	9	8	9	9	13	13	12	14	17	17	11	8
15	7	8	8	10	12	11	15	14	17	16	13	9
16	9	8	off	9	11	12	14	14	18	17	11	9
17	7	8	11	10	11	11	12	14	17	17	12	10
18	8	8	11	9	11	11	12	15	17	18	12	10
19	8	8	9	12	12	12	12	15	18	18	12	12
20	8	8	11	14	14	12	12	14	18	18	11	10
21	8	8	11	11	14	12	14	16	18	18	11	11
22	9	8	11	11	13	12	13	16	18	17	11	9
23	7	8	12	11	12	12	14	15	18	17	11	9
24	6	8	11	12	12	13	14	15	19	18	11	8
25	6	7	off	11	12	12	16	15	18	18	11	8
26	6	9	11	10	12	12	14	16	18	16	11	8
27	9	7	9	9	11	13	15	15	18	15	11	8
28	8	9	9	11	11	12	15	15	18	16	11	8
29	7		off	12	11	11	15	15	17	16	10	8
30	7		off	11	11	12	14	15	17	16	10	9
31	6		10		11		13	15		15		10

North Auburn Raw Water Temperatures 2012												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	9	10	8	11	9	11	13	16	18	19	17	15
2	9	10	8	11	9	11	13	18	17	19	16	off
3	10	8	9	11	10	12	13	17	18	20	17	16
4	9	9	9	12	9	12	13	18	18	19	17	15
5	8	9	10	11	12	12	13	17	18	19	16	15
6	9	9	10	11	9	11	13	17	19	19	16	16
7	10	8	11	11	10	12	14	17	19	19	16	15
8	9	9	10	11	10	12	13	17	19	19	16	off
9	10	9	11	9	10	12	14	17	19	19	15	off
10	9	9	10	9	10	11	14	17	18	19	14	12
11	off	10	9	11	13	12	14	17	18	19	14	14
12	8	9	9	off	10	12	14	18	19	18	14	13
13	9	off	10	off	10	12	14	18	19	18	14	12
14	8	10	9	11	10	14	14	18	19	18	14	12
15	7	7	11	12	10	12	14	18	19	18	14	10
16	7	8	off	12	10	13	14	18	20	18	15	11
17	7	8	12	10	11	13	14	18	20	18	14	12
18	7	9	11	12	12	13	14	18	20	18	14	11
19	8	8	10	12	12	12	14	18	19	19	14	10
20	8	8	10	14	11	14	15	18	19	19	14	10
21	9	8	11	14	11	14	15	18	19	17	15	10
22	9	9	9	14	12	14	15	18	19	17	13	11
23	8	9	11	10	11	12	16	18	19	16	13	off
24	8	9	9	10	11	12	15	18	19	15	14	12
25	9	8	10	9	10	12	15	18	19	16	14	12
26	10	8	10	12	10	12	16	18	19	15	13	12
27	7	8	10	13	10	12	16	18	19	16	13	10
28	8	8	11	8	11	13	16	18	19	16	13	10
29	off	8	10	9	11	13	16	18	19	16	13	12
30	9		11	9	11	13	16	18	19	17	15	11
31	8		11		12		16	18		17		10

North Auburn Raw Water Temperatures 2013												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Date	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**	**Deg C**
1	11	10	6	11	12	13	16	18	21	19	14	13
2	11	11	7	9	10	13	16	18	21	19	13	13
3	9	11	8	10	10	13	19	18	21	18	14	13
4	10	11	8	10	10	13	18	18	20	18	13	13
5	9	10	6	11	12	13	18	18	21	18	13	13
6	10	9	7	10	10	14	16	19	20	18	13	9
7	10	10	7	10	10	14	16	18	20	18	13	8
8	10	10	7	10	10	15	18	18	20	18	14	8
9	11	9	7	10	10	14	16	19	21	18	12	8
10	11	9	8	11	11	14	16	19	21	18	12	8
11	8	9	6	11	11	13	16	19	20	17	13	7
12	9	9	9	8	11	13	16	19	20	17	13	8
13	8	9	10	8	12	13	17	19	20	17	12	8
14	8	10	7	8	11	14	17	20	21	17	13	8
15	9	12	9	9	11	14	17	19	21	17	13	8
16	10	9	7	9	11	15	17	20	20	17	13	8
17	10	11	9	9	11	14	17	20	20	15	12	8
18	9	10	9	9	11	14	18	20	20	15	11	9
19	9	10	7	8	11	14	18	21	20	15	13	9
20	9	9	10	9	11	14	18	21	19	15	13	8
21	9	9	7	9	11	14	18	20	20	16	13	8
22	9	10	8	9	11	14	18	20	18	16	12	7
23	10	10	8	9	11	14	18	21	19	16	12	8
24	10	8	7	9	13	14	18	21	19	15	12	8
25	11	6	7	9	13	13	18	20	19	14	12	8
26	11	7	8	9	12	14	18	20	18	14	12	8
27	11	6	8	10	14	14	18	21	18	14	12	8
28	9	8	8	13	14	15	17	20	18	14	12	8
29	10		10	10	14	18	17	20	19	14	12	7
30	10		8	10	off	16	17	21	19	14	12	8
31	10		9		16		18	20		14		8

North Auburn Raw Water Temperatures 2014												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	8	9	11	10	13	16	16	17	18	20	off	13
2	8	10	10	8	11	15	16	17	18	19	14	13
3	9	8	10	10	11	16	16	18	18	19	15	14
4	8	7	10	10	11	16	16	17	18	19	15	15
5	8	7	12	10	11	16	16	16	18	19	14	14
6	8	8	13	10	12	17	15	16	18	21	14	14
7	8	7	13	12	12	17	17	16	18	20	14	14
8	9	7	13	off	11	17	17	17	18	20	14	13
9	8	off	13	17	11	16	17	17	18	19	14	13
10	8	10	13	13	12	16	17	17	19	19	15	13
11	9	11	11	11	12	16	17	19	18	19	14	12
12	8	10	12	10	13	17	18	18	18	19	15	14
13	8	11	13	10	12	16	15	18	18	19	14	14
14	8	11	9	10	12	15	18	18	19	18	15	14
15	8	11	12	10	14	14	18	17	20	18	15	13
16	8	11	11	11	14	14	15	18	19	18	13	14
17	8	11	9	10	12	15	15	18	20	17	14	12
18	8	12	10	12	12	15	15	18	19	17	13	13
19	8	10	11	10	12	14	16	18	20	17	13	12
20	8	9	9	10	12	14	16	17	19	18	12	13
21	8	8	12	12	12	15	15	18	19	17	13	14
22	8	9	10	10	12	15	15	17	19	16	13	11
23	8	8	12	10	15	14	15	19	19	16	13	11
24	8	10	11	13	13	15	15	18	19	16	12	14
25	9	8	12	11	14	15	15	18	19	16	13	15
26	10	9	10	10	15	15	16	19	18	16	13	15
27	8	11	10	11	16	15	18	18	19	15	13	9
28	8	10	10	13	16	15	16	19	18	15	13	9
29	9		11	10	16	15	18	18	21	16	13	11
30	10		11	11	15	16	16	19	20	15	14	9
31	10		11		15		17	18		15		10

North Auburn Raw Water Temperatures 2015												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C	Deg C
1	10	9	11	13	13	18	18	19	22	18	15	8
2	8	9	9	13	13	18	18	19	22	18	15	8
3	8	9	9	13	15	18	18	19	22	18	15	10
4	8	11	9	11	15	18	18	19	22	18	14	10
5	9	10	10	11	13	18	22	19	22	18	13	10
6	9	10	11	12	13	20	19	19	21	18	12	11
7	10	11	10	11	14	18	25	19	22	18	12	10
8	12	10	10	11	15	22	20	23	22	19	12	10
9	11	11	12	10	16	18	19	20	22	18	12	11
10	9	12	12	11	16	19	19	20	22	19	11	12
11	11	12	13	11	14	19	19	20	22	21	11	11
12	9	12	11	15	14	17	18	21	23	20	11	10
13	9	10	10	14	15	17	18	21	22	20	10	10
14	9	10	10	13	16	20	18	21	22	20	11	10
15	9	12	10	13	14	18	18	21	22	18	11	9
16	9	11	14	15	14	18	19	21	22	18	10	7
17	12	9	10	14	14	18	19	21	21	19	10	8
18	9	10	11	12	14	20	19	21	21	18	9.7	8
19	10	10	11	12	15	21	19	21	22	19	11	8
20	10	12	11	12	15	18	19	23	22	19	12	9
21	9	9	13	13	15	22	20	22	22	17	11	8
22	10	9	13	13	16	18	23	22	23	17	11	8
23	8	9	13	12	18	18	18	22	23	16	11	8
24	10	9	12	13	16	18	18	22	22	18	12	9
25	9	10	12	12	16	18	18	22	22	16	11	8
26	9	9	11	13	17	18	18	22	23	16	10	8
27	10	9	14	15	18	18	18	22	18	16	9	7
28	9	10	14	15	17	21	18	22	18	16	8	7
29	9		12	16	17	18	18	22	18	15	9	7
30	9		13	15	18	18	19	22	18	15	8	7
31	10		13		18		19	23		15		7

APPENDIX C
REGULATORY FRAMEWORK

REGULATORY FRAMEWORK

This Framework provides a review of current and anticipated drinking water regulations related to large surface water systems as promulgated by the United States Environmental Protection Agency (USEPA) and the California State Water Resources Control Board's Division of Drinking Water (DDW). Anticipated regulations were limited to those projected to be implemented within five years. Under the provisions of the Safe Drinking Water Act (SDWA), the DDW has the primary enforcement responsibility (referred to as "primacy"). The Health and Safety Code of the California Administrative Code establishes DDW's authority and stipulates drinking water quality and monitoring standards. To maintain primacy, a state's drinking water regulations can be no less stringent than the federal standards (a state's regulations can be more stringent).

The USEPA and DDW establish primary regulations for the control of contaminants that affect public health and secondary regulations for compounds that affect the taste or aesthetics of drinking water. For each contaminant that is regulated, the USEPA is required to establish a maximum contaminant level (MCL) or a treatment technique (TT) to limit the level of these compounds in drinking waters. USEPA is also required to recommend a Best Available Technology (BAT) for removal of each contaminant during treatment.

In March 2010 the USEPA announced that they would be implementing a new regulatory strategy for drinking water. There are four major components to the strategy:

- Regulate contaminants as groups,
- Foster development of new drinking water treatment technologies,
- Use authority of multiple statutes to protect drinking water, and
- Partner with states to share data.

CURRENT REGULATIONS

The most significant drinking water quality regulations applied to surface water supplies are shown in **Table 1**. **Attachment 1** contains a summary of each of the contaminants currently regulated in drinking water by either the USEPA or the DDW. The attachment identifies the regulation and the MCL or the TT associated with each of the contaminants listed. There are numerous constituents which only have a California drinking water standard or a more stringent California drinking water standard, so DDW is indicated as the regulation. The following is a general discussion of the requirements of the regulations listed in **Table 1**.

NIPDWR

Prior to the establishment of the USEPA, the US Public Health Service had established 22 drinking water standards. These standards were adopted by the USEPA as National Interim Primary Drinking Water Regulations (NIPDWR) by the SDWA. These contaminants have been updated or replaced by subsequent regulations.

Table 1
Summary of Current Major Federal and State Drinking Water Quality Regulations

Regulation	Year of Promulgation	Number of Contaminants	Targeted Contaminants
National Interim Primary Drinking Water Regulations (NIPDWR)	1975-1981	7	Trihalomethanes, Arsenic, Radiologicals
Phase I Standards	1987	8	VOCs
Phase II Standards	1991	36	VOCs, SOCs, and IOCs
Phase V Standards	1992	23	VOCs, SOCs, and IOCs
Surface Water Treatment Rule (SWTR)	1989	5	Microbiological and Turbidity
Total Coliform Rule (TCR)	1989	2	Microbiological
Lead and Copper Rule (LCR)	1991/2003 [1]	2	Lead and Copper
Drinking Water Source Assessment and Protection Program	1996	-	Source Water Protection
Stage 1 Disinfectants/Disinfection By-Products (D/DBP) Rule	1998/2006 [1]	14	D/DBPs and Precursors
Interim Enhanced Surface Water Treatment Rule (IESWTR)	1998/2007 [1]	2	Microbiological and Turbidity, Systems >10,000
Radionuclides Rule	2000	4	Radionuclides
Arsenic Rule	2001/2008 [1]	1	Arsenic
Filter Backwash Recycling Rule	2001/2007 [1]	-	Microbiological and Turbidity
Stage 2 D/DBP Rule	2006	9	DBPs
Long Term 2 ESWTR	2006	1	*Cryptosporidium*
Unregulated Contaminant Monitoring Rule 2	2006	25	Chemical and Microbiological
CA Public Notification Requirements	2006	None	None
CA Secondary Drinking Water Standards	2006	25	Aesthetics
CA Perchlorate Regulation	2007	1	Perchlorate
Contaminant Candidate List 2/ Second Regulatory Determination	2005/2008	51/11	Chemical
CA Waterworks Standard	2008	None	None
Endocrine Disrupters Screening Program	2009/2010	134	Endocrine Disrupters
Contaminant Candidate List 3/ Third Regulatory Determination	2009/2016	116/5	Chemical and Microbiological
Six-Year Review	2017	-	-
Unregulated Contaminant Monitoring Rule 3	2012	30	Chemical and Biological

Table 1 Cont'd
Summary of Current Major Federal and State Drinking Water Quality Regulations

Revised Total Coliform Rule	2012	3	Microbiological
CA Hexavalent Chromium Reg	2014	1	Hexavalent Chromium
Contaminant Candidate List 4	2016	109	Chemical and Microbiological
Unregulated Contaminant Monitoring Rule 4	2016	30	Chemical and Microbiological

[1]California Adoption of Federal Rule

Phase I Regulations

The Phase I Regulations were finalized in July 1987 and compliance for large utilities was required by January 1989. The Phase I Regulations included MCLs for eight volatile organic compounds (VOCs) and required utilities to collect quarterly samples from each source water supply for one year. After one year, utilities could qualify for reduced monitoring based on the first year monitoring results (one sample every three years). The Phase I Regulations also included monitoring requirements for unregulated contaminants. All systems were required to monitor for a minimum of 34 unregulated volatile organic contaminants; two additional contaminants if the system is determined vulnerable; and 15 additional contaminants at the State's discretion.

Phase II Regulations

The Phase II Regulations were proposed in May 1989 and finalized in July 1991. Monitoring under the Phase II Regulations was required to begin in January 1993. The Phase II Regulations established MCLs for 36 contaminants (7 inorganic constituents (IOCs), 10 VOCs, and 19 synthetic organic compounds (SOCs), plus nitrate, nitrite, and total nitrate and nitrite) and TT requirements for two additional treatment additives (polymers). In order to simplify the increasing number of monitoring requirements, the Standardized Monitoring Framework (SMF) was developed. The SMF is based on a nine-year cycle divided into three, three-year monitoring periods. Under the new monitoring schedule, initial monitoring, baseline monitoring, reduced monitoring, and increased monitoring requirements were established.

Phase V Regulations

The Phase V Regulations were proposed in July 1990 and finalized in July 1992. The SMF was incorporated into the Phase V Regulations with the first compliance period for large utilities beginning January 1994. Phase V established regulations for 23 contaminants including 22 from the original list of 83 included in the 1986 SDWA Amendments (originally included a proposal for sulfate that was not included in the final Phase V regulations). The 23 Phase V contaminants include five IOCs, three VOCs, and 15 SOCs. The MCL for nickel, 0.1 mg/L, was remanded in February 1995 by the

US Court of Appeals for the District of Columbia Circuit. The USEPA is required to reconsider the nickel MCLG and the MCL, but no action has been taken yet.

Surface Water Treatment Rule

The Surface Water Treatment Rule (SWTR) was promulgated to control the levels of turbidity, *Giardia lamblia*, viruses, *Legionella*, and heterotrophic plate count bacteria in U.S. drinking waters. Many of the detailed requirements of this regulation were enhanced or superseded by the Interim and Long Term 2 Enhanced Surface Water Treatment Rules described later.

The California SWTR requires all utilities utilizing a surface water supply or a groundwater supply under the influence of a surface water supply, to provide adequate disinfection and, under most conditions, to provide filtration. Exemptions from filtration of surface water supplies are provided in rare occasions where the source water supply meets extremely rigid requirements for water quality and the utility possesses control of the watershed.

General Requirements

The SWTR includes the following general requirements to minimize human exposure to microbial contaminants in drinking water.

- Utilities are required to achieve at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts (3-log removal) and a minimum 99.99 percent removal and/or inactivation of viruses (4-log removal). The required level of removal/inactivation must occur between the point where the raw water ceases to be influenced by surface water runoff to the point at which the first customer is served.
- The disinfectant residual entering the distribution system must not fall below 0.2 mg/L for more than 4 hours during any 24-hour period.
- A disinfectant residual must be detectable in 95 percent of distribution system samples. A heterotrophic plate count (HPC) concentration of less than 500 colonies/mL can serve as a detectable residual if no residual is measured.
- Each utility must perform a watershed sanitary survey at least every five years.

Removal Credit

The level of physical removal credit given a utility for both *Giardia lamblia* and viruses is determined by the type of treatment process used. For a conventional water treatment plant, the SWTR provides a 2.5-log removal credit for *Giardia lamblia* and a 2.0-log removal credit for viruses. Alternative treatment technologies are awarded removal credit from DDW based on performance tests.

Disinfection Credit

Disinfection during conventional treatment (assuming all operational criteria and performance standards are met and the plant receives 2.5-log credit for physical removal of *Giardia* and 2.0-log credit for physical removal of viruses), must achieve 0.5-log inactivation of *Giardia lamblia* and 2.0-log inactivation of viruses. To determine the inactivation of *Giardia lamblia* and viruses achieved at a treatment plant, the SWTR established the concept of disinfection contact time (CT). CT is the product of the concentration of disinfectant remaining at the end of a treatment process ("C" in mg/L) and the contact time in which 10 percent of the water passes through the treatment process ("T" or "T_{10}" in minutes). The contact time in which 10 percent of the water travels through a unit process can be conservatively estimated from DDW guidelines or more accurately determined by conducting a tracer study. The USEPA Guidance Manual to the SWTR includes tables that identify the log removal of both *Giardia lamblia* and viruses achieved for a calculated CT value based on the type of disinfectant, the water temperature, and pH.

Total Coliform Rule

The Total Coliform Rule (TCR) was promulgated by the USEPA in June 1989 with compliance required eighteen months after promulgation (January 1991). DDW promulgated the Total Coliform Rule in January 1992 and the Rule went into effect on May 1, 1992. The Revised Total Coliform Rule is discussed later and supersedes some parts of this rule. Under the TCR, utilities must submit a monitoring plan to the DDW for approval. The plan must provide for representative sampling of the distribution system (including all pressure zones and reservoir areas), describe any sample rotations proposed and include a statement that the sample collector has been trained. The total number of samples and frequency of sampling required is dependent on the population served by the utility. For all but the smallest utilities, weekly sampling is required. If any sample is coliform-positive, two actions must be taken within 24 hours of notification to DDW of the positive result:

- A set of repeat samples must be collected. The location of the repeat samples must include the tap that tested positive, and one upstream and downstream location, both of which must be within five service connections of the positive sample location. If one or more of the repeat samples tests positive for the presence of coliforms, an additional set of repeat samples must be taken. This process continues until all of the samples are total coliform-negative or an MCL has been violated.
- The sample must be analyzed for the presence of fecal coliform or *E. coli*.

The previous coliform standard was a density based standard. This was replaced by a presence/absence regulation. There are three potential scenarios in which an MCL is violated. These scenarios consist of the following:

- For utilities that analyze less than 40 samples per month, no more than 1 monthly sample may be coliform-positive (this includes repeat samples). If more than 1 monthly sample is coliform-positive then an MCL has been violated. For >40 samples per month collected, an MCL has been violated if more than 5.0% are positive.
- Utilities are in violation of an MCL if an original sample is fecal coliform/*E. coli*-positive <u>and</u> any repeat sample is total, fecal, or *E. coli*-positive.
- Utilities are in violation of an MCL if an original sample is total coliform-positive <u>and</u> any repeat sample is fecal coliform/*E. coli*-positive.

Furthermore, there are two conditions that result in a "Significant Rise in Bacterial Count" classification. This condition is not considered a violation of an MCL; however, it does require notification to DDW. The two conditions that result in this classification are listed below:

- An initial sample that is total coliform-positive is determined to be either fecal coliform or *E. coli*.-positive, as well.
- At least two repeat samples are total coliform-positive but neither sample is fecal coliform or *E. coli*-positive.

Best Available Technology

The TCR includes a list of four preventative measures a utility can institute to minimize the presence of coliforms in the distribution system. These four items include the following:

- Ensure proper well protection.
- Maintain of a minimum 0.2 mg/L disinfectant residual through the entire distribution system.
- Institute a distribution system maintenance program including:
  - appropriate pipe replacement and repair procedures,
  - flushing program,
  - proper operation and maintenance of distribution system reservoirs, and
  - maintenance of a positive water pressure throughout system.
- Provide adequate filtration and disinfection treatment processes.

Lead and Copper Rule

The Lead and Copper Rule (LCR) was promulgated by the USEPA on June 7, 1991. The objective of the LCR is to minimize the corrosion of lead and copper-containing plumbing materials in public water systems (PWS) by requiring utilities to optimize treatment for corrosion control. The LCR establishes "action levels" in lieu of MCLs for regulating the levels of both lead and copper in drinking water. The action level for lead was established at 0.015 mg/L while the action level for copper was set at 1.3 mg/L. The compliance for these action levels is based on results from first-flush distribution system samples at sites selected to meet the LCR requirements. An action level is exceeded when greater than 10 percent of samples collected from the sampling pool contain lead levels above 0.015 mg/L or copper levels above 1.3 mg/L. Unlike an MCL, a utility is not out of compliance with the LCR when an action level is exceeded. Exceedance of an action level requires a utility to take additional steps to reduce lead and copper corrosion in the distribution system. In addition, there is a California state secondary standard, of 1.0 mg/L, for copper that requires monitoring in the source and treated water separately.

In October 1999, USEPA made minor revisions to the LCR to clarify the original rule, streamline implementation, promote consistent national implementation, and reduce the reporting requirements. The revisions do not include any changes to the action levels for lead and copper. The revisions include requiring monitoring for public water systems with optimized corrosion control, which was inadvertently left out of the original LCR. The revisions also include changing the definition of the word "control" in the LCR to only require public water systems to replace lines that it owns or has authority to replace to protect the water quality. The revisions allow systems with low lead and copper tap levels to reduce the number and frequency of sample collection sooner. Finally, there are numerous modifications to the system reporting requirements to minimize the reporting burden.

In 2004 and 2007 the USEPA made several more minor revisions to the LCR, including a requirement to include lead health effects language in the annual Consumer Confidence Report.

Drinking Water Source Assessment and Protection Program

The 1996 SDWA Amendments included a requirement for States to develop a program to assess sources of drinking water and encourage States to establish protection programs. California has developed the Drinking Water Source Assessment and Protection (DWSAP) Program in response to this requirement. When bringing a new source into service, a source assessment must be conducted as part of the permitting process.

Once an original assessment is performed for a source water, DDW recommends that the assessment be reviewed every five years. If conditions have changed that might impact the overall ranking of potential contaminating activities (presence in watershed/source water or change to treatment), then a water utility could consider updating the assessment. A completed assessment is required to obtain and continue to obtain chemical monitoring waivers for source waters.

There are eight components identified by California which are required as part of its DWSAP Program.

- Source Identification: Systems must locate the source using Global Positioning System.
- Delineation of the Watershed and the Near Intake Zones: Surface water systems must delineate the watershed contributing to the source and may, optionally, identify the near intake zones which are close to the point of diversion where contaminant activities may have a greater influence.
- Evaluation of the Physical Barrier Effectiveness: Surface water systems must complete the forms developed by the State to determine the effectiveness of the natural physical barriers for preventing contaminants from entering the source.
- Identification of Potential Contaminating Activities (PCAs): Surface water systems must develop an inventory of PCAs within the near intake zone or the entire watershed. The PCAs on the inventory must then be ranked for risk using the table from the DWSAP guidance.
- Perform a Vulnerability Assessment: Systems must perform a vulnerability assessment for each PCA identified. This assessment is based on the risk ranking, location, and the physical barrier effectiveness. After assessment, the PCAs are prioritized.
- Develop an Assessment Map: Systems must develop an assessment map, at a minimum using USGS quad maps 7.5 minute series. The map must show the location of the source, the watershed or recharge area, the near intake zones, and the location of the PCAs.
- Prepare a Drinking Water Source Assessment Report: Systems must prepare a report on the assessment to submit to the State for review. The report must include the assessment map, the methods used to locate the source, the recharge area delineation calculations, the physical barrier effectiveness forms, the potential contaminating activity forms, and the vulnerability assessment forms.
- Include a Summary of the Report in the Annual Consumer Confidence Report: Systems must prepare a summary of the assessment to include in the annual Consumer Confidence Report. The report must also be available to the public for review.

After the final report has been reviewed and accepted by DDW, systems can begin the voluntary Source Water Protection Program if desired. There are some loan and grant funds available to assist with these programs. The Source Water Protection Program components have been highlighted by the State and will include: public involvement, report review, initiation of protection measures, and information transfer to the public.

Stage 1 Disinfectants and Disinfection By-Products Rule

The purpose of the Stage 1 Disinfectants/Disinfection By-Product (D/DBP) Rule is "… to minimize risks from disinfection by-products and still maintain adequate control over microbial contamination." DDW adopted this regulation in 2012 without any significant variation from the Federal rule. The Stage 2 D/DBP Rule is discussed later and supersedes some parts of this rule.

Maximum Residual Disinfectant Level Goals

The USEPA has set maximum residual disinfectant level goals (MRDLGs) for chlorine, chloramines, and chlorine dioxide. These are shown in **Table 2**.

Table 2
Maximum Residual Disinfectant Level Goals

Disinfectant	Goal
Chlorine	4 mg/L as Cl_2
Chloramines	4 mg/L as Cl_2
Chlorine Dioxide	0.8 mg/L as ClO_2

The MRDLGs are set at levels for which no known or anticipated adverse health effects occur. These goals are non-enforceable health goals based only on health effects and exposure information.

Maximum Residual Disinfectant Levels

The Stage 1 D/DBP Rule established maximum residual disinfectant levels (MRDLs) for chlorine, chloramines, and chlorine dioxide. These are shown in **Table 3**.

Table 3
Maximum Residual Disinfectant Levels

Disinfectant	Level
Chlorine	4.0 mg/L as Cl_2
Chloramines	4.0 mg/L as Cl_2
Chlorine Dioxide	0.8 mg/L as ClO_2

Chlorine

The residual disinfectant level must be monitored at the same points in the distribution system and at the same time as when sampling for total coliforms. Compliance with the MRDL will be based on the running annual average of the monthly average of all samples, computed quarterly. Operators may increase the residual chlorine level in the distribution system above the MRDL if necessary to protect public health from acute microbiological contamination problems including: distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Chloramines

The residual disinfectant level must be monitored at the same points in the distribution system and at the same time as when sampling for total coliforms. Compliance with the MRDL will be based on the running annual average of the monthly average of all samples, computed quarterly. Operators may increase the residual chloramine level in the distribution system above the MRDL if necessary to protect public health from acute microbiological contamination problems including: distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Chlorine Dioxide

Systems that use chlorine dioxide must measure the residual disinfectant level at the entrance to the distribution system on a daily basis. Non-compliance with the MRDL can result in acute or non-acute violations. If the daily sample at the entrance exceeds the MRDL, then the system is required to take three additional samples in the distribution system on the next day as described below. If any samples collected the second day in the distribution system exceed the MRDL, or if the distribution system samples were not collected, the system will be in acute violation of the MRDL. If only the sample collected at the entrance to the distribution system exceeds the MRDL on the second day, or if the entrance sample was not collected, the system will be in a non-acute violation of the MRDL.

Follow up monitoring in the distribution system will be governed by the type of residual disinfectant used. Systems using chlorine as a residual disinfectant and operating booster stations after the entrance to the distribution system must take three samples in the distribution system; one close to the first customer, one at an average residence time, and one at the maximum residence time. Systems using chlorine dioxide or chloramines as a residual disinfectant or chlorine without operating booster stations after the entrance to the distribution system must take three samples in the distribution system as close as possible to the first customer at intervals of not less than six hours.

Operators may not increase the residual chlorine dioxide level in the distribution system above the MRDL under any circumstances.

Maximum Contaminant Level Goals (MCLGs) for Trihalomethanes, Haloacetic Acids, Chlorite, and Bromate

The USEPA has set MCLGs for four trihalomethanes, three haloacetic acids, chlorite, and bromate. These are shown in **Table 4**.

The MCLGs are set at levels for which no known or anticipated adverse health effects occur. These goals are non-enforceable health goals based only on health effects and exposure information.

Table 4
Maximum Contaminant Level Goals

Disinfection By-Product	MCLG
Bromodichloromethane	0 mg/L
Dibromochloromethane	0.06 mg/L
Bromoform	0 mg/L
Chloroform	0.07 mg/L
Monochloroacetic Acid	0.07 mg/L
Dichloroacetic Acid	0 mg/L
Trichloroacetic Acid	0.02 mg/L
Chlorite	0.8 mg/L
Bromate	0 mg/L

Maximum Contaminant Levels for TTHM, HAA5, Chlorite, and Bromate

The Stage 1 D/DBP Rule set MCLs for Total Trihalomethanes (TTHM), five haloacetic acids (HAA5), chlorite, and bromate. These are shown in **Table 5**.

Table 5
Maximum Contaminant Levels

Contaminant	Level
TTHM[1]	0.080 mg/L
HAA5[2]	0.060 mg/L
Chlorite	1.0 mg/L
Bromate	0.010 mg/L

[1]TTHM includes chloroform, bromodichloromethane, dibromochloromethane, bromoform.
[2] HAA5 includes mono, di and tri-chloroacetic acids and mono and di-bromoacetic acids.

Total Trihalomethanes and Haloacetic Acids

TTHMs and HAA5 are formed when disinfectants react with naturally occurring organic matter in water. All systems must monitor the distribution system for TTHMs and HAA5. Compliance for surface water, GWUDIS and groundwater systems with population greater than 10,000 is based on the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly.

Chlorite

Chlorite is produced when chlorine dioxide reacts with naturally-occurring organic material. Systems using chlorine dioxide for disinfection are required to conduct sampling for chlorite. Systems are required to monitor chlorite on a daily basis at the point of entry to the distribution system. If chlorite is detected at levels greater than 1.0

mg/L at the entrance to the distribution system, then additional distribution system monitoring is required the following day. Systems must monitor three locations in the distribution system (at the same time): close to the first customer, representative of average residence time, and representative of maximum residence time, on a monthly basis.

Bromate

Bromate is produced when ozone reacts with naturally occurring bromide. Systems using ozone for disinfection are required to conduct sampling for bromate. Systems must collect one sample per month at the entrance to the distribution system while the ozonation system is operating under normal conditions. Compliance with the MCL is based on a running annual average, computed quarterly, of monthly samples.

Treatment Technique for Disinfection By-Product Precursors

The USEPA requires systems that have surface water or groundwater under the direct influence of surface water (GWUDIS) as a supply to use conventional filtration treatment to remove specific amounts of organic material by implementing a treatment technique, either by enhanced coagulation or enhanced softening. The percent of removal required depends on source water total organic carbon (TOC) and alkalinity. **Table 6** provides a summary of the removal requirements.

Compliance with this treatment technique must be calculated on a quarterly basis, once 12 months of data are available. Each month the system must calculate percent actual TOC removal, determine the percent required TOC removal (from above), and calculate the removal ratio (must be greater than 1.0).

Table 6
TOC Removal Requirements (Percent)

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

In lieu of calculating the removal ratio, systems have the opportunity to be granted a 1.0 for the monthly removal ratio if they meet one of the four following conditions, regardless of the calculated removal ratio:

- Remove greater than or equal to 10 mg/L of magnesium hardness (as $CaCO_3$),
- Raw water TOC is less than 2.0 mg/L,

- Raw water or treated water specific UV absorbance (SUVA) is less than or equal to 2.0 L/mg-m, or
- Treated water alkalinity is less than 60 mg/L (only for systems practicing enhanced softening).

The USEPA has also provided alternative compliance criteria from the treatment technique requirements. Utilities will not be required to achieve the specified TOC removals provided one of the following conditions is met:

- Source water TOC is less than 2.0 mg/L,
- Treated water TOC is less than 2.0 mg/L,
- Source water TOC is less than 4.0 mg/L, source water alkalinity is greater than 60 mg/L, and distribution system TTHM is less than 0.04 mg/L and HAA5 is less than 0.03 mg/L,
- Distribution system TTHM is less than 0.04 mg/L and HAA5 is less than 0.03 mg/L and only chlorine is used for primary disinfection and distribution system residual,
- Source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m, or
- Treated water SUVA is less than or equal to 2.0 L/mg-m.

Interim Enhanced Surface Water Treatment Rule

The Interim ESWTR applies to public water systems (PWSs) that use surface water or GWUDIS and serve > 10,000 population. The purpose of this regulation is "… to improve control of microbial pathogens, including specifically *Cryptosporidium*, in drinking water; and address risk trade-offs with disinfection by-products." When the DDW adopted this regulation in 2007, it included several more detailed regulatory requirements than the Federal version.

Cryptosporidium

The rule set an MCLG for the protozoan genus *Cryptosporidium* of zero (0). Since there was not a reliable means for monitoring this constituent in the drinking water at the time of promulgation, a treatment technique requirement was established in lieu of setting an MCL. The treatment technique requires a 2.0-log (99 percent) *Cryptosporidium* removal or control for PWSs that are currently required to filter under the existing SWTR. This removal must be achieved between the raw water intake and the first customer.

The rule provides that systems with conventional or direct filtration water treatment plants will be granted the 2.0-log removal credit, provided turbidity requirements are met for the existing SWTR (1.0/5.0 NTU) and the combined filter effluent requirements for this rule (0.3/1.0 NTU).

The rule also provides that systems with slow sand or diatomaceous earth filtration water treatment plants will be granted the 2.0-log removal credit, provided turbidity requirements are met for the existing SWTR (1.0/5.0 NTU). For systems applying to use an "alternative filtration technology", the system must show that the treatment, in combination with disinfection, consistently achieves 99.9 percent removal/inactivation of *Giardia*, 99.99 percent removal/inactivation of viruses, and 99 percent removal of *Cryptosporidium*.

Turbidity

For surface water and GWUDIS systems that are required to filter their source water under the existing SWTR, that employ conventional or direct filtration for treatment, the combined filter effluent turbidity requirements have been tightened. For alternative filtration technologies, the State set turbidity performance requirements at a level that, in combination with disinfection, will consistently achieve 99.9 percent removal/inactivation of *Giardia*, 99.99 percent removal/inactivation of viruses, and 99 percent removal of *Cryptosporidium*.

The combined filter effluent (CFE) turbidity must be less than 0.3 NTU in at least 95 percent of monthly measurements. The CFE may never exceed 1 NTU (based on four hour measurements) and may not exceed 1 NTU for more than 1 continuous hour based on more frequent measurements (at least recorded every 15 minutes for conventional and direct filtration plants). The CFE turbidity shall not exceed 1.0 NTU for more than eight hours (based on 15-minute measurements). Monthly reports must show total number of measurements taken and have two options for value reporting:

- Report the number of 15-minute measurements and show the 50th, 90th, 95th, 98th, and 99th percentiles and report all measurements greater than 1.0 NTU.
- Report 4 hour measurements and also provide the number of 15-minute measurements that month, the number and percent of those 15-minute measurements less than or equal to 0.3 NTU, and show all 15-minute measurements greater than 0.3 NTU.

The rule requires continuous, on-line measurement of turbidity for each individual filter effluent (IFE) for conventional and direct filtration plants. These data must be recorded every 15 minutes also. Systems with two or fewer filters may conduct continuous monitoring of the CFE turbidity in lieu of individual monitoring. IFE turbidity levels shall be monitored and the following conditions will require DDW reporting and self-assessment activities:

- Report IFE turbidity if greater than 1.0 NTU in two consecutive measurements, 15 minutes apart anytime during filter run
- Report IFE turbidity if greater than 0.3 NTU in two consecutive measurements, 15 minutes apart during the first 60 minutes of filter operation

- Conduct Filter Self-Assessment if IFE turbidity greater than 1.0 NTU in two consecutive measurements, 15 minutes apart anytime during filter run, for three consecutive months
- Conduct Comprehensive Performance Evaluation if IFE turbidity greater than 2.0 NTU in two consecutive measurements, 15 minutes apart anytime during filter run, for two consecutive months

DDW has added several other requirements to the rule including:

- All filters shall be visually inspected once per year as part of the operations plan based on DDW guidance.
- On-line turbidimeters shall be manually verified once per month for combined filter effluent and once per month for individual filter effluent.
- Turbidity shall be recorded and reported for sedimentation effluent at least once per day.
- Flow rate and turbidity shall be recorded and reported for recycled backwash water at least once per day.
- System must report turbidity data to the State within 10 days after the end of each month.

Disinfection Profiling and Benchmarking

The purpose of the disinfection profiling and benchmarking is to develop a process to assure that there is no significant reduction in microbial protection as a result of significant disinfection process modifications to meet the new MCLs for TTHMs and HAA5 from the Stage 1 D/DBP Rule, or subsequent MCLs.

Initial profiling was required for surface water systems if their annual average TTHM levels were greater than or equal to 80 percent of the new MCL (0.064 mg/L) or annual average HAA5 levels were greater than or equal to 80 percent of the new MCL (0.048 mg/L).

The initial disinfection profile was developed using a minimum of one year of weekly *Giardia lamblia* log inactivation. The month with the lowest average log inactivation was identified as the critical period or benchmark. When only one year of data was used, the benchmark inactivation was the same as the critical period. When multiple years of data were used, the benchmark inactivation was the average of the critical period from each year.

After the initial profiling and benchmarking was complete, a utility submitted it to the State as part of the sanitary survey (see description below). If a utility decides to make changes to the disinfection practices, then the utility must consult with the State to ensure that microbial protection is not compromised. Changes that would require a benchmark analysis include; changes in the point of disinfection, the type of disinfectant, the disinfection process, or any other modification identified by the State.

Finished Water Reservoirs

Under this rule, surface water and GWUDIS systems must cover all new treated water reservoirs, holding tanks, and other storage facilities.

Sanitary Surveys

Primacy states, such as California, must now conduct sanitary surveys for all surface water and GWUDIS systems, regardless of size. This is not the same as the watershed sanitary survey requirements, which is a water system requirement. These surveys must be conducted every three years for community water systems (CWS) and every five years for non-community water systems (NCWS). DDW may grant a waiver to water utilities to perform the sanitary survey every five years if the system has outstanding performance based on previous sanitary surveys. DDW must determine how outstanding performance will be evaluated to allow for the reduced frequency of the sanitary survey.

The sanitary surveys must meet the eight components of the 1995 USEPA/State Guidance. These components include: source assessment (DDW typically uses watershed sanitary surveys for compliance with this component), treatment, distribution system, finished water storage, pumps, pumping facilities and controls, monitoring and reporting, data verification, system management and operation, operator compliance with state requirements, and disinfection profiling (if required).

Radionuclides

The USEPA published the Final Radionuclides Rule on December 8, 2000. The Rule applies to all CWSs. It included several new standards including:

- Set the Gross Alpha, Gross Beta and Photon, Combined Radium (226/228), and Uranium MCLGs at zero.
- Set the Gross Alpha MCL at 15 pCi/L.
- Set the Gross Beta and Photon MCL at 4 mrem/yr.
- Set the Combined Radium MCL at 5 pCi/L.
- Set the Uranium MCL at 30 ug/L.

The Rule requires all initial monitoring to be collected at the entry point to the distribution system (EPDS). It also clarified that Gross Beta and Photon are only required to be monitored by vulnerable systems. The frequency of repeat monitoring is determined by the initial one year of quarterly monitoring results.

- Sample results less than the detection limit for reporting (DLR), then 1 sample every 9 years.
- Sample results less than half the MCL, then 1 sample every 6 years.
- Sample results less than the MCL, then 1 sample every 3 years.

Arsenic Rule

The Final Arsenic Rule was promulgated by the USEPA on January 22, 2001. The Rule sets an MCLG of 0 mg/L and an MCL of 0.010 mg/L (10 ug/L) for arsenic. DDW adopted a regulation with the same standard in 2008. The OEHHA has developed a PHG for arsenic of 4 nanograms per liter (ng/L), equal to 0.004 ug/L.

Surface water systems are required to collect an annual sample. If sample results are greater than the MCL, then quarterly sampling is triggered. Waivers are available with three rounds of monitoring with results less than the MCL. With a waiver, sampling can be reduced to once every nine years.

Filter Backwash Recycling Rule

The Final Filter Backwash Recycling Rule applies to all PWSs that use surface water and employ conventional or direct filtration and recycle water within the treatment plant. The DDW incorporated this rule into its adoption of the IESWTR.

This requires all recycle streams to pass through all treatment processes; therefore all streams need to be returned prior to chemical addition and coagulation. Also, each system must notify DDW in writing that they practice recycling. This notification must include a plant schematic that shows the type and location of recycle streams, typical recycle flow data, highest plant flow in the previous year, design flow of the plant, and DDW approved operating capacity.

Each system must collect and maintain the following information: copy of recycle notice to DDW, list of all recycle flows and frequency, average and maximum backwash flow rate and duration, typical filter run length and how determined, type of recycle treatment, and data on recycle treatment facilities.

DDW has added several other requirements to the rule including:

- Raw water shall be sampled for total coliform and either fecal coliform or *E. Coli* at least once per month.
- Chlorine residual shall be confirmed in 95 percent of distribution samples every month.

Stage 2 Disinfectants and Disinfection By-Products Rule

The Stage 2 D/DBP Rule was published in January 2006 and adopted by DDW in 2012. It applies to public water systems (PWSs) that are community water systems (CWSs) or non-transient non-community water systems (NTNCWs) that add a primary or residual disinfectant other than ultraviolet light or deliver water that has been treated with a primary or residual disinfectant other than ultraviolet light.

The key provision in this rule is the change in calculating the maximum contaminant level (MCL). Under the State 1 D/DBP Rule compliance with the MCL was calculated using a running annual average (RAA) to average compliance samples from all distribution system sampling locations. Under Stage 2 D/DBPR, the MCL is calculated using locational running annual averages (LRAAs). PWSs must maintain the LRAA for each compliance sampling location at or below 0.080 mg/L total trihalomethanes (TTHM) and 0.060 mg/L haloacetic acids (HAA5). All systems, including consecutive systems, must comply with the MCLs for TTHM and HAA5 LRAA using compliance sampling locations identified from their Initial Distribution System Evaluation (IDSE) Final Report.

In May 2012 DDW adopted the Stage 2 D/DBP Rule as a marked up version of the existing regulatory code to incorporate the federal requirements into State code.

Initial Distribution System Evaluation

An IDSE was to be performed to identify locations with representative high TTHM and HAA5 concentrations throughout a system’s retail distribution system. The IDSE results were used in conjunction with the Stage 1 D/DBPR compliance monitoring to identify and select Stage 2 D/DBPR routine compliance monitoring locations. There are four IDSE options:

- Standard monitoring program
- System specific study [based on TTHM and HAA5 monitoring] and modeling requirements
- Obtaining a 40/30 waiver
- Obtaining a very small system waiver

For systems electing the Standard Monitoring Program both the timing and number of IDSE monitoring were based on the <u>retail population served</u> by the individual public water system(s) and the source water type (either surface water or groundwater).

The timing of when the IDSE must be completed is based on either an individual system's retail population or, in the case of a combined distribution system, the retail population served by the largest system in that combined system. Combined distribution systems include water systems that receive fully treated water from another water system. The system providing the water is the wholesaler and the system receiving the water is the consecutive system. Since this rule included specific monitoring requirements for both wholesale and consecutive systems, USEPA developed guidance materials to assist combined systems and encouraged coordinating the timing of sample collection for those consecutive systems to enable data assessment. Those systems determined to be large, >100,000 population, were required to submit their IDSE plans under Schedule 1, by October 1, 2006. Schedule 2 systems, those between 50,000 and 100,000 population, had plans due April 1, 2007. Schedule 3 systems, those between 10,000 and 50,000 population, had plans due October 1, 2007. Schedule 3 systems, those less than 10,000 population, had plans due April 1, 2008.

The numbers of IDSE samples in the standard monitoring option are based on each individual system's retail population and the source water type, with the number ranging from 2 to 40. The frequency of sample collection also depends on the retail population and source water type, either one annual, four quarterlies, or six every 60 days.

Compliance Monitoring

Compliance with the Stage 2 D/DBPR is based on calculating a LRAA, where compliance means maintaining the annual average at each routine sampling location in the distribution system at or below 0.080 mg/L and 0.060 mg/L for TTHM and HAA5, respectively. This is in lieu of the RAA MCL calculation under the Stage 1 D/DBPR that averaged observed values across distribution system compliance sampling locations. Monitoring for the LRAA will occur at routine sampling locations identified in the IDSE Final Report at specific frequencies based on system population. In addition, water systems must submit a new Monitoring Plan for routine sampling which identifies the location, timing, and frequency of sample collection as well as the methodology for determining compliance with the MCLs. The number of routine sites for compliance monitoring is based on retail population and source water type, ranging from 2 to 20. The frequency also depends on retail population and source water type, with small systems only required to monitor annually and large systems monitoring quarterly.

If a water system is required to conduct quarterly monitoring, it must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date (based on system size and designation in their IDSE Report and updated Monitoring Plan) and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If the system is required to conduct monitoring at a frequency that is less than quarterly, it must make compliance calculations beginning with the first compliance sample taken after the compliance date.

Operational Evaluation Levels

The Stage 2 D/DBPR includes the concept of "operational evaluation levels." Operational evaluation levels trigger a system to evaluate system operational practices and identify opportunities to reduce DBP concentrations in the distribution system in order to reduce the potential the system will exceed the MCL. The Stage 2 D/DBPR operational evaluation levels are identified using the system's Stage 2 D/DBPR compliance monitoring results.

The operational evaluation includes an examination of system treatment and distribution operational practices, including changes in sources or source water quality, storage tank operations, and excess storage capacity, which may contribute to high TTHM and HAA5 formation. Systems must also identify what steps could be considered to minimize future operational evaluation level exceedences.

Operational Evaluation Levels (calculated at each monitoring location) **IF (Q1 + Q2 + 2Q3)/4 > MCL,** **then the system must conduct an operational evaluation** where Q3 = current quarter measurement Q2 = previous quarter measurement Q1 =quarter before previous quarter measurement **MCL**=Stage 2 MCL for TTHM (0.080 mg/l) **or** Stage 2 MCL for HAA5 (0.060 mg/L)

Minimum Reporting Levels for DBPs

The rule establishes regulatory minimum reporting limits (MRLs) for compliance reporting of DBPs by public water systems. These regulatory MRLs also define the minimum concentrations that must be reported as part of the Consumer Confidence Reports. Beginning April 1, 2007 water systems must report all quantitative data results that have concentrations above the MRL. This includes both compliance data, such as routine or increased DBP monitoring, as well as non-compliance data, such as IDSE monitoring, operational evaluation assessment data, and treatment technique compliance data.

Maintain TOC < 4 mg/L for Reduced TTHM and HAA5 Monitoring

In order to qualify for reduced routine compliance monitoring for TTHM and HAA5, subpart H systems (i.e., systems that use surface water supplies or ground water under direct influence of surface water) not monitoring to demonstrate compliance with TOC removal requirements of Stage 1 D/DBPR (i.e., plants that are not conventional filtration designs) must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the state. The source water TOC running annual average must be <4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. After demonstration of TOC level, the system may reduce monitoring to every 90 days.

Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more than frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

Long Term 2 Enhanced Surface Water Treatment Rule

The Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) was published by the USEPA in early January 2006 in the Federal Register. This regulation applies to all public water systems that use surface water or ground water under the direct influence of surface water (GWUDI).

The LT2ESWTR includes variable deadlines that are dependent on population served. Some systems serving more than 100,000 people were required to submit detailed monitoring plan submissions under LT2ESWTR by July 1, 2006. The Major Milestone Schedule for Stage 2 D/DBPR and LT2ESWTR Implementation provides an overview of key monitoring, reporting, and compliance milestones under both rules.

The requirements for filtered and unfiltered systems are different. This section summarizes only the requirements for filtered systems.

Source Water Monitoring

Filtered systems are not required to conduct source water monitoring if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium.* Otherwise, PWSs using surface water or GWUDI are required to monitor their source water (i.e., the influent water entering the treatment plant) monthly for 24 months to determine a maximum running annual average *Cryptosporidium* level. As described in the next section, monitoring results determine the extent of *Cryptosporidium* action requirements under the LT2ESWTR. Large systems must also monitor for *E. coli* and turbidity at the same time in source water.

Systems must adhere to their sampling plan and must report results no later than 10 days after the end of the first month following the month when the sample is collected. All systems serving at least 10,000 people must report the results from the initial source water monitoring to USEPA electronically using the Central Data Exchange (CDX) website. Submission of historical (grandfathered) data was allowed if it met the quality assurance and quality control requirements specified in the rule.

Systems serving less than 10,000 persons may use *E. coli* as a surrogate indicator for *Cryptosporidium.* However, if the *E. coli* levels are sufficiently high, these systems must then undertake *Cryptosporidium* monitoring. The trigger level for *Cryptosporidium* monitoring was originally set at *E. coli* levels above 10 MPN/100 mL for a lake or reservoir source and 50 MPN/100 mL for a flowing stream. In 2010, based on data submitted by large systems the USEPA revised the trigger threshold to 100 MPN/100 mL for all surface water supplies.

The rule also includes a provision for all systems to conduct a second round of source water monitoring (either *Cryptosporidium* or *E. coli)* for all systems. This second round of sampling will take place six years following bin classification for the source water.

Analytical Method

Systems must analyze for *Cryptosporidium* using either USEPA Method 1623 or Method 1622. Systems must analyze at least a 10 L sample, a packed pellet volume of at least 2 mL, or enough volume to clog two filters. The rule contains specific quality assurance and quality control requirements. Only USEPA approved laboratories can perform the *Cryptosporidium* sample analysis. Analytical methods are also specified for turbidity and *E. coli* measurements required by the rule.

Sampling

Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months. Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months. Filtered systems serving fewer than 10,000 people with the initial *E. coli* annual mean *E. coli* concentration greater than 100 *E. coli MPN*/100 mL must then sample their source water for *Cryptosporidium* at least twice per month for 12 months. These small systems could also elect to skip the *E. coli* monitoring and instead conduct *Cryptosporidium* monitoring at least monthly for 24 months.

Systems must collect samples within a five-day period around the scheduled date. If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample, the system must sample as close to the scheduled date as is feasible unless the state approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the state concurrent with the shipment of the sample to the laboratory. If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

Replacement samples should be collected not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the state approves an alternative re-sampling date. The system must submit an explanation for the delayed sampling date to the state concurrent with the shipment of the sample to the laboratory. Systems that fail to meet these criteria for any source water sample must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the state for approval prior to when the system begins collecting the missed samples.

Monitoring Location

Systems must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the state may approve one set of monitoring results to be used for all plants. Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants. The state may approve a system to collect a source water sample after chemical treatment. To grant this approval, the state must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample. Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition. Specific requirements are included for bank filtration and other special cases.

A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under paragraph (c) of this section must monitor the new source on a schedule the state approves.

Monitoring and Treatment Compliance Dates

Starting dates for monitoring are staggered by system size, with smaller systems beginning monitoring after larger systems. Milestones for monitoring, reporting, and compliance occur first for very large systems ($\geq$100,000 persons), then systems serving 50,000 - 99,999 persons, followed by systems serving 10,000 - 49,999 persons, and finally systems serving fewer than 10,000. Populations are based on retail population served.

Bin Classification Table for Filtered Systems

Filtered water systems will be classified in one of four categories or bins based on their monitoring results. The rule specifies several calculation procedures depending on how many samples were collected or if the sample frequency was not consistent.

Additional action for *Cryptosporidium* (beyond 3.0-log reduction awarded for conventional filtration or 2.5-log reduction for direct filtration) will be based on source water concentrations of the protozoa and the type of treatment implemented at the plant. If the maximum running annual average (MRAA) is less than 0.075 oocysts/L, the source is assigned Bin 1 classification and no additional action is required. If the MRAA is greater than or equal to 0.075 oocysts/L, then various levels of action are required based on the Bin classification and the treatment type. **Table 7** provides a summary of those action requirements.

Calculating Bin Placement

- Total of at least 48 samples. The bin concentration is equal to the arithmetic mean of all sample concentrations.
- Total of at least 24 samples, but not more than 47 samples. The bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected (maximum running annual average).
- For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.
- For systems with plants operating only part of the year that monitor fewer than 12 months per year under § 141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

Table 7
Treatment Requirements by Bin Classification

Bin Classification	Filtration Treatment			
	Conventional filtration (including softening)	**Direct Filtration**	**Slow Sand or Diatomaceous Earth Filtration**	**Alternative Filtration Technology**
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log	1.5-log	1-log	As determined by State
Bin 3	2-log[1]	2.5-log[1]	2-log[1]	As determined by State[1]
Bin 4	2.5-log[1]	3-log[1]	2.5-log[1]	As determined by State[1]

[1]Systems must achieve at least 1-log through ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or bank filtration.

Conventional filtration systems classified in Bins 2, 3 and 4 must provide 1.0 to 2.5-log additional action for *Cryptosporidium*. Systems will select from a wide range of treatment and management strategies in the "microbial toolbox" to meet their additional action requirements. Systems classified in Bin 3 and Bin 4 must achieve at least 1 log of additional treatment using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or ultraviolet (UV) light.

Microbial Toolbox

PWSs can achieve additional *Cryptosporidium* treatment credit through implementing pretreatment processes, such as pre-sedimentation or bank filtration, by developing a watershed control program, and by applying additional treatment steps like ozone, chlorine dioxide, UV, and membranes. In addition, PWSs can receive a higher level of credit for existing treatment processes through achieving superior filter effluent turbidity or through a demonstration of performance. Taken as a whole, this list of control options is termed the "microbial toolbox." PWSs may use one or more tools to accumulate the needed treatment credits to meet the treatment requirement associated with their bin classification.

UV Dose Table

Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the UV dose values described in the rule. Systems must validate and monitor UV reactors to demonstrate that they are achieving a particular UV dose value for treatment credit. UV reactor validation must occur at full-scale using a test microbe with quantified dose-response characteristics using low-pressure mercury lamps. Validation must include operating conditions of flow rate, UV intensity as measured by a UV sensor, and UV lamp status, as well as other considerations including lamp fouling and inlet/outlet hydraulics. To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose.

CT Tables

CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone must calculate CT at least once each day, with both C and T measured during peak hourly flow. Systems with several disinfection segments in sequence may calculate and sum the CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Systems receive the *Cryptosporidium* treatment credit by meeting the corresponding CT value for the applicable water temperature specified in CT tables specified in the rule.

Open Finished Water Reservoirs

Up to now, regulations required PWSs to cover all new storage facilities for finished water but did not address existing uncovered finished water storage facilities. Under the LT2ESWTR, PWSs using uncovered finished water storage facilities must either cover the storage facility, treat the storage facility discharge to achieve inactivation and/or removal of 4-log virus, or develop and implement a risk mitigation plan.

Microbial Profiling and Benchmarking

After the first round of source water monitoring if a water system plans to make a significant change to its disinfection practice, they must develop a disinfection profile and calculate disinfection benchmarks for *Giardia lamblia* and viruses. The same process should be used as outlined in Guidance under the IESWTR. Significant changes to disinfection practice are defined as follows:

- Changes to the point of disinfection;
- Changes to the disinfectant(s) used in the treatment plant;
- Changes to the disinfection process; or
- Any other modification identified by the state as a significant change to disinfection practice.

Unregulated Contaminant Monitoring Rule 2

The Unregulated Contaminant Monitoring Rule 2 (UCMR2) required “treated” water monitoring of specified unregulated constituents. The Rule was promulgated on January 4, 2007. The purpose was to assist the USEPA to collect information about contaminants present in drinking water supplies that were unregulated. The UCMR2 was comprised of three lists, or groups, of monitoring. List 1 required CWSs and NTNCWs serving greater than 10,000 to conduct “treated” water monitoring of specified unregulated constituents. A select group of 800 systems serving less than 10,000 were also required to conduct the monitoring. List 2 required only large systems, serving greater than 100,000, to conduct “treated” water monitoring of specified unregulated constituents.

- List 1 - 10 constituents, two methods, sampling was conducted between January 2008 and December 2010, surface water quarterly for one year, groundwater semi-annual for one year, sampled at entry point to distribution system only.
  - 2,2',4,4'- tetrabromodiphenyl ether (BDE-47), 2,2',4,4',5-pentabromodiphenyl ether (BDE-99), 2,2',4,4',5,5'-hexabromobiphenyl (HBB), 2,2',4,4',5,5'-hexabromodiphenyl ether (BDE-153), 2,2',4,4',6-

    - pentabromodiphenyl ether (BDE-100), Dimethoate, Terbufos sulfone, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene (TNT), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX).
- List 2 - 15 constituents, three methods, sampling was conducted between January 2008 and December 2010, surface water quarterly for one year, groundwater semi-annual for one year, sampled at entry point to distribution system for all constituents and also at distribution system maximum residence time for the six nitrosamines (all under one method).
    - N-nitrosodiethylamine (NDEA), N-nitrosodimethylamine (NDMA), N-nitroso-di-n-butylamine (NDBA), N-nitroso-di-n-propylamine (NDPA), N-nitrosomethylethylamine (NMEA), N-nitrosopyrrolidine (NPYR), Acetochlor ethane sulfonic acid (ESA), Acetochlor oxanilic acid (OA), Alachlor ESA, Alachlor OA, Metolachlor ESA, Metolachlor OA, Acetochlor, Alachlor, Metolachlor.

Analytical work was to be completed using a USEPA approved UCMR2 laboratory and data was to be submitted to the USEPA via the on-line CDX system. The USEPA assigned specific dates for sampling conducted by each water agency. The List 1 and List 2 constituents were monitored concurrently. Systems finalized their sampling inventory with the USEPA and had the opportunity to revise the sampling schedule through CDX. Some large systems that have multiple ground water entry points to the distribution system (EPTDSs) were allowed to monitor at representative entry point(s) rather than at each EPTDS.

California Public Notification Requirements

These requirements were finalized and effective in September 2006. They apply to all PWSs. DDW revised the existing requirements by modifying the format substantially, and not necessarily the content. DDW revised public notification into three Tiers.

1. Tier 1 violations are the most serious (fecal/*E.coli* positive distribution system samples, nitrate/nitrite MCL exceedances without resampling, turbidity violations without DDW notification, or other emergency short-term exposure health advisories). These violations will require mass public notification within 24 hours.
2. Tier 2 violations are the less serious (other MCL violations, bacterial monitoring/testing errors). These violations require mass public notification within 30 days and must run for at least seven days. If the violation continues, the notification shall be repeated every 3 months.
3. Tier 3 violations are the least serious (other monitoring violations, testing procedure violations). These violations require mass public notification within one year and must run for at least seven days. If the violation continues, the notification shall be repeated annually. A detailed list of items to be included in public notifications is provided in the final rule.

There are new requirements, similar to the Consumer Confidence Report, such as foreign language translations, revised health effects text, submittal of certification to DDW within 10 days of public notification, and notification retention for up to three years.

California Secondary Drinking Water Standards

These Standards were finalized and effective in September 2006. They apply to all PWSs. DDW revised several secondary drinking water standards and clarified monitoring and compliance requirements. Corrosivity was removed from the list of secondary MCLs and pH was added.

Systems may obtain a waiver for treatment (up to nine years) to meet the secondary MCLs, and the process to obtain that waiver was clarified and detailed. Only sources with levels less than three times the MCLs may apply and must include:

- System complaint log
- Engineering report on treatment feasibility
- Results of customer survey
- Report of public meeting

The rule also clarifies that a source exceeding a secondary MCL may be used for standby or to meet peak demands if the use of the source is metered, it is only used less than five consecutive days or maximum 15 days per year, a PWS provides public notice prior to use if feasible, the use of the source is disclosed in the CCR, and the system is flushed to minimize the impact of the source.

California Perchlorate Regulation

DDW developed a primary MCL for perchlorate in drinking water in July 2007. DDW set the MCL for perchlorate at 6 ug/L, based on the public health goal (PHG) for perchlorate at that time of 6 ug/L, set by the Office of Environmental Health Hazard Assessment (OEHHA) in March 2004. The regulation requires all sources to be monitored for perchlorate two times in one year, once during the vulnerable period (May through September) and once five to seven months earlier or later. Historic data collected after January 1, 2001 was allowed to be grandfathered if it met all the sampling and quality assurance and quality control requirements of the regulation.

OEHHA revised the PHG down to 1 µg/L in February 2015 (discussed further below in the Other Drinking Water Thresholds section). Given the number of detections in water supplies and the reduction in the PHG to take into account infant exposures, DDW has determined to examine the perchlorate detections and the drinking water sources involved, and to develop a cost benefit analysis of a possible MCL revision. The MCL revision process is ongoing and draft information may be possible in 2017.

Contaminant Candidate List 2 (CCL2)

The 1996 Safe Drinking Water Act Amendments provided a list of chemical and microbial contaminants for possible future regulation. Every five years the USEPA is required to update the list, select at least five constituents for evaluation, and determine whether to regulate. The regulations will be determined based on risk assessment and cost-benefit considerations and on minimizing overall risk.

The USEPA selected constituents to evaluate as part of the first listing in 1998 and determined in 2003 not to regulate any of those selected. The USEPA opted to use the remaining constituents from the first listing as the second list for evaluation. Beginning in 2006, from this list of 51 constituents, 42 chemical and 9 microbial, the USEPA was to select at least five to determine whether to regulate. Eleven constituents were selected for determination, several of which were already regulated in California. USEPA published a Final Regulatory Determination in July 2008 and determined not to regulate any of the eleven constituents due to their lack of presence at levels of public health concern in public water systems. USEPA did determine that updated Health Advisories were warranted for seven of the constituents; including both dacthal acid degradates, as shown on **Table 8**.

If a contaminant is determined to need regulation, the standard shall be promulgated within 18 months of the determination. The regulations are determined based on risk assessment and cost-benefit considerations and on minimizing overall risk. Regulations must be based on best available, peer-reviewed science and data from best available methods. If regulated, the standard will take effect three years later. For each new regulation, the USEPA is required to identify affordable technologies that will achieve compliance for small systems.

As part of the Regulatory Determination, USEPA also requested more information on perchlorate and MTBE in order to make those regulatory determinations. In February 2011 the USEPA determined that perchlorate does warrant regulation in drinking water and this is discussed further in the Anticipated Future Regulations section below. A revised risk assessment for MTBE was expected in 2011 however it has not yet been completed. A regulatory determination will be made after that is complete.

Table 8
Contaminant Candidate List 2

Constituent	USEPA Regulate?	DDW Regulate?	Updated Health Advisory?
Boron	No	NL	Yes
Dacthal mono and di-acid degradates	No	No	Yes
1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE)	No	No	No
1,3-dichloropropene	No	MCL	Yes
2,4-dinitrotoluene	No	No	Yes
2,6-dinitrotoluene	No	No	Yes
s-ethyl propylthiocarbamate (EPTC)	No	No	No
Fonofos	No	No	No
Terbacil	No	No	No
1,1,2,2-tetrachloroethane	No	MCL	Yes

California Waterworks Standard

This was finalized by DDW in February 2008 and effective on March 9, 2008. It applies to all PWSs. The previous requirements were modified substantially in format, and somewhat in content. The definitions were expanded and detailed. Permit requirements for new sources and systems, as well as amendments, were organized and detailed. This also included a list of actions that require a permit amendment. There is now a requirement for a source capacity planning study for any anticipated water system expansion. The study shall present information on expected growth, water demands, and water supplies for a ten-year projection in a report to DDW. An Urban Water Management Plan can also meet these requirements.

Significant detail has been added for new well siting, construction and permit application. All technical sections of the Standards, related to design, installation, and operation, were updated, and many were expanded or had detail added.

The additives section was expanded to include indirect additives. Indirect additives, including chemical, material, lubricant, or product in the production, treatment or distribution of drinking water that will result in its contact with the drinking water including process media (carbon, sand), protective materials (coatings, linings, liners), joining and sealing materials (solvent cements, welding materials, gaskets, lubricating oils), pipes and related products (pipes, tanks, fittings), and mechanical devices used in treatment/transmission/distribution systems (valves, chlorinators, separation membranes), must be tested and certified as meeting the specifications of American National Standard Institute/NSF International (ANSI/NSF) 61.

If a water system is determined by DDW to have a deficiency in operations, the water system may be required to develop and submit a Water System Operations and Maintenance Plan. Detailed requirements for the plan are provided.

Endocrine Disrupters Screening Program

This is a monitoring program through the USEPA Office of Science that was finalized in April 2009. This program only applies to pesticide manufacturers, importers, and potentially users. The USEPA developed criteria for screening endocrine disrupters to identify priority chemicals. USEPA will implement the workplan by using assays in a two-tiered screening and testing process (Endocrine Disrupters Screening Program):

- Through Tier 1 screening, USEPA hopes to identify chemicals that have the potential to interact with the endocrine system. (see June 2015 modification below)
- Through Tier 2 testing, USEPA will determine the endocrine-related effects caused by each chemical and obtain information about effects at various doses.

USEPA will use this two-tiered approach to gather information needed to identify endocrine-active substances and take appropriate action. The initial list of 67 chemicals considered for Tier 1 screening is primarily pesticides – both active ingredients and inerts. In December 2007, USEPA issued draft procedures for the initial screening. For active ingredients, test orders will be sent to technical registrants and for inert ingredients, test orders will be sent to manufacturers, importers, and potentially users of chemicals on the list. Some of these constituents are already regulated in drinking water and some are on the CCL3/CCL4 (see below).

A second list of chemicals for Tier 1 screening was published in November 2010. The list of 134 chemicals includes pesticides, two perfluorocarbon compounds (PFCs), and three pharmaceuticals (erythromycin, nitroglycerin, and quinoline). This list also contains other chemicals, such as those used for industrial manufacturing processes, plasticizers, or in the production of pharmaceutical and personal care products (PPCPs).

The USEPA received information requests for Tier 1 between October 2011 and February 2012. In May 2014, the USEPA removed hydrazine and hydrochlorofluorocarbon from the list of chemicals for screening. They are currently reviewing this information to identify the Tier 2 testing requirements. Pesticides have been prioritized based on existing information and their review will be coordinated with the pesticide registration review program to reduce workload. A Comprehensive Management Plan was developed in 2012 and updated in February 2014. It is anticipated that the screening and testing will be completed by 2021.

In June 2015, USEPA proposed to modify the screening process to include the use of a high throughput assay (robot) and a computational model to identify a chemical's ability to interact with the endocrine system. This would replace three of the 11 current assays in the Tier 1 battery (related to estrogen receptors). The USEPA is hoping to replace the other eight assays in the future. This alternative method will accelerate the pace of screening, reduce costs, and reduce animal testing.

Contaminant Candidate List 3 (CCL3)

This is the third list developed by USEPA, as described previously under CCL2, to determine whether additional constituents need to be regulated in drinking water. The process used to draft this list was different than that implemented to develop the first and second CCLs. This process involved development of a "universe" of potential chemicals and then screening that list down based on health effects and occurrence in drinking water supplies.

The final list for the CCL3 was published in September 2009 and focused on chemicals that are toxic and have potential to be present in drinking water supplies. This included 116 constituents, 104 chemicals and 12 microbiological contaminants. USEPA is required to select at least five constituents from the list to make regulatory determinations for. In June 2011, the USEPA identified a short list of 32 constituents for the CCL3 that were assessed for determinations and in October 2014 announced preliminary regulatory determination for five constituents, including four determinations not to regulate and one to regulate (strontium).

In January 2016, USEPA published its final Third Regulatory Determination and determined not to regulate dimethoate, 1,3-dinitrobenzene, terbufos, and terbufos sulfone. USEPA delayed the final regulatory determination on strontium to consider additional data and decide whether there is a meaningful opportunity for health risk reduction by regulating strontium in drinking water. The timeline for this assessment is unclear.

Six-Year Review

In January 2017, the USEPA published its Six-Year Review of the National Primary Drinking Water Regulations. This is an assessment of the existing 88 regulations to determine if any of the current standards are in need of a detailed analysis for possible regulatory revision. The USEPA determined that 80 of the 88 existing standards are acceptable as they stand. Eight constituents are candidates for possible regulatory revision. This includes five under the SWTRs (viruses, heterotrophic bacteria, *Legionella*, *Giardia*, and *Cryptosporidium*) and three under the D/DBPRs (chlorite, TTHM, and HAA5). This will initiate a process for detailed analyses in four categories to determine if the current standards should be revised. The analyses include:

- Health effects assessment
- Analytical and treatability feasibility assessment
- Occurrence assessment
- Cost and benefit assessment

Unregulated Contaminant Monitoring Rule 3

The goal of the Unregulated Contaminant Monitoring Program is to generate national occurrence data for CCL contaminants (and other selected contaminants) that can be used to make future regulatory determinations under the Safe Drinking Water Act. The third Unregulated Contaminant Monitoring Rule (UCMR3) was outlined in April 2010 and formally proposed in March 2011. The final rule was published in April 2012.

Sampling for the UCMR 3 occurred from 2013 through 2015. The monitoring included 30 contaminants (28 chemicals and 2 viruses) under three lists. Nineteen of the target contaminants are from the CCL3 that was finalized in September 2009. The eleven chemicals included in UCMR3 that were not part of CCL3 are chromium, chromium 6, testosterone, 4-androstene-3,17-dione, chlorodifluoromethane, bromodichloromethane, noroviruses, and four perfluorinated chemicals; perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexane sulfonic acid (PFHxS), and perfluoronanoic acid (PFNA).

- Assessment Monitoring (List 1 Contaminants) applies to all PWSs serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people. These constituents will be monitored in the Entry Point to the Distribution System (EPDS), and the six metals and chlorate will also be monitored at the maximum detention time in the distribution system.

    - Method 522 (GC/MS) for 1,4-dioxane;
    - Method 524.3 (GC/MS) for seven VOCs: 1,1-dichloroethane, 1,2,3-trichloropropane, 1,3-butadiene, bromochloromethane, chlorodifluoromethane, chloromethane, and methyl bromide;
    - Method 200.8 (ICP/MS) for five metals: cobalt, molybdenum, strontium, chromium, and vanadium;
    - Method 218.7 (IC/UV) for chromium 6;
    - Method 300.1 (IC) for chlorate; and
    - Method 537 Rev1.1 for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), PFNA, PFHxS, PFHpA, and PFBS.

- Screening Survey (List 2 Contaminants) applies to all PWSs serving more than 100,000 people, 320 representative PWSs serving 10,001 to100,000 people, and 480 representative PWSs serving 10,000 or fewer people. These constituents will be monitored at the EPDS.

  - Method 539 (LC/MS/MS) for seven hormones: 17-alpha-ethynylestradiol, 17-beta-estradiol, equilin, estriol, estrone, testosterone, and 4-androstene-3,17-dione.

- Pre-Screen Testing (List 3 Contaminants) applies to USEPA-selected 800 representative PWSs serving 1,000 or fewer people that do not disinfect. These PWSs with wells that are located in areas of karst or fractured bedrock, will participate in monitoring for two List 3 viruses during a 12-month period from January 2013 through December 2015. These constituents will be monitored at the EPDS.

  - Method 1615 for viruses; enteroviruses and noroviruses; and
  - Bacterial Indicators; total coliforms, *E. coli*, bacteriophage, *Enterococci*, and aerobic spores.

Changes from the UCMR2 included adding PWSs that rely on 100 percent purchased water (consecutive systems), clarifying the terms of representative groundwater sampling, and updated reporting elements.

Revised Total Coliform Rule

The USEPA published revisions to the TCR (RTCR) in February 2013. There were also some minor revisions published in February 2014. These revisions apply to all PWSs. There were numerous changes to the original TCR, but the key topics included:

- Removal of MCLG and MCL of zero for total coliform,
- Establish MCLG and MCL of zero of *E. coli,*
- Total coliform will serve as an indicator or potential contamination into the distribution system, with detects requiring assessments to determine if any sanitary defects exist and correct them (find and fix strategy),
- *E. coli* MCL violation will result in a requirement to conduct an assessment and correct any sanitary defects found,
- Minor revisions of routine and repeat monitoring requirements to match newer Groundwater Rule requirements (related to water quality and system performance), and
- Opportunity for increased flexibility in repeat monitoring for total coliform positive to better increase options for verifying and identifying extent of fecal contamination.

Provided below are some additional details of the regulation related to the MCLs, monitoring, reporting, and public notification.

Coliform Treatment Technique

Under the RTCR there will no longer be a monthly MCL violation for multiple total coliform detections. This will become effective on April 1, 2016. Instead, EPA replaced the MCLG and MCL for total coliforms with a treatment technique for coliforms that requires assessment and corrective action. A PWS that exceeds a specified frequency of total coliform occurrence must conduct an assessment to determine if any sanitary defects exist (a sanitary defect is defined by the RTCR as a "defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure of a barrier that is already in place"); if any are found, the system must correct them. In addition, under the treatment technique requirements, a PWS that incurs an *E. coli* MCL violation must conduct an assessment and correct any sanitary defects found.

A PWS that exceeds a specified frequency of coliform occurrence must conduct a Level 1 or Level 2 assessment to determine if any sanitary defect exists and, if found, to correct the sanitary defect. A Level 2 assessment requires a more in-depth and comprehensive review of the PWS compared to a Level 1. PWSs are required to correct all sanitary defects found through either a Level 1 or Level 2 assessment. Systems should ideally be able to correct any sanitary defects found in the assessment within 30 days and report that correction on the assessment form.

Level 1 treatment technique triggers:

- For systems taking 40 or more samples per month, the PWS exceeds 5.0 percent total coliform-positive samples for the month; or
- For systems taking fewer than 40 samples per month, the PWS has two or more total coliform-positive samples in the same month; or
- The PWS fails to take every required repeat sample after any single routine total coliform-positive sample.

Level 2 treatment technique triggers:

- The PWS has an *E. coli* MCL violation (see below for a description of what constitutes an *E. coli* MCL violation); or
- The PWS has a second Level 1 treatment technique trigger within a rolling 12-month period, unless the initial Level 1 treatment technique trigger was based on exceeding the allowable number of total coliform-positive samples, the State has determined a likely reason for the total coliform-positive samples that caused the initial Level 1 treatment technique trigger, and the State establishes that the system has fully corrected the problem; or
- For PWSs with approved reduced annual monitoring, the system has a Level 1 treatment technique trigger in two consecutive years.

At a minimum, both Level 1 and 2 assessments must include review and identification of the following elements:

- Atypical events that may affect distributed water quality or indicate that distributed water quality was impaired;
- Changes in distribution system maintenance and operation that may affect distributed water quality, including water storage;
- Source and treatment considerations that bear on distributed water quality, where appropriate;
- Existing water quality monitoring data; and
- Inadequacies in sample sites, sampling protocol, and sample processing.

Level 1 Assessment:

A Level 1 assessment must be conducted when a PWS exceeds one or more of the Level 1 treatment technique triggers specified previously. Under the rule, this self-assessment consists of a basic examination of the source water, treatment, distribution system and relevant operational practices. The PWS should look at conditions that could have occurred prior to and caused the total coliform-positive sample. Example conditions include treatment process interruptions, loss of pressure, maintenance and operation activities, recent operational changes, etc. In addition, the PWS should check the conditions of the following elements: sample sites, distribution system, storage tanks, source water, etc. These assessments can be completed by the water system.

Level 2 Assessment:

A Level 2 assessment must be conducted when a PWS exceeds one or more of the Level 2 treatment technique triggers specified previously. It is a more comprehensive examination of the system and its monitoring and operational practices than the Level 1 assessment. The level of effort and resources committed to undertaking a Level 2 assessment is commensurate with the more comprehensive investigation and review of available information, and engages additional parties and expertise relative to the Level 1 assessment. Level 2 assessments must be conducted by a party approved by the State: the State itself, a third party, or the PWS where the system has staff or management with the required certification or qualifications specified by the State. If the PWS or a third party conducts the Level 2 assessment, the PWS or third party must follow the State requirements for conducting the Level 2 assessment. The PWS must also comply with any expedited actions or additional actions required by the State in the case of an *E. coli* MCL violation.

USEPA has published a draft Guidance Manual for completion of the Level 1 and 2 Assessments. That document is available on the USEPA website, but it will be replaced with a final version of the Guidance Manual in 2013. The Assessments must include a list of sanitary defects/significant deficiencies or a statement of none found, a description of the corrective actions taken, and a list of additional corrective actions proposed.

Coliform Treatment Technique Violation

A system incurs a coliform treatment technique violation when any of the following occurs:

- A system fails to conduct a required assessment within 30 days of notification of the system exceeding the trigger.
- A system fails to correct any sanitary defect found through either a Level 1 or 2 assessment within 30 days or in accordance with State-derived schedule.
- A seasonal system fails to complete a State-approved start-up procedure prior to serving water to the public.

These violations would result in a Tier 2 Public Notification.

***E. coli* MCL**

Systems are required to meet an MCL for *E. coli*, as demonstrated by required monitoring. EPA is also establishing an MCLG of zero. These are both effective on April 1, 2016. The MCL for *E. coli* is based on the monitoring results for total coliforms and *E. coli*.

E. coli MCL Violation

A system incurs an *E. coli* MCL violation if any of the following occurs:

- A routine sample is total coliform-positive and one of its associated repeat samples is *E. coli*-positive.
- A routine sample is *E. coli*-positive and one of its associated repeat samples is total coliform-positive.
- A system fails to take all required repeat samples following a routine sample that is positive for *E. coli*.
- A system fails to test for *E. coli* when any repeat sample tests positive for total coliforms.

These violations result in a Tier 1 Public Notification. Although not explicitly stated, as a logical consequence of the second condition, a system also violates the MCL when an *E. coli*-positive routine sample is followed by an *E. coli*-positive repeat sample because *E. coli* bacteria are a subset of total coliforms.

Monitoring and Reporting Requirements

The RTCR specifies the frequency and timing of the microbial testing by water systems based on population served, system type, and source water type. The RTCR links monitoring frequency to compliance monitoring results and system performance. It provides criteria that well-operated small systems must meet to qualify for and stay on reduced monitoring. It requires increased monitoring for high-risk small systems with unacceptable compliance history. It also requires some new monitoring requirements for seasonal systems.

Monitoring Violation

A system incurs a monitoring violation when any of the following occurs:

- A system fails to take every required routine or additional routine sample in a compliance period.
- A system fails to test for *E. coli* following a routine sample that is total coliform-positive.

Reporting Violation

A system incurs a reporting violation when any of the following occurs:

- A system fails to timely submit a monitoring report or a correctly completed assessment form after it properly monitors or conducts an assessment by the required deadlines. The PWS is responsible for reporting this information to the State regardless of any arrangement with a laboratory.
- A system fails to timely notify the State following an *E. coli*-positive sample.
- A seasonal system fails to submit certification of completion of State-approved start-up procedure.

Public Notification Requirements

The rule continues to require public notification (PN) when there is a potential health threat as indicated by monitoring results, and when the system fails to identify and fix problems as required. The RTCR eliminates PN requirements based only on the presence of total coliforms. Instead, the RTCR requires PN when an *E. coli* MCL violation occurs, indicating a potential health threat, or when a PWS fails to conduct the required assessment and corrective action.

EPA is requiring a Tier 1 PN for an *E. coli* MCL violation, Tier 2 PN for a treatment technique violation for failure to conduct assessments or corrective actions, and a Tier 3 PN for a monitoring violation or a reporting violation.

DDW has two years to adopt a similar version of this regulation. Compliance with this regulation began on April 1, 2016.

The Consumer Confidence Reports will be modified to remove the reporting requirements for total coliform, modify reporting requirements for *E. coli*, and modify health effects language.

California Hexavalent Chromium Regulation

DDW published a Final Hexavalent Chromium Regulation in May 2014 with an MCL of 10 µg/L; effective July 1, 2014. This was based on the OEHHA PHG of 0.02 µg/L, which was finalized in July 2011. Initial and repeat monitoring requirements are the same as other inorganic contaminants. Chromium (VI), or hexavalent chromium, has primarily been found in groundwater supplies in California. Chromium (VI) causes acute gastritis when ingested in high doses and is an established human lung carcinogen when inhaled.

In a parallel effort, the USEPA recommends that water systems conduct enhanced monitoring for hexavalent chromium. For surface waters this includes quarterly sampling of the raw water, the entry point to the distribution system, and a maximum residence time location in the distribution system.

USEPA Contaminant Candidate List 4

The USEPA published a final list of the fourth CCL in November 2016. See **Attachment 2** for a list of constituents on the Final CCL4. This list includes 109 constituents; 97 chemicals and 12 microbiological contaminants. The CCL4 is largely comprised of the same constituents on the CCL3, except the following; manganese and nonylphenol were added and perchlorate, strontium, dimethoate, 1,3-dinitrobenzene, terbufos, and terbufos sulfone were removed. Three constituents were removed from the draft list since they are cancelled pesticides; disulfoton, fenamiphos, and molinate. The USEPA will have five years to review the constituents and make regulatory determinations for at least five constituents on the list.

USEPA Unregulated Monitoring Contaminant Rule 4

The goal of the Unregulated Contaminant Monitoring Program is to generate national occurrence data for CCL contaminants (and other selected contaminants) that can be used to make future regulatory determinations under the Safe Drinking Water Act. This is the Fourth Round of the UCMR, promulgated in December 2016. The list includes 30 constituents, monitored between 2018 and 2020. Monitoring will be conducted only for List 1 Contaminants, by both large PWSs (serving more than 10,000 people) and randomly selected small PWSs (serving 10,000 or fewer people).

- Cyanotoxin Monitoring: These ten constituents will be monitored in the Entry Point to the Distribution System (EPDS) monthly over a four month consecutive period.

    - Method EPA 544 for microcystin-LA, microcystin-LF, microcystin-LR, microcystin-LY, microcystin-RR, microcystin-YR, nodularin;
    - Method EPA 545 for anatoxin-a, cylindrospermopsin; and

- Method EPA 546 for total microcystins.

- Additional Chemicals: These 22 constituents (including two surrogates) will be monitored at the specified sites quarterly over a 12 month consecutive period.

  - Method EPA 200.8 for manganese and germanium (at EPDS).
  - Method EPA 525.3 for alpha-hexachlorocyclohexane, chlorpyrifos, dimethipin, ethoprop, oxyfluorfen, profenofos, tebuconazole, total permethrin, tribufos (at EPDS).
  - Method EPA 552.3 for HAA5, HAA6Br, HAA9 (at Stage 2 D/DBP Sites).
  - Method EPA 541 for 1-butanol, 2-methoxyethanol, 2-propen-1-ol (at EPDS).
  - Method EPA 530 for butylated hydroxyanisole, o-toluidine, quinoline (at EPDS).
  - Method EPA 300.0 for bromide (in source water coordinated with EPA 552.3).
  - Standard Method 5310 for TOC (in source water coordinated with EPA 552.3).

OTHER DRINKING WATER THRESHOLDS

In addition to regulatory standards, there are several other drinking water thresholds that should be discussed. This includes USEPA Health Advisories, USEPA Human Health Benchmarks for Pesticides, California Notification Levels and Archived Advisory Levels, and OEHHA Public Health Goals.

USEPA Health Advisories

The USEPA Office of Water Office of Science and Technology has developed Health Advisories for other constituents in drinking water that are not currently regulated. These are non-enforceable levels which can provide guidance to water systems on the potential risk to public health. USEPA has conveniently compiled Federal drinking water standards, including Health Advisories, into a reference handbook (USEPA 2012). The reference handbook includes acute and chronic risk for cancer and non-cancer health effects. (http://water.epa.gov/action/advisories/drinking/upload/dwstandards2012.pdf) In 2015 USEPA added Health Advisories for two cyanotoxins and in 2016 for two perfluoroalkyl substances, as described below.

Cyanotoxins

USEPA published 10-day Health Advisories (HA) for microcystin and cylindrospermopsin in June 2015. The HAs for children less than six years old are microcystin at 0.3 ug/L and cylindrospermopsin at 0.7 ug/L. The HAs for older children and adults are microcystin at 1.6 ug/L and cylindrospermopsin at 3.0 ug/L.

USEPA also released "Health Effects Support Documents" for microcystin, cylindrospermopsin and a third cyanotoxin, anatoxin-a. At this time, USEPA has determined that there is not sufficient data to develop a Health Advisory for anatoxin-a. In addition, USEPA released a document "Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water." All three of these cyanotoxins are listed on the CCL3 and Draft CCL4, for consideration of potential future regulation.

Perfluoroalkyl Substances

USEPA published lifetime Health Advisories for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) in November 2016. The HA for each substance is 0.070 ug/L. When both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 0.070 ug/L HA. This health advisory level offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water.

USEPA Human Health Benchmarks for Pesticides

For those pesticides without drinking water standards or Health Advisories, USEPA Office of Pesticide Programs has developed Human Health Benchmarks for use by the states and water systems in water quality management. The USEPA developed human health benchmarks for 363 pesticides to enable others to better determine whether the detection of a pesticide in drinking water or source waters for drinking water may indicate a potential health risk and to help them prioritize monitoring efforts. These values, which are periodically updated, are available on the Internet (http://iaspub.epa.gov/apex/pesticides/f?p=HHBP:home:3921856313509). The benchmarks include acute and chronic non-cancer endpoints, and USEPA has also started development of cancer risk benchmarks.

California Notification Levels and Archived Advisory Levels

DDW has established health-based notification levels for contaminants that have no MCLs but, are thought to pose a risk to drinking water supplies. Notification Levels (NLs) and Archived Advisory Levels (AALs) have been established in response to detection in drinking water supplies or in anticipation of possible contamination. Chemicals for which NLs or AALs are established may eventually be regulated by MCLs. To date, 39 of the 93 chemicals for which NLs or AALs have been established, are now regulated by MCLs. Of the remaining 54 chemicals, 30 currently have NLs, as shown in **Table 9**, and 24 are chemicals with AALs, as shown in **Table 10**. NLs and AALs are calculated using standard risk assessment procedures. If a chemical is present in a water supply at a concentration that exceeds the NL or AAL, the water system must inform its customers. If a chemical is present at the response level concentration, DDW recommends taking the source out of service. If the drinking water system does not take the source out of service, more extensive public notification is required.

Table 9
DDW Drinking Water Notification Levels

Chemical	Notification Level (milligrams per liter)	Response Level (milligrams per liter)
Boron	1	10
n-Butylbenzene	0.26	2.6
sec-Butylbenzene	0.26	2.6
tert-Butylbenzene	0.26	2.6
Carbon disulfide	0.16	1.6
Chlorate	0.8	8
2-Chlorotoluene	0.14	1.4
4-Chlorotoluene	0.14	1.4
Diazinon	0.0012	0.012
Dichlorodifluoromethane (Freon 12)	1	10
1,4-Dioxane	0.001	0.035
Ethylene glycol	14	140
Formaldehyde	0.1	1
HMX	0.35	3.5
Isopropylbenzene	0.77	7.7
Manganese	0.5	5
Methyl isobutyl ketone (MIBK)	0.12	1.2
Naphthalene	0.017	0.17
N-Nitrosodiethyamine (NDEA)	0.00001	0.0001
N-Nitrosodimethylamine (NDMA)	0.00001	0.0003
N-Nitrosodi-n-propylamine (NDPA)	0.00001	0.0005
Propachlor	0.09	0.9
n-Propylbenzene	0.26	2.6
RDX	0.0003	0.03
Tertiary butyl alcohol (TBA)	0.012	1.2
1,2,3-Trichloropropane (1,2,3-TCP)*	0.000005	0.0005
1,2,4-Trimethylbenzene	0.33	3.3
1,3,5-Trimethylbenzene	0.33	3.3
2,4,6-Trinitrotoluene (TNT)	0.001	0.1
Vanadium	0.05	0.5

*MCL Currently in Development

Table 10
DDW Drinking Water Archived Advisory Levels

Chemical	Archived Advisory Level (milligrams per liter)	Response Level (milligrams per liter)
Aldicarb	0.007	0.07
Aldrin	0.000002	0.0002
Baygon	0.03	0.3
a-Benzene Hexachloride	0.000015	0.0015
b-Benzene Hexachloride	0.000025	0.0025
Captan	0.015	1.5
Carbaryl	0.7	7
Chloropicrin	0.05	0.5
Chlorpropham (CIPC)	1.2	12
1,3-Dichlorobenzene	0.6	6
Dieldrin	0.000002	0.0002
Dimethoate	0.001	0.01
2,4-Dimethylphenol	0.1	1
Diphenamide	0.2	2
Ethion	0.004	0.04
Malathion	0.16	1.6
N-Methyl dithiocarbamate (Metam sodium)	0.00019	0.019
Methylisothiocyanate	0.19	1.9
Methyl Parathion	0.002	0.02
Parathion	0.04	0.4
Pentachloronitrobenzene	0.02	0.2
Phenol	4.2	42
2,3,5,6-Tetrachloroterephthalate	3.5	35
Trithion	0.007	0.07

California Public Health Goals

The Office of Environmental Health Hazard Assessment (OEHHA) is responsible for development of risk assessments for drinking water contaminants and publication of Public Health Goals (PHGs). These values represent the level below which there is no expected or known risk to human health for non-carcinogens. For cancer-causing chemicals, the PHG is set at the one-in-a-million risk level. These are reviewed periodically and updated as appropriate. Currently, there are 90 PHGs as shown in **Attachment 3**. OEHHA must develop a PHG before DDW can set a California MCL for a contaminant for the first time, or in agreement with adoption of a federal standard.

The MCL must be as close as possible to the PHG, considering cost and feasibility of treatment. PHG are revised periodically. Whenever a PHG is updated, DDW must re-evaluate the current MCL.

ANTICIPATED FUTURE REGULATIONS

The USEPA and DDW are developing new drinking water regulations. The major anticipated future regulations that are projected to impact surface water supplies within the next five years are shown in **Table 11** and those regulations are discussed below. It should be noted that there are other constituents of public interest on the drinking water horizon, such as cyanotoxins and pharmaceutical compounds. However, the human health impacts of these constituents are not well understood yet and there is no specific regulatory path for them at this time so they are not specifically addressed in this section (they are indirectly discussed previously in the Endocrine Disrupters Screening Program and the Contaminant Candidate List subsections).

Table 11
Summary of Anticipated Major Federal and State Drinking Water Quality Regulations for Surface Water Supplies

Regulation	Year Projected	Number of Contaminants	Targeted Contaminants
USEPA Revised Fluoride Regulation	2017/2018	1	Fluoride
USEPA Long Term Revisions to the Lead and Copper Rule	2017	2	Lead and Copper
USEPA Perchlorate Regulation	2018/2019	1	Perchlorate
USEPA Hexavalent Chromium Regulation	2017/2018	1	Hexavalent Chromium
USEPA cVOCs Regulation	2018/2019	Up to 16	Carcinogenic VOCs
CA Total Coliform Rule Revisions	2017	3	Microbial
CA 1,2,3-Trichloropropane MCL	2017	1	VOC
CA Lead and Copper Rule Revisions	2017	2	Lead and Copper
CA Cross Connection Control Program	Unknown	None	None

[1] Draft/Final Rule Dates

USEPA Revised Fluoride Regulation

The USEPA announced in January 2011 that they would review the primary and secondary standards for fluoride based on the new health and exposure assessments. The National Research Council recommended the review based on newly available data for orally ingested fluoride. Data show that children may have overexposure to fluoride, which could result in a decrease in the drinking water standards and the optimum dosing for fluoridation systems.

The US Department of Health and Human Services announced in April 2015 a recommended optimal level of fluoride in drinking water at 0.7 mg/L, based on the health review. In response, the DDW updated their optimal level of fluoride in drinking water to allow systems to implement the optimal level, with a control range of 0.6 to 1.2 mg/L. USEPA will decide whether revisions to the drinking water standards are appropriate.

USEPA Long Term Revisions to the Lead and Copper Rule

The goal for the Long-Term Revisions to the Lead and Copper Rule is to improve public health protection by making substantive changes based on topics that were identified in the 2004 National Review, and to streamline the rule requirements. Example categories of potential changes to the rule include:

- Sample site collection criteria and sampling procedures for lead and copper tap monitoring,
- Corrosion control treatment and water quality parameter monitoring requirements,
- Lead service line replacement requirements,
- Schools and day care facilities,
- Consecutive system requirements, and
- Potentially outdated requirements, rule relevancy and simplicity for systems.

USEPA's National Drinking Water Advisory Council Lead and Copper Working Group has been meeting regularly in 2014 and 2015 to prepare a report on recommendations for proposed changes to the Lead and Copper Rule. This report is expected to be finalized in 2017 and will be used by the USEPA to initiate Long-Term Revisions to the Lead and Copper Rule.

USEPA Perchlorate Regulation

The USEPA is developing a regulation for perchlorate. A proposed rule was expected in February 2013, but has now been delayed until mid-2017 with a final rule to follow in 2018. A final rule must be adopted by December 2019, as per a consent decree from the US District Court. Any standard developed by USEPA would need to be adopted by the DDW within two years, and may result in changes to the current California primary MCL for perchlorate. This effort would likely be coordinated with the DDW review triggered by the revision of the PHG by OEHHA.

USEPA has initiated a two-part external peer review process of the health effects model in which the first panel will examine the strength of new and novel approaches to modeling health effects. The second panel will review how, and if, the model and related information support developing a maximum contaminant level goal. USEPA has indicated that the external peer review will be completed by Oct. 30, 2017, and per the consent decree, must promulgate a proposed rule for perchlorate by Oct. 31, 2018.

USEPA Hexavalent Chromium Regulation

USEPA began a review of the health effects of hexavalent chromium following the 2008 release of toxicity studies by the Department of Health and Human Service's National Toxicology Program. In September, 2010, USEPA released a draft of the scientific human health assessment for public comment and external peer review. Currently, there is no schedule identified for the final hexavalent chromium human health assessment. USEPA will review the final assessment once it is available and consider all other relevant information to determine if a new drinking water regulation for hexavalent chromium, or a revision to the current total chromium standard, is warranted. Any revisions would need to be adopted by DDW and may result in changes to the current California primary MCL.

USEPA recommends that water systems voluntarily implement enhanced monitoring for hexavalent chromium (as discussed previously). Also, the UCMR 3 required many public water systems to monitor for hexavalent chromium.

USEPA Carcinogenic VOC Regulation

As part of the new Drinking Water Strategy USEPA announced that it will move forward with development of regulatory standards for a group of carcinogenic VOCs. A draft rule was projected for early 2015, with a final in 2016, but it has been delayed possibly until 2018. These are largely industrial contaminants and include 16 VOCs, eight of which are already regulated so this Rule may result in reduced MCLs. The regulated list includes; TCE, PCE, benzene, carbon tetrachloride, 1,2-dichloroethane, 1,2-dichloropropane, dichloro-methane, and vinyl chloride. The unregulated list includes; aniline, benzyl chloride, 1,3-butadiene, 1,1-dichloroethane, nitrobenzene, methyl oxirane, 1,2,3-trichloropropane, and urethane.

California Total Coliform Rule Revisions

In response to the Federal Revised Total Coliform Rule, California must revise its version of the Total Coliform Rule in Title 22. However, the draft regulations were not adopted in time to correspond with the Federal rule requirements. Beginning April 1, 2016, all public water systems were required to comply with California's existing Total Coliform Rule and the new requirements in the Federal Revised TCR. DDW is in the process of preparing an updated Revised TCR for public review, expected in early 2017.

California 1,2,3-Trichloropropane MCL

California will be setting a primary MCL for 1,2,3-trichloropropane. Currently, there is a PHG of 0.7 ug/L and a Notification Level of 5 ug/L. 1,2,3-trichchloropropane was used as an industrial solvent and soil fumigant. It is a carcinogenic. Monitoring results in drinking water supplies show that there is widespread detection throughout the State in groundwater. DDW held a meeting in July 2016 to discuss the regulatory process and proposed a staff recommended primary MCL of 5 ug/L. A regulatory package is expected for public review in early 2017.

California Lead and Copper Rule Revisions

DDW is planning to update the Lead and Copper regulations to incorporate recent Federal clarifications to the rule and State laws, as follows.

In late February 2016, USEPA encouraged States to enhance the oversight of implementation and enforcement of drinking water regulations, including the Lead and Copper Rule. This included specific recommendations on the need to address lead action level exceedances, to fully implement and enforce the Lead and Copper Rule, to enhance public transparency and public access to data and compliance information, and to leverage additional funding sources to address aging infrastructure needs.

At the same time, USEPA also clarified tap sampling procedures for the Lead and Copper Rule, with specific recommendations for removal and cleaning of aerators, pre-stagnation flushing, and sample bottle configuration. The memo includes a revised version of Suggested Directions for Homeowner Tap Sample Collection Procedures.

Senate Bill 1398 became effective January 1, 2017, which requires PWSs to compile an inventory of known lead user service lines in use in its distribution system and identify areas that may have lead user service lines in use in its distribution system by July 1, 2018. Additional actions are required by July 1, 2020.

California Cross Connection Control Program

This will apply to all PWSs. The DDW published a draft version of the Proposed Cross Connection Control Rule in December 2005. The existing requirements have been modified substantially in format, and somewhat in content.

The Rule will now include a section on dual plumbed recycled water systems with design and operations criteria. The Rule has been reorganized into seven sections; definitions, hazard assessment, backflow protection selection criteria and standards, backflow protection installation/ testing/ repairs, additional cross connection control requirements for CWSs, and recordkeeping and public notification.

Key components include a new table with hazard criteria and appropriate backflow protection, and more details on all sections.

ATTACHMENT 1
Summary of Regulated Contaminants

Summary of Contaminants
Currently Regulated by USEPA and DDW

Classification	Contaminant	Regulation	MCL (mg/L)
Inorganics (Section 64432)			
	Aluminum	DDW	1
	Antimony	Phase V	0.006
	Arsenic	Arsenic Rule	0.010
	Barium	DDW	1
	Beryllium	Phase V	0.004
	Cadmium	Phase II	0.005
	Chromium	DDW	0.05
	Copper	LCR	1.3 [1,2]
	Cyanide	Phase V	0.15
	Fluoride	DDW	2
	Hexavalent Chromium	DDW	0.010
	Lead	LCR	0.015 [1,2]
	Mercury	Phase II	0.002
	Nickel	Phase V	0.1 [3]
	Perchlorate	Perchlorate	0.006
	Selenium	Phase II	0.05
	Thalium	Phase V	0.002
Nitrate, Nitrite (Section 64432.1)			
	Nitrate	Phase II	10 as N (45 as NO3)
	Nitrite	Phase II	1 as N
	Nitrate + Nitrite	Phase II	10 (sum as N)
Asbestos (Section 64432.2)			
	Asbestos	Phase II	7 MFL (>10um)
Secondary Standards (Section 64449, Table 64449-A)			
	Aluminum	DDW	0.2
	Color	DDW	15 Units
	Copper	DDW	1
	Foaming Agents	DDW	0.5
	Iron	DDW	0.3
	Manganese	DDW	0.05
	Methyl-tert-butyl-ether (MTBE)	DDW	0.005
	Odor-Threshold	DDW	3 Units
	Silver	DDW	0.1
	Thiobencarb	DDW	0.001
	Turbidity	DDW	5 NTU
	Zinc	DDW	5
Secondary Standards (Section 64449, Table 64449-B)			
	Total Dissolved Solids	DDW	500/1,000/1,500 [4]
	Specific Conductance	DDW	900/1,600/2,200 [4]
	Chloride	DDW	250/500/600 [4]
	Sulfate	DDW	250/500/600 [4]
General Mineral (Section 64449 (c) (2))			
	Bicarbonate	DDW	MO
	Carbonate	DDW	MO
	Hydroxide	DDW	MO
	Alkalinity	DDW	MO
	pH	DDW	MO
	Calcium	DDW	MO
	Magnesium	DDW	MO
	Sodium	DDW	MO
	Hardness	DDW	MO
(Volatile) Organic Chemicals (Section 64444, Table 64444-A (a))			
	Benzene	DDW	0.001
	Carbon Tetrachloride	DDW	0.0005
	o-Dichlorobenzene	Phase II	0.6
	p-Dichlorobenzene	DDW	0.005
	1,1-Dichloroethane	DDW	0.005
	1,2-Dichloroethane	DDW	0.0005

Summary of Contaminants
Currently Regulated by USEPA and DDW

Classification	Contaminant	Regulation	MCL (mg/L)
	1,1-Dichloroethylene	DDW	0.006
	cis-1,2-Dichloroethylene	DDW	0.006
	trans-1,2-Dichloroethylene	DDW	0.01
	Dichloromethane (Methylene chloride)	Phase V	0.005
	1,2-Dichloropropane	Phase II	0.005
	1,3-Dichloropropene	DDW	0.0005
	Ethylbenzene	DDW	0.3
	Methyl-tert-butyl ether (MTBE)	DDW	0.013
	Monochlorobenzene	DDW	0.07
	Styrene	Phase II	0.1
	1,1,2,2-Tetrachloroethane	DDW	0.001
	Tetrachloroethylene	Phase II	0.005
	Toluene	DDW	0.15
	1,2,4-Trichlorobenzene	DDW	0.005
	1,1,1-Trichloroethane	Phase I	0.2
	1,1,2-Trichloroethane	Phase V	0.005
	Trichloroethylene	Phase I	0.005
	Trichlorofluoromethane	DDW	0.15
	1,1,2-Trichloro-1,2,2-Triflouroethane	DDW	1.2
	Vinyl Chloride	DDW	0.0005
	Xylenes (total)	DDW	1.75
(Non-Volatile Synthetic) Organic Chemicals (Section 64444, Table 64444-A (b))			
	Acrylamide	Phase II	TT (PAP)
	Alachlor	Phase II	0.002
	Atrazine	DDW	0.001
	Bentazon	DDW	0.018
	Benzo(a)pyrene	Phase V	0.0002
	Carbofuran	DDW	0.018
	Chlordane	DDW	0.0001
	2,4,-D	Phase II	0.07
	Dalapon	Phase V	0.2
	Dibromochloropropane	Phase II	0.0002
	Di (2-ethylhexyl) Adipate	Phase V	0.4
	Di (2-ethylhexyl) Phthalate	DDW	0.004
	Dinoseb	Phase V	0.007
	Diquat	Phase V	0.02
	Endothall	Phase V	0.1
	Endrin	Phase V	0.002
	Epichlorohydrin	Phase II	TT (PAP)
	Ethylene Dibromide	Phase II	0.00005
	Glyphosate	Phase V	0.7
	Heptachlor	DDW	0.00001
	Heptachlor Epoxide	DDW	0.00001
	Hexachlorobenzene	Phase V	0.001
	Hexachlorocyclopentadiene	Phase V	0.05
	Lindane	Phase II	0.0002
	Methoxychlor	DDW	0.03
	Molinate	DDW	0.02
	Oxamyl	DDW	0.05
	Pentachlorophenol	Phase II	0.001
	Picloram	Phase V	0.5
	PCBs	Phase II	0.0005
	Simazine	Phase V	0.004
	Thiobencarb	DDW	0.07
	Toxaphene	Phase II	0.003
	2,3,7,8-TCDD (Dioxin)	Phase V	3.00E-08
	2,4,5-TP (Silvex)	Phase II	0.05
Natural Radioactivity (Section 64441)			
	Gross Alpha Particle Activity	NPDWR	15 pCi/L
	Combined Radium 226 & 228	NPDWR	5 pCi/L
	Uranium	DDW	20 pCi/L
Man-Made Radioactivity (Section 64443)			
	Tritium	DDW	20,000 pCi/L
	Strontium-90	DDW	8 pCi/L

Summary of Contaminants
Currently Regulated by USEPA and DDW

Classification	Contaminant	Regulation	MCL (mg/L)
	Gross Beta Particle Activity	NPDWR	50 pCi/L
Disinfection By-Products			
	Total Trihalomethanes (Chloroform, Bromoform, Chlorodibromomethane, Bromodichloromethane)	Stage 1 D/DBP Rule	0.08
	Haloacetic Acids 5 (Mono, di, and tri-chloroacetic acid, mono and di-bromoacetic acid)	Stage 1 D/DBP Rule	0.06
	Chlorite	Stage 1 D/DBP Rule	1
	Bromate	Stage 1 D/DBP Rule	0.01
Disinfection By-Product Precursors			
	Total Organic Carbon	Stage 1 D/DBP Rule	TT (% Removal)
Disinfectants			
	Chlorine (as Cl2)	Stage 1 D/DBP Rule	4 [5]
	Chloramines (as Cl2)	Stage 1 D/DBP Rule	4 [5]
	Chlorine Dioxide (as ClO2)	Stage 1 D/DBP Rule	0.8 [5]
Microbial			
	Giardia Lamblia	SWTR	TT (3-log Reduction)
	Legionella	SWTR	TT
	Viruses	SWTR	TT (4-Log Reduction)
	Disinfectant Residual	SWTR	TT (detectable)
	Fecal Coliform	TCR	TT (positive sample)
	E. Coli	TCR	TT (positive sample)
	Total Coliform	TCR	TT (<5% mo. samples pos., if >40 samples per month)
	Turbidity	IESWTR	TT (<0.3 in 95% CFE samples, <1 in 100% CFE)
	Cryptosporidium	IESWTR/ LT1ESWTR/ LT2ESWTR	TT (2-log Reduction)

[1] - Action Level
[2] - Based on 90th Percentile of Tap Water Samples
[3] - CDPH MCL lower than EPA, EPA remanded in 1995
[4] - Recommended/Upper/Short Term MCLs
[5] - Maximum Residual Disinfectant Level (MRDL)

Acronyms:
USEPA - United States Environmental Protection Agency
DDW - California Division of Drinking Water
MCL - Maximum Contaminant Level
NPDWR - National Primary Drinking Water Regulation
LCR - Lead and Copper Rule
MO - Monitored Only
TT - Treatment Technology
PAP - Polymer Addition Practices
D/DBP - Disinfectants and Disinfection By-Products
SWTR - Surface Water Treatment Rule
TCR - Total Coliform Rule
IESWTR - Interim Enhanced Surface Water Treatment Rule
CFE - Combined Filter Effluent

ATTACHMENT 2
Contaminant Candidate List 4

CONTAMINANT CANDIDATE LIST 4

MICROBIAL CONTAMINANTS

Adenovirus
Calicivirus
Campylobacter jejuni
Enterovirus
Escherichia coli (0157)
Helicobacter pylori
Hepatitis A virus
Legionella pneumophila
Mycobacterium avium
Naegleria fowleri
Salmonella enterica
Shigella sonnei

CHEMICAL CONTAMINANTS

Common name--registry name	CASRN
1,1,1,2-Tetrachloroethane	630-20-6
1,1-Dichloroethane[1]	75-34-3
1,2,3-Trichloropropane[2]	96-18-4
1,3-Butadiene	106-99-0
1,4-Dioxane[2]	123-91-1
1-Butanol	71-36-3
17-alpha estradiol	57910
2-Methoxyethanol	109-86-4
2-Propen-1-ol	107-18-6
3-Hydroxycarbofuran	16655-82-6
4,4'-Methylenedianiline	101-77-9
Acephate	30560-19-1
Acetaldehyde	75-07-0
Acetamide	60-35-5
Acetochlor	34256-82-1
Acetochlor ethanesulfonic acid (ESA)	187022-11-3
Acetochlor oxanilic acid (OA)	184992-44-4
Acrolein	107-02-8
Alachlor ethanesulfonic acid (ESA)	142363-53-9
Alachlor oxanilic acid (OA)	171262-17-2
alpha-Hexachlorocyclohexane	319-84-6
Aniline	62-53-3
Bensulide	741-58-2
Benzyl chloride	100-44-7
Butylated hydroxyanisole	25013-16-5
Captan[3]	133-06-2
Chlorate	14866683
Chloromethane (Methyl chloride)	74-87-3
Clethodim	110429-62-4
Cobalt	7440-48-4
Cumene hydroperoxide	80-15-9
Cyanotoxins (3)	
Dicrotophos	141-66-2
Dimethipin	55290-64-7

Common name--registry name	CASRN
Diuron	330-54-1
Equilenin	517099
Equilin	474862
Erythromycin	114078
Estradiol (17-beta estradiol)	50282
Estrinol	50271
Estrone	53167
Ethinyl estradiol (17-alpha ethinyl estradiol)	57636
Ethoprop	13194-48-4
Ethylene glycol[2]	107-21-1
Ethylene oxide	75-21-8
Ethylene thiourea	96-45-7
Formaldehyde[2]	50-00-0
Germanium	7440-56-4
Halon 1011	74975
HCFC-22	75-45-6
Hexane	110-54-3
Hydrazine	302-01-2
Manganese	
Mestranol	72333
Methamidophos	10265-92-6
Methanol	67-56-1
Methyl bromide (Bromomethane)	74-83-9
Methyl tert-butyl ether[1]	1634-04-4
Metolachlor	51218-45-2
Metolachlor ethanesulfonic acid (ESA)	171118-09-5
Metolachlor oxanilic acid (OA)	152019-73-3
Molybdenum	7439-98-7
Nitrobenzene	98-95-3
Nitroglycerin	55-63-0
N-Methyl-2-pyrrolidone	872-50-4
N-nitrosodiethylamine (NDEA) [2]	55-18-5
N-nitrosodimethylamine (NDMA) [2]	62-75-9
N-nitroso-di-n-propylamine (NDPA)	621-64-7
N-Nitrosodiphenylamine	86-30-6
N-nitrosopyrrolidine (NPYR)	930-55-2
Nonylphenol	
Norethindron (19-Noresthisterone)	68224
n-Propylbenzene[2]	103-65-1
o-Toluidine	95-53-4
Oxirane, methyl-	75-56-9
Oxydemeton-methyl	301-12-2
Oxyfluorfen	42874-03-3
Perfluorooctane sulfonic acid (PFOS)	1763231
Permethrin	52645-53-1
PFOA (perfluorooctanoic acid)	335-67-1
Profenofos	41198-08-7
Quinoline	91-22-5
RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)	121-82-4
Common name--registry name	**CASRN**
sec-Butylbenzene[2]	135-98-8
Tebuconazole	107534-96-3

Tebufenozide	112410-23-8
Tellurium	13494-80-9
Thiodicarb	59669-26-0
Thiophanate-methyl	23564-05-8
Toluene diisocyanate	26471-62-5
Tribufos	78-48-8
Triethylamine	121-44-8
Triphenyltin hydroxide (TPTH)	76-87-9
Urethane	51-79-6
Vanadium[2]	7440-62-2
Vinclozolin	50471-44-8
Ziram	137-30-4

[1]Primary Regulated Chemical in California
[2]Current Notification Level in California
[3]Archived Advisory Level in California

ATTACHMENT 3
OEHHA Public Health Goals

OEHHA PHGs

Chemical	California PHG (ppb)
1,1-Dichloroethane	3
1,1-Dichloroethylene	10
1,1,1-Trichloroethane	1000
1,2-Dibromoethane	0.01
1,2-Dibromo-3-chloropropane	0.0017
1,2-Dichloroethane	0.4
1,2-Dichloroethylene, cis	100
1,2-Dichloroethylene, trans	60
1,2-Dichloropropane	0.5
1,1,2-Trichloroethane	0.3
1,1,2,2-Tetrachloroethane	0.1
1,2,3-Trichloropropane	0.0007
1,2,4-Trichlorobenzene	5
1,2-Dichlorobenzene	600
1,3-Dichloropropene (Telone II®)	0.2
1,4-Dichlorobenzene	6
2,4-Dichlorophenoxyacetic acid	20
Alachlor	4
Aluminum	600
Antimony	1
Arsenic	0.004
Asbestos	$7x10^{-6}$ fibers/L
Atrazine	0.15
Barium	2,000
Bentazon	200
Benzene	0.15
Benzo[a]pyrene	0.007
Beryllium	1
Bromate	0.1
Cadmium	0.04
Carbofuran	0.7
Carbon Tetrachloride	0.1
Chlordane	0.03
Chlorite	50
Chlorobenzene	70
Chromium, Hexavalent	0.02
Copper	300
Cyanide	150
Dalapon	790
Dichloromethane	4
Diethylhexyl adipate	200
Diethylhexylphthalate (DEHP)	12
Dinoseb	14
Diquat	6
Endothall	94

OEHHA PHGs

Chemical	California PHG (ppb)
Endrin	0.3
Ethylbenzene	300
Ethylene dibromide	0.01
Fluoride	1,000
Glyphosate	900
Heptachlor	0.008
Heptachlor epoxide	0.006
Hexachlorobenzene	0.03
Hexachlorocyclopentadiene	2
Lead	0.2
Lindane	0.032
Mercury, inorganic	1.2
Methoxychlor	0.09
Methyl tertiary butyl ether (MTBE)	13
Molinate	1
N-Nitrosodimethylamine	0.003
Nickel	12
Nitrate	45,000 as NO_3
Nitrate and Nitrite	10,000 as N
Nitrite	1,000 as N
Oxamyl	26
Pentachlorophenol	0.3
Perchlorate	1
Picloram	166
Polychlorinated Biphenyls (PCBs)	0.09
Radium-226	0.05 pCi/L
Radium-228	0.019 pCi/L
Selenium	30
Silvex	3
Simazine	4
Strontium-90	0.35 pCi/L
Styrene	0.5
2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	0.00005 parts per trillion (ppt)
Tetrachloroethylene	0.06
Thallium	0.1
Thiobencarb	42
Toluene	150
Toxaphene	0.03
Trichloroethylene	1.7
Trichlorofluoromethane (Freon 11)	1,300
Trichlorotrifluoroethane (Freon 113)	4,000
Tritium	400 pCi/L
Uranium	0.43 pCi/L
Vinyl Chloride	0.05
Xylene	1,800