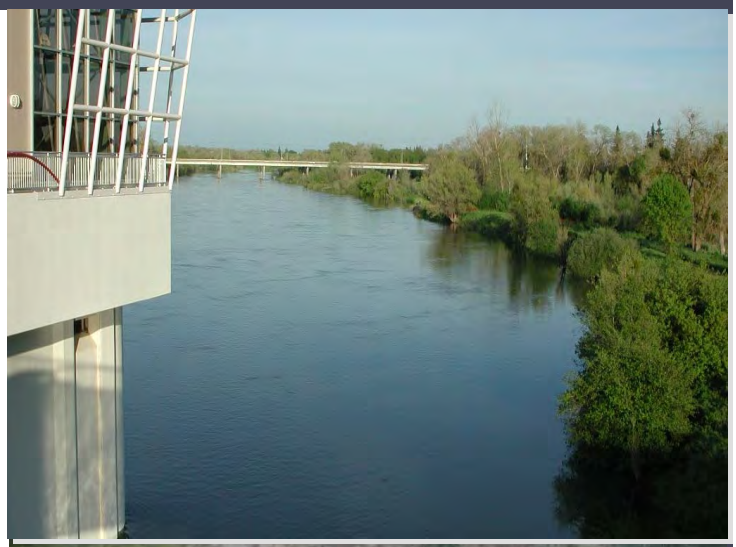
American River Watershed Sanitary Survey 2013 Update



December 2013

Prepared By

STARR CONSULTING

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AMERICAN RIVER WATERSHED SANITARY SURVEY
2013 UPDATE

December 2013

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LIST OF ABBREVIATIONS

AB – Assembly Bill
ACL – Administrative Civil Liabilities
ARPS – American River Pump Station
ARWTC – American River Watershed Technical Committee

BMP – Best Management Practice
BOD – Biological Oxygen Demand

CABY – Cosumnes, American, Bear, and Yuba Rivers
Cal EMA – California Emergency Management Agency
CalFIRE – California Department of Forestry and Fire Protection
Caltrans – California Department of Transportation
CAP – *Cryptosporidium* Action Plan
CCBN – California Clean Boating Network
CCC – California Coastal Commission
CCR – Consumer Confidence Report
CDO – Cease and Desist Order
CEQA – California Environmental Quality Act
CFE – combined filter effluent
CMP – Coordinated Monitoring Program
COC – Constituent of Concern
CREAT - Climate Resilience Evaluation and Assessment Tool
CSD – County Sanitation District
CSP – California State Prison
CT – Disinfection Contact Time
CUPA – Certified Unified Program Agency
CWD – Carmichael Water District

DBP – disinfection by-product
DBW – California Department of Boating and Waterways
D/DBP – Disinfectants/Disinfection By-Products
DDWEM – Division of Drinking Water and Environmental Management
DEIR – Draft Environmental Impact Report
DOC – Dissolved Organic Carbon
DPH – California Department of Public Health
DPR – California Department of Parks and Recreation
DTSC – California Department of Toxic Substances Control
DWP – Drinking Water Policy
DWR – California Department of Water Resources

EBC - Existing Biological Condition
EBMUD – East Bay Municipal Utility District
E. coli – Escherichia coli
EDH – El Dorado Hills
EID – El Dorado Irrigation District
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
ELT – Early Long Term
EMD – Environmental Management Department
ENF – Eldorado National Forest
EOC – Emergency Operations Center

°F – degrees Fahrenheit
FBR – fluidized bed reactor
FERC – Federal Energy Regulatory Commission
FSP – Folsom State Prison

GAC – granular activated carbon
GET – Groundwater Extraction and Treatment
GHG – greenhouse gases
GIF - Geospatial Innovation Facility
GIS – Geographic Information System
gpd – gallons per day
gpm – gallons per minute
GSWC – Golden State Water Company

HAA5 – haloacetic acids

IDSE – Initial Distribution System Evaluation
IESWTR – Interim Enhanced Surface Water Treatment Rule
IFE – individual filter effluent
IOC – inorganic compound
IPCC – Intergovernmental Panel on Climate Change
IRWMP – Integrated Regional Water Master Plan

JFP – Joint Federal Project

KOWC – Keep Our Waters Clean

LLT – Late Long Term
LRAA – locational running annual average
LUP - Linear Underground/Overhead Project
LT1ESWTR – Long Term 1 Enhanced Surface Water Treatment Rule

LT2ESWTR – Long Term 2 Enhanced Surface Water Treatment Rule

MCL – maximum contaminant level
MEP – Maximum Extent Practicable
mg – million gallon
mgd – million gallons per day
mg/L – milligrams per liter
MPN/100 mL – most probable number per 100 milliliters
MRP – Monitoring and Reporting Program Plan
MTBE – methyl tert-butyl ether
MVUM – Motor Vehicle Use Map

NAL – Numeric Action Level
ND – non-detect
NDMA – n-Nitrosodimethylamine
NE – not enumerated
NEL - Numeric Effluent Limitation
NEPA – National Environmental Protection Act
ng/L – nanograms/liter
NIMS – National Incident Management System
NL – Notification Level
NPDES – National Pollutant Discharge Elimination System
NPS – Non-Point Source
NTU – nephelometric turbidity unit

O&M – Operations and Maintenance
OES – California Office of Emergency Services
OHV – Off-Highway Vehicle
OU – Operable Unit

PCAs – Potential Contaminating Activities
PCD – Partial Consent Decree
PCE - tetrachloroethylene
PCWA – Placer County Water Agency
PG&E – Pacific Gas and Electric
PHG – Public Health Goal
PIER - Public Interest Energy Research

RAA – running annual average
RCD – Resource Conservation District
RCMP – River Corridor Management Plan
Regional Board – Central Valley Regional Water Quality Control Board
RI/FS – Remedial Investigation and Feasibility Study
RIMS – Response Information Management System
ROD – Record of Decision
RPF – Registered Professional Forester
RTMP – Rubicon Trail Master Plan

SASD – Sacramento Area Sewer District
SCADA – Systems Control and Data Acquisition
SCWA – Sacramento County Water Agency
SDWA – Safe Drinking Water Act
SEMS – Standardized Emergency Management System
sf – square foot
SFM – State Fire Marshall
SJWD – San Juan Water District
SM – Standard Method
SMARTS - Stormwater Multiple Application and Report Tracking System
SMP – Standard Monitoring Plan
SMUD – Sacramento Municipal Utility District
SOC – synthetic organic compound
SQIP – Stormwater Quality Improvement Plan
SRA – State Recreation Area
SRWSS – Sacramento River Watershed Sanitary Survey
SSMP – sewer system management plans
SSO – sanitary sewer overflow
SSQP – Sacramento Stormwater Quality Partnership
State Board – State Water Resources Control Board
SWMP – Stormwater Management Plan
SWPPP – Stormwater Pollution Prevention Plan
SWTR – Surface Water Treatment Rule

TAF – thousand acre feet
TAG – Technical Advisory Group
TC – Technical Committee
TCD – Temperature Control Device
TCE - trichloroethylene
THP – Timber Harvest Plan
TMDL – Total Maximum Daily Load
TMP – Timber Management Plan

TNF – Tahoe National Forest
TOC – total organic carbon
TON – threshold odor number
TRI – Toxic Release Inventory
TSS – total suspended solids
TTHM – total trihalomethanes

UAO – Unilateral Administrative Order
UC – University of California
µg/L – micrograms per liter
USBR – United States Department of Interior Bureau of Reclamation
USEPA – United States Environmental Protection Agency
USFS – United States Department of Agriculture Forest Service
UV – ultraviolet

VGP – Vessel General Permit
VOC – volatile organic compound

WCM – Water Control Manual
WDRs – Waste Discharge Requirements
WQMH - Water Quality Management Handbook
WRF – Water Reclamation Facility
WTP – water treatment plant
WWTP – wastewater treatment plant

GOALS OF THE 2013 UPDATE TO THE WATERSHED SANITARY SURVEY

This 2013 Update to the American River Watershed Sanitary Survey includes a review and evaluation of source and treated water quality and a review and evaluation of potential contaminating activities in the watershed. The primary goals of the 2013 Update are to confirm the appropriate level of treatment of the source water and evaluate regulatory compliance for the water treatment plants, to identify relationships between contaminant sources and source water quality, and to make reasonable recommendations to protect or improve source and treated water quality.

One of the primary uses of the American River is as a source of drinking water supply. The California Department of Public Health (DPH) requires all surface water supplies to conduct a watershed sanitary survey and then update that study every five years. This report; presents the information collected and the evaluations conducted, highlights key changes over the past five years, identifies key findings, and presents recommendations for source and treated water protection.

Eleven participating water utilities have jointly conducted this 2013 Update to the American River Watershed Sanitary Survey. The water diversion and treatment facilities are located throughout the watershed, from the headwaters in the high Sierra Nevada down to the confluence with the Sacramento River. **Figure 2-1** is a watershed map that shows the boundary of the watershed as well as the location of the water diversion facilities.

The study focuses on constituents of interest for drinking water purposes, including; turbidity, fecal coliform, *Escherichia coli* (*E. coli*), total organic carbon (TOC), disinfection by-products (DBPs), hexavalent chromium, n-Nitrosodimethylamine (NDMA), and other detected constituents that have a primary or secondary drinking water standard.

There are numerous activities in the watershed that have the potential to impact source water quality; these are referred to as potential contaminating activities (PCAs). For this study seven PCAs were identified to be investigated, including: forest activities, recreation, river corridor activities, source water spills, urban runoff, wastewater, and the Aerojet industrial facility.

PARTICIPATING WATER UTILITIES

Placer County Water Agency
El Dorado Irrigation District
San Juan Water District
City of Roseville
City of Folsom
Folsom State Prison
Golden State Water Company
Carmichael Water District
City of Sacramento
Sacramento County Water Agency
East Bay Municipal Utility District

In addition to evaluating the PCAs above, the participating water utilities also identified six special topics that would be investigated and discussed for informational purposes only including; population growth, the Cosumnes, American, Bear, and Yuba (CABY) Integrated Regional Water Master Plan (IRWMP), the Central Valley Regional Water Quality Control Board's (Regional Board) Drinking Water Policy, climate change, potential for selected invasive species growth, and potential for reservoir operational changes.

SIGNIFICANT CHANGES DURING PAST FIVE YEARS

Two of the participating water utilities implemented changes during the past five years related to water treatment plant upgrades and expansions. All of the participating water utilities are in various stages of converting to the requirements of the Stage 2Disinfectants/Disinfection By-Products (D/DBP) Rule. There has been a resurgence of recreators in the watershed during the study period. Finally, the two wastewater treatment plants discharging to the American River have completed major upgrades.

FINDINGS

Water Quality

The American River provides source water that is an excellent supply for drinking water. There are no persistently detected contaminants and the source water can be treated effectively with direct, conventional, alternative treatment, or membrane filtration.

Source water quality is generally low in solids, with average turbidity levels ranging from 1.9 nephelometric turbidity units (NTU) to 23.1 NTU. This can vary during storm events when levels peak and show a distinct increasing trend from upstream to downstream. All of the water treatment plants comply with the treated water turbidity standards of the Interim Enhanced Surface Water Treatment Rule (IESWTR) and overall solids removal ranges from 97.8 to 99.9 percent, well exceeding the 80 percent required.

The microbial quality of the water is also very good. Fecal coliform and *E. coli* levels are relatively low, with median raw water values ranging from 2 to 30 most probable number per 100 milliliters (MPN/100 mL). Average levels are typically higher, caused by peaking during storm events. Three intakes show localized impacts affecting source water quality: Strawberry Water Treatment Plant (WTP), Reservoir One WTP, and Coloma/Pyrites WTPs. The causes are uncertain, but may be associated with upstream residence facilities, off-stream canals, and waterfowl at Lake Natoma, respectively. The fecal coliform and *E. coli* data supports that the appropriate level of treatment for the American River supply continues to be 3/4/2-log *Giardia*/virus/ *Cryptosporidium* reduction. Golden State Water Company (GSWC) is required to provide an additional log reduction of *Giardia* and viruses at the Coloma and Pyrites WTPs if total coliform monthly medians exceed 1,000 MPN/100 mL, which occurred in 40 percent of months during the study period.

The organic content in the American River supply has remained low, with average levels of TOC ranging from 0.97 to 1.9 milligrams per liter (mg/L). No water treatment plants trigger enhanced coagulation requirements for removal of TOC. A review of the DBP results in the distribution system for total trihalomethanes (TTHM) and haloacetic acids (HAA5) show that all water systems have met the Stage 1 D/DBP Rule maximum contaminant levels (MCLs), except for two events in EID's Strawberry system. A review of the data, as compared to the upcoming Stage 2 D/DBP Rule MCLs, indicates that most systems should be able to comply with the new locational running annual average (LRAA), but some systems may need to identify management strategies to assist with compliance.

A review of the Consumer Confidence Reports (CCRs) for each of the participating water utilities indicates that there are currently no other persistently detected constituents of interest. There were two other MCL violations; manganese at the Folsom WTP and total coliform in the Cordova distribution system. A review of the Sacramento Coordinated Monitoring Program data along the Lower American River, in urban creeks, and from urban runoff discharge points resulted in a few constituents being detectable at levels of interest, but generally at very low levels; n-Nitro-di-n-propylamine was detected at Nimbus Dam above its Notification Level, bis (2-ethylhexyl) phthalate was detected at Discovery Park above its primary MCL, and total iron was detected above its secondary MCL.

Three participating water utilities have conducted raw water monitoring for hexavalent chromium and all results were less than 0.2 micrograms per liter (µg/L), well below the currently proposed MCL of 10 µg/L. Five participating water utilities have sampled treated American River water for NDMA and all results were less than 8 nanograms per liter (ng/L), below the current Notification Level of 10 ng/L.

An assessment of the temperature and DBP data for San Juan Water District (SJWD) was conducted to determine if the Temperature Control Device (TCD) has had an impact on the source and treated water quality. The TCD is the variable-elevation outlet diversion structure at Folsom Lake for the municipal diverters. The data show that the water temperature has increased significantly, nearly five degrees Fahrenheit, since operation of the TCD in June 2003. In addition, the data show that the duration of peak water temperatures increased from one to three months, typically in the late summer. Since the operation of the TCD, the distribution system levels of DBPs increased by 37 percent for TTHM and by 20.6 percent for HAA5; both values are still well below the respective MCLs. There was no increase in other related water quality constituents so there is a likelihood that operation of the TCD resulted in a significant increase in distribution system DBP levels.

Watershed Contaminant Sources

Forest activities, including timber harvesting, wildfires, and off-highway vehicle (OHV) use, are non-point sources of contamination. These activities are largely present in the upper watershed and have various management authorities. Timber harvesting is more significant in El Dorado County, and therefore is more likely to impact the South Fork American River. Four

major wildfires occurred during the study period and burned nearly 25,000 acres. There has been increased management and regulation of all three forest activities by the administering agencies. Examples include renewal of the Waiver of Waste Discharge Requirements for Timber Harvest Activities from the Regional Board, revisions to the United States Forest Service (USFS) Water Quality Management Handbook, and the Motor Vehicle Use Maps for the USFS.

Recreation is a predominant activity throughout the watershed. Whitewater rafting occurs on all major river reaches, but is most significant along the South Fork American River. During the study period the use trend reversed and is now again increasing, showing that peak use is now up to 84 percent of the carrying capacity of the river. Also, visitorship to Auburn State Recreation Area (SRA) and Folsom Lake SRA increased substantially, over 50 percent. The Marshall Gold Discovery State Historic Park continued reductions in use. Some participating water utilities continue to support the "Keep Our Waters Clean" and "Pups on the Parkway" campaigns, which continue to be effective public education efforts. The General Plan/ Resource Management Plan for Folsom Lake SRA was finalized and continues to include a proposal for expansion of motorized boating at Folsom Lake.

The river corridor has three activities of interest: goose management at Lake Natoma, pet waste management, and illegal camping. Golden State Water Company (GSWC) diverts water from the Folsom South Canal, out of Lake Natoma, and sees peak levels of coliform in the source water during the spring and fall which do not correlate to any other PCA and may be related to the goose waste. Dog walking is a popular past-time in the American River Parkway that contributes large amounts of waste deposited in the floodplain. The creation of the "Pups on the Parkway" campaign resulted in 12 pet waste stations installed for public use. Illegal camping is primarily a result of the unsheltered homeless population along the lowest three miles of the Lower American River. Research by Community Link shows that the unsheltered population of homeless in Sacramento County has decreased 25 percent during the study period.

A review of the California Emergency Management Agency (Cal EMA) spill database showed that there were 182 spills reaching the American River during the study period. Thirteen of those were determined to be potentially significant, and the majority was related to wastewater spills. The participating water utilities have implemented a voluntary spill notification program, which includes the wastewater agencies, to provide for direct notification to the water utilities in the event of a discharge to the American River or its tributaries.

There is limited urban runoff in the upper watershed, while the lower watershed is primarily an urban landscape with significant runoff into the Lower American River. The Regional Board regulates stormwater through National Pollutant Discharge Elimination System (NPDES) permits. There are municipal separate storm sewer system permits (Phase I and Phase II MS4), industrial permits, and construction permits issued in the watershed. There is also a Caltrans statewide permit covering its Phase I MS4 requirements and construction activities. The Sacramento Stormwater Quality Partnership (SSQP) manages discharge to the Lower American River from its permitted area and has a large program to implement best management

practices, conduct public outreach, study target pollutants, and conduct monitoring programs. Of greatest interest are the levels of microbials, TOC, and total iron in the urban runoff.

There are two NPDES permitted wastewater discharges in the upper watershed; the cities of Colfax and Placerville. Both facilities have been expanded and upgraded to minimize impacts to receiving waters. The septic systems located along the South Fork American River upstream of Strawberry have been historically identified as a potential concern; current *E. coli* data evaluated in this study continues to support their potential impact to surface water quality. Unpermitted discharges, spill events, also occurred from the various wastewater collection systems located throughout the watershed.

Aerojet General Corporation is a superfund site that is conducting groundwater remediation. Aerojet extracts and treats the groundwater and then a portion is discharged to the American River or its tributaries. During the study period the permitted discharge flow was increased 8 million gallons per day (mgd), up to 33.6 mgd. The constituents of concern include volatile organic compounds (VOCs), perchlorate, NDMA, and 1,4-dioxane. The facilities and their discharges are NPDES permitted through the Regional Board and effluent limits are equal to or less than drinking water standards. Aerojet is required to monitor effluent and receiving waters monthly to ensure that treatment systems are working and meeting effluent limitations. There were incidents of permit violations that resulted in notifications to Carmichael Water District (CWD) and the City of Sacramento. These failures have resulted in more comprehensive operations and maintenance procedures at the facilities.

RECOMMENDATIONS

The American River Watershed Sanitary Survey 2013 Update developed sixteen recommendations based on the findings of the study, which are presented in **Table ES-1**. The findings focus on assisting the participating water utilities with meeting all drinking water treatment and regulatory compliance goals, identify opportunities for coordination with outside agencies to address potential source water quality impacts, and encourage the implementation of effective stakeholder activities to protect source water quality. Recommendations may be implemented by the participating water utilities as they have resources available.

TABLE ES-1
2013 Update Recommendations

Recommendation	Applies To
Continue to optimize treatment and distribution processes. Optimization may include: ➢ Monitoring source water quality. ➢ Conducting regular equipment inspection and maintenance. ➢ Optimizing facility controls such as; flow, coagulant type, loading rates, backwash procedures, and disinfection. ➢ Coordinating with distribution system operations and maintenance to preserve treated water quality and minimize degradation.	All Participating Utilities
Conduct a second round of source water monitoring in accordance with United States Environmental Protection Agency (USEPA) guidance. Utilities will either conduct *Cryptosporidium* (plus *E. coli* and turbidity) or *E. coli* sampling, depending on system size. Those collecting *Cryptosporidium* samples should consider utilizing an analytical method that will provide results for *Giardia* as well to create a comprehensive data set.	All Participating Utilities
Ensure that monitoring plans are in place which account for regulation-specific monitoring requirements and that samples are collected at consistent periods.	All Participating Utilities
Continue to investigate high DBP levels in the distribution system for the Strawberry WTP.	EID
Consider revising the location for the source water coliform monitoring at the Bajamont WTP to post-Ranney Collectors.	CWD
Consider converting to Standard Method 5310 C (oxidation method) for TOC analysis at the Folsom State Prison WTP.	FSP

TABLE ES-1 Cont'd
2013 Update Recommendations

Recommendation	Applies To
Continue to maintain voluntary direct notification and inter-notification procedures established by the ARWTC and supplemented on the Lower American River. Periodically check the currency of the contacts and notification agreements and conduct periodic dry-runs to test and improve the procedures.	American River - All Participating Utilities Lower American River – CWD, City of Sacramento, SCWA, EBMUD
Consider utilizing the Regional Board's Drinking Water Policy Implementation Policy if LT2ESWTR *Cryptosporidium* monitoring results in a Bin 2 classification at a water treatment plant.	All
Continue to support the Keep Our Waters Clean (KOWC) campaign.	Folsom, SJWD, Roseville, CWD, City of Sacramento, SCWA, and EBMUD (Future consideration for EID, Folsom State Prison and GSWC)
Continue to support the Pups on the Parkway program.	GSWC, CWD, City of Sacramento, SCWA, and EBMUD
Consider communicating with the United States Bureau of Reclamation (USBR)/ California DPR on impacts to drinking water supplies of increasing marina space and dredging activities at Folsom Lake.	City of Folsom, Folsom State Prison, City of Roseville, SJWD, GSWC, CWD, City of Sacramento, SCWA, and EBMUD

TABLE ES-1 Cont'd
2013 Update Recommendations

Recommendation	Applies To
Consider to communicate with, or continue to communicate with, the USBR and the United States Army Corps of Engineers (USACE) on possible operational revisions at Folsom Dam.	City of Folsom, Folsom State Prison, City of Roseville, SJWD, GSWC, CWD, City of Sacramento, SCWA, and EBMUD
Continue to track events at the Aerojet site, receive notification for discharges, and act as an active stakeholder with regard to USEPA and Regional Board permitting.	CWD, City of Sacramento, SCWA, EBMUD
Continue stakeholder participation in the CABY IRWMP and consider development of source water protection projects to implement. Consider coordinating efforts with the ARWTC.	PCWA and EID
Consider coordinating with the SSQP to discuss key drinking water issues, such as organic carbon, pathogens, and metals.	CWD, City of Sacramento, SCWA, and EBMUD
Continue coordination with CalFIRE and USFS when wildfires impact drinking water sources.	PCWA and EID

This report presents the findings of the 2013 Update to the American River Watershed Sanitary Survey (2013 Update). This fourth update covers the period of January 2008 through December 2012. The initial watershed sanitary survey was completed in 1993 (1993 Survey), the first update was completed in 1998 (1998 Update), the second update was completed in 2003 (2003 Update), and the third update was completed in 2008 (2008 Update) in accordance with the California Surface Water Treatment Rule (SWTR).

This section provides a list of the participating water utilities, identifies the objectives of the study, presents the constituents and topics covered in the update, generally describes the conduct of the study, and provides the outline of the report.

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

PARTICIPATING WATER UTILITIES

The 2013 Update was jointly conducted by eleven participating water utilities. These utilities are listed in **Table 1-1**. The utilities also participated in preparation of the original survey and updates. Together these utilities are herein referred to as the participating water utilities.

Table 1-1
List of Participating Water Utilities

Participating Water Utility	Water Treatment Plant (WTP) or Diversion Included
Placer County Water Agency	Foothill WTP/ American River Pump Station
El Dorado Irrigation District	Strawberry WTP
	Reservoir One WTP
	El Dorado Hills WTP
San Juan Water District	Sidney N. Peterson WTP
City of Roseville	Roseville WTP
City of Folsom	Folsom WTP
Folsom State Prison	Folsom State Prison WTP
Golden State Water Company	Coloma WTP
	Pyrites WTP
Carmichael Water District	Bajamont WTP
City of Sacramento	E. A. Fairbairn WTP
Sacramento County Water Agency	Freeport Diversion
East Bay Municipal Utility District	Freeport Diversion

The participating water utilities participate informally in the American River Watershed Technical Committee (ARWTC). This includes meeting a few to several times per year to coordinate efforts on source water protection, water quality, and information sharing. This group implements the American River Voluntary Spill Notification Program.

Another subset is the Lower American River partners which implement the Lower American River Source Water Protection Program, including Carmichael Water District, the City of Sacramento, Sacramento County Water Agency, and East Bay Municipal Utilities District. These agencies work together to implement additional follow up to the Watershed Sanitary Surveys. A highlight of the accomplishments of this program during this period was receiving the American Water Works Association (AWWA) California/Nevada Section's 2010 Exemplary Source Water Protection Award (jointly with the Sacramento River Source Water Protection Program Partners). In addition, the City of Sacramento was nominated for, and received, the 2012 AWWA Exemplary Source Water Protection Program award for metropolitan-sized system.

OBJECTIVES OF THE UPDATE

The overall objective of this 2013 Update is to assess the source water quality of the American River to ensure that the existing water treatment plants continue to produce drinking water that meets all drinking water standards.

A watershed sanitary survey focuses on the first barrier to contamination of the drinking water supply, namely 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. An evaluation of water treatment plant capabilities and treated water quality provides an assessment of the ability of the participating water utilities to treat the American River source water. Therefore, certain aspects of the second barrier (water treatment plant) are also evaluated in relationship to water quality.

This 2013 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 utilities conduct a watershed 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 for the study period, 2008 through 2012, 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. Development of recommendations for water 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 potential 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. Development of recommendations for watershed management actions that are economically feasible and within the authority of the participating water utilities to implement is critical. Of importance is to focus on 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 2013 UPDATE

Several water quality constituents were selected for evaluation as part of the 2013 Update. **Table 1-2** presents a summary of the water quality constituents selected and the reason for selection.

Seven potential contaminating activities were selected for review as part of the 2013 Update:

- Forest activities, including timber harvesting, forest fires, and off-highway vehicle use,
- Recreation, including body and non-body contact,
- River corridor activities, including goose management at Lake Natoma, pet waste management, and illegal camping,
- Source water spills,
- Urban runoff,
- Wastewater collection and treatment facilities, and
- Aerojet industrial facility.

Each of these activities is a potential source for at least one of the constituents identified in **Table 1-2**. There is also a discussion on watershed management programs that support source water protection, and in which the participating water utilities may have the opportunity to network or participate.

In addition, six special topics were identified for investigation and summary. This included projected population growth in the watershed, upper watershed management programs, the Central Valley Regional Water Quality Control Board's (Regional Board) Drinking Water Policy, climate change, selected invasive species, and reservoir operations. These topics are summarized only for informational purposes.

Table 1-2
Water Quality Constituents Selected for Evaluation as Part of the 2013 Update

Constituent	Reason for Inclusion in 2013 Update
Turbidity	Turbidity is a measurement of suspended solids in water. Treated water turbidity levels are regulated in the SWTR and the IESWTR.
Fecal Coliform	Source water fecal coliform is a surrogate for fecal contamination.
Escherichia coli (E. coli)	The United States Environmental Protection Agency (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. Actual source water levels of *Cryptosporidium* are used to determine treatment requirements as part of 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 in the Stage 1 Disinfectant/Disinfection By-Product (D/DBP) Rule.
Total Trihalomethanes	Total trihalomethanes (TTHM) are disinfection by-products formed in treated water. Treated water levels are regulated by the Stage 1 D/DBP Rule and the Stage 2 D/DBP Rule.
Haloacetic Acids	Haloacetic acids (HAA5) are disinfection by-products formed in treated water. Treated water levels are regulated by the Stage 1 D/DBP Rule and the Stage 2 D/DBP Rule.
Detectable Title 22 Constituents of Interest	Utility and ambient monitoring program data were reviewed to identify detectable constituents which are regulated for drinking water. This resulted in a presentation of selected organic compounds data.
Hexavalent Chromium and NDMA	Utility monitoring program data were reviewed for hexavalent chromium and n-Nitrosodimethylamine (NDMA) results. Hexavalent chromium will have a California primary drinking water standard in 2014, and NDMA currently has a Notification Level. This resulted in a presentation of available data.

SUMMARY OF HOW THE 2013 UPDATE WAS CONDUCTED

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

The consultant team obtained information from all water treatment plants through a utility survey that addressed each treatment plant's processes, including a discussion of treatment challenges and changes since the 2008 Update. The participating water utilities provided raw and treated water data as well as information on their actions relevant to recommendations from the 2008 Update. Water quality data was also obtained from several ambient monitoring programs to supplemental information from the water treatment plants.

The consultant team collected information on the seven potential contaminating activities reviewed in this report through literature reviews, Internet searches, and discussions with various agencies' staff. A list of agency contacts and a bibliography are provided in **Appendix A**. This data was reviewed to identify conditions of interest and relationships to source water quality, review source water protection activities, and identify significant changes since the 2008 Update.

REPORT ORGANIZATION

Section 1 - Introduction

This section identifies the participating water utilities that funded the study, describes the objectives of the 2013 Update, lists the main topics and constituents covered in the 2013 Update, describes how the 2013 Update was conducted, and includes a description of the basic report organization. **Appendix A** provides a list of contacts and a bibliography.

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. For more detailed descriptive information on watershed characteristics, the reader is referred to the 1993 Survey and the 1998 Update.

Section 3 – American 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. This includes the ambient monitoring data from other organizations. 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'

intake 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 seven potential contaminating activities that were reviewed as part of this update, as well as an update on the participating water utilities related source water protection efforts. Also included are discussions on the six special topics identified for this study. **Appendix D** contains materials related to the potential contaminating activities and watershed management programs.

Section 5 - Individual Intake Evaluations

This section contains an evaluation of the twelve included water treatment plants' treated water quality, as well as an evaluation of each water treatment plant's ability to meet the SWTRs as well as other existing regulations and selected future regulations.

Section 6 - Findings and Recommendations

This section presents the key findings for the 2013 Update report and a list of recommendations for the participating water utilities. Significant changes since the 2008 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 1993 Survey. For a more detailed account of this information, the reader is referred to the 1993 Survey and the 1998 Update. This section provides a brief description of the overall watershed, both upper and lower, and the water diversion and treatment facilities, including a summary of significant changes since the 2008 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

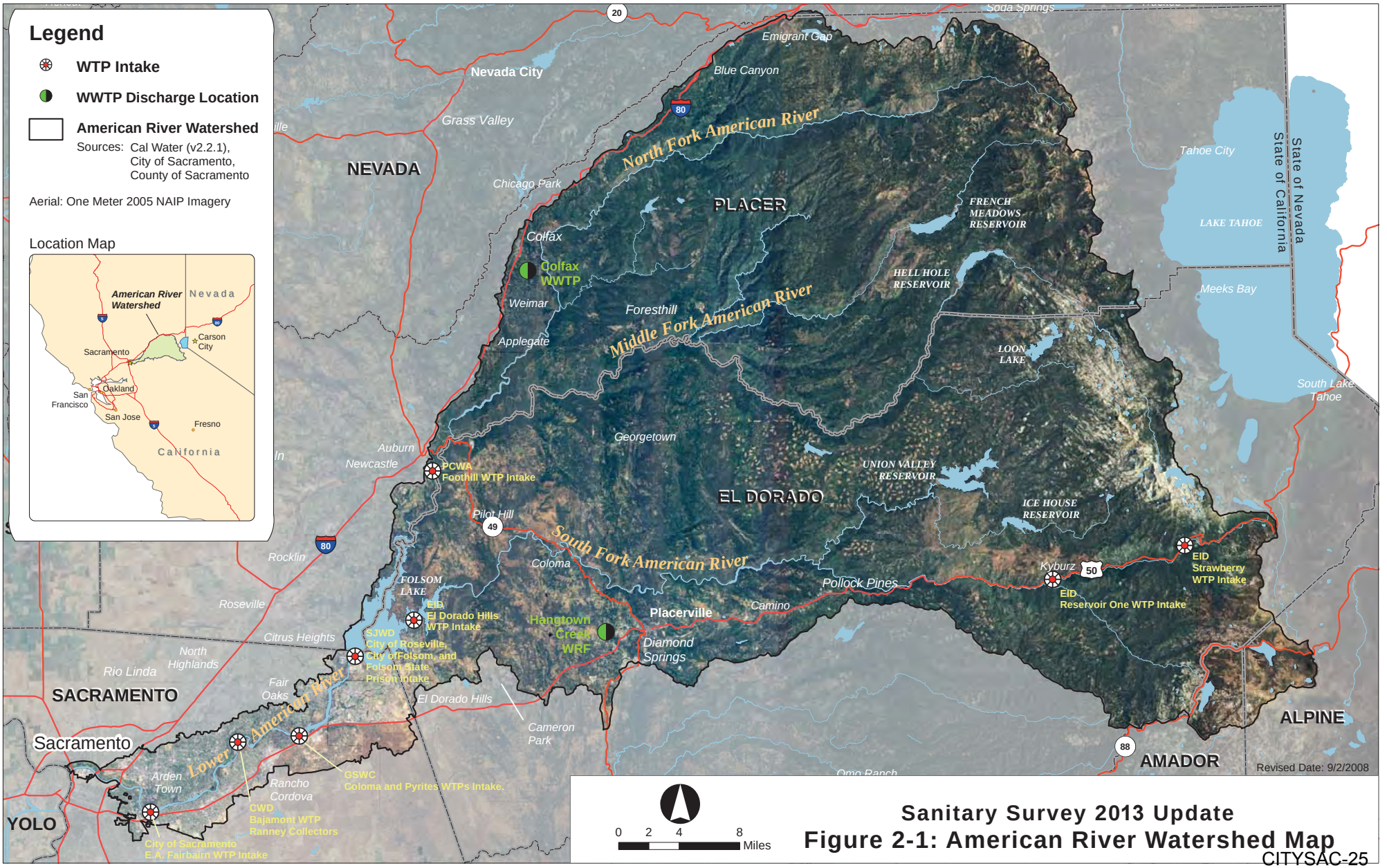
All of the participating water utilities utilize water from the American River. The watershed has a total area of 1,975 square miles and is located on the western slope of the Sierra Nevadas in Nevada, Placer, El Dorado, Alpine, Amador, and Sacramento counties. A Geographic Information System (GIS) watershed map was developed as part of the 2008 Update and is provided as **Figure 2-1;** see following page.

The American River watershed climate is temperate and is characterized by wet winters and dry summers. Most of the annual precipitation occurs between November and April as both rain and snow. Annual precipitation varies throughout the watershed depending on elevation; peak amounts occur in the high Sierras at over 80 inches to less than 20 inches in Sacramento. The annual snowpack at the higher elevations acts as a natural reservoir, releasing water over the spring and summer months. Water is collected and transported in a variety of creeks, rivers, reservoirs, and canals. The water is currently distributed from various locations throughout the watershed to the twelve water treatment plants for the participating water utilities.

The watershed is principally divided into an upper and lower watershed. The upper watershed consists of the area located upstream of Folsom Lake, and the lower watershed is the area located downstream of Folsom Lake. Provided below is a brief description of the upper and lower watersheds.

Upper Watershed

The American River above Folsom Lake has a watershed that is approximately 1,860 square miles, with elevations ranging from 484 feet at Folsom Lake to over 10,000 feet in the high Sierras. It is located in Nevada, Placer, El Dorado, Alpine and Amador counties. Vegetation varies throughout the upper watershed primarily due to elevation changes. From west to east, the vegetation at Folsom Lake is characterized by grasslands which lead to oak-studded grasslands and then into coniferous forests. The highest elevations of the watershed are above the tree line. Large portions of the upper watershed are National Forests (Tahoe and Eldorado). There is limited urbanization in the upper watershed and significant open space. The principal



Sanitary Survey 2013 Update

Figure 2-1: American River Watershed Map

potential contaminating activities in the upper watershed are timber harvesting and year-round recreation.

The upper watershed includes several large lakes (French Meadows, Hell Hole, Loon, Union Valley, Ice House, and Folsom), numerous small lakes (Lake Valley, Clementine, Stumpy Meadows, Caples, and Silver), and several key creeks and rivers (North, Middle, and South forks of the American River and the Rubicon River). In addition to providing drinking water supply, these water facilities are used for other purposes including flood control, power generation, and recreation.

Lower Watershed

The American River below Folsom Lake has a watershed that is approximately 115 square miles, with elevations ranging from 18 feet at the confluence with the Sacramento River to 484 feet at Folsom Dam. It includes drainage areas in El Dorado and Sacramento counties. Urban landscaping dominates the lower watershed with little native grasslands remaining below Folsom Lake. The principal uses in the lower watershed are urbanization (including residential, commercial, and industrial uses) and year-round recreation (especially within Lake Natoma and the American River Parkway).

The lower watershed is centered on the Lower American River, which consists primarily of releases from Folsom Lake. The releases are controlled by the United States Bureau of Reclamation (USBR) and pass through Lake Natoma prior to passing onto the Lower American River and Folsom South Canal. Lake Natoma and the Lower American River also receive local drainage from numerous urban creeks (Willow, Alder, Buffalo, Minnesota, Carmichael, Strong Ranch Slough, and Chicken Ranch Slough), as well as direct urban runoff.

THE WATER DIVERSION AND TREATMENT SYSTEMS

Placer County Water Agency (PCWA)

PCWA owns and operates one water treatment plant that utilizes American River water supply seasonally, the Foothill Water Treatment Plant (WTP). Water from the American River is diverted a few miles downstream of Auburn at the American River Pump Station and pumped into Pacific Gas and Electric's (PG&E) South Canal which flows to the intake of the Foothill WTP. The Foothill WTP consists of two treatment plants; see below. The Foothill WTP feeds water into the Foothill distribution system.

Foothill 1 Water Treatment Plant (40 mgd)

Under normal operating conditions, the plant is fed raw water from PG&E's South Canal which carries Yuba/Bear River water. The plant can also be fed from the Boardman Canal, also carrying Yuba/Bear River water, or from the American River via the South Canal during periods when the PG&E Bear River canal is down for maintenance. Foothill 1 WTP is a ballasted

clarification water treatment plant that consists of two individual Actiflo® trains. The plant design flow is 40 million gallons per day (mgd), with an average winter flow of 10 mgd and an average summer flow of 30 mgd. The Foothill 1 WTP changed disinfectant from chlorine gas to sodium hypochlorite feed, added pre-caustic soda feed, and added a multi-purpose chemical feed system during the study period.

Foothill 2 Water Treatment Plant (15 mgd in standard mode, 18.26 in direct filtration mode)

The Foothill 2 WTP is supplied the same water supply as Foothill 1 WTP. Foothill 2 is classified as a conventional water treatment plant for flows up to 15 mgd and as a direct filtration plant for flows between 15 and 18 mgd, consisting of pre-chlorination, coagulation/ flocculation, sedimentation, gravity filtration, and post-chlorination. The plant design flow is 15 mgd, with an average winter flow of seven mgd and an average summer flow of 15 mgd. This flow can be increased to 18 mgd during summer demands, which changes its classification to a direct filtration plant. The Foothill 2 WTP upsized its raw water pipeline, changed disinfectant from chlorine gas to sodium hypochlorite feed, added pre-caustic soda feed, and added a multi-purpose chemical feed system during the study period.

El Dorado Irrigation District (EID)

EID owns and operates three water treatment plants that utilize American River water supply: Strawberry WTP, Reservoir One WTP, and El Dorado Hills WTP. A summary of each of these is presented below. Strawberry WTP serves the Strawberry water system, while the Reservoir One and El Dorado Hills WTPs both serve EID's Main water system.

Strawberry Water Treatment Plant

The Strawberry WTP is located adjacent to the South Fork of the American River and diverts directly off the river in the community of Strawberry. Strawberry is a membrane microfiltration water treatment plant, utilizing membrane microfiltration and post-chlorination. The plant design flow is 100 gallons per minute (gpm), with flows normally varying from 70 to 90 gpm.

Reservoir One Water Treatment Plant

The Reservoir One WTP is located in the community of Pollock Pines. Water is diverted from the South Fork of the American River near Kyburz into the El Dorado Canal. It travels approximately 22 miles to Forebay Reservoir in Pollock Pines and then into the Main Canal approximately three miles to the Reservoir One WTP. Reservoir One WTP is a conventional filtration water treatment plant, utilizing pre-chlorination, coagulation/sedimentation, filtration, and post-chlorination. The plant design flow is 26 mgd, with winter flows ranging from six to 13 mgd and summer flows ranging from 20 to 26 mgd.

El Dorado Hills Water Treatment Plant

The El Dorado Hills WTP is located in the community of El Dorado Hills, just south of Folsom Lake. Water is diverted from Folsom Lake near the confluence with the South Fork of the American River. El Dorado Hills is an approved alternative filtration technology water treatment plant, utilizing pre-chlorination, ballasted media upflow clarification, filtration, and post-chlorination. The plant design flow is 19.4 mgd, with winter flows ranging from two to six mgd and summer flows ranging from eleven to 19.4 mgd.

City of Folsom

The City of Folsom owns and operates one water treatment plant that utilizes American River water supply, Folsom WTP. Water from the Folsom Lake is diverted at Folsom Dam through the Temperature Control Device (TCD) and pumped direct to the water treatment plant. The Folsom WTP consists of conventional filtration and sodium hypochlorite disinfection; see below. The Folsom WTP feeds water into the City's distribution system.

Folsom Water Treatment Plant

The Folsom WTP is located in the City of Folsom. Water is diverted from Folsom Lake at the Dam. Folsom is a conventional filtration water treatment plant. The plant utilizes pre-chlorination, coagulation/sedimentation, filtration, and post-chlorination. The plant design flow is 40 mgd, with an average winter flow of 14 mgd and an average summer flow of 32 mgd.

Folsom State Prison (FSP)

FSP owns and operates one water treatment plant that utilizes American River water supply, Folsom State Prison WTP. Water from the Folsom Lake is diverted at Folsom Dam through the TCD and pumped direct to the water treatment plant. The Folsom State Prison WTP consists of direct filtration and chlorine disinfection; see below. The Folsom State Prison WTP feeds water into the Prison's distribution system.

Folsom State Prison Water Treatment Plant

The Folsom State Prison WTP is located at the Prison, located in Represa, which is located on the south side of Lake Natoma below Folsom Dam. Water is diverted from Folsom Lake at the Dam. Folsom State Prison is a direct filtration water treatment plant. The plant utilizes a two-stage Micro-floc package plant with chlorine disinfection. The plant design flow is four mgd, with an average winter flow of 1.5 mgd and an average summer flow of 1.9 mgd.

San Juan Water District (SJWD)

SJWD owns and operates one water treatment plant that utilizes American River water supply, Sidney N. Peterson WTP (Peterson WTP). Water from the Folsom Lake is diverted at Folsom Dam through the TCD and flows by gravity or is pumped directly to the water treatment plant. The Peterson WTP is a conventional water treatment plant complete with conventional filtration and chlorine disinfection; see below. The Peterson WTP feeds water into the SJWD distribution system and several consecutive systems.

Sidney N. Peterson Water Treatment Plant

The Peterson WTP is located in the community of Granite Bay, just north of Folsom Lake. Water is diverted from Folsom Lake at the Dam. The plant design flow is 120 mgd, which applies from November 1 through May 14 of each year, and with CDPH approval, a flow of 150 mgd from May 15 through October 31 of each year. The average winter flow is 29 mgd and the average summer flow is 73 mgd. Peterson WTP is classified as a conventional filtration water treatment plant. The plant utilizes pre-chlorination, coagulation/sedimentation with tube settlers, filtration, and post-chlorination. SJWD made several improvements to the Peterson WTP during the study period, including; raw water pipeline improvements, rehabilitation of the sedimentation basin walls, replacement of the tube settlers and upgrade of launderers, replacement caulking in filter basins, a new filter effluent pipe, chlorine system improvements, conversion of the primary coagulant to an aluminum sulfate/2 percent cationic blend, and generator and supervisory control and data acquisition replacements.

City of Roseville

The City of Roseville owns and operates one water treatment plant that utilizes American River water supply, Roseville WTP. Water from the Folsom Lake is diverted at Folsom Dam through the TCD and pumped direct to the water treatment plant. The Roseville WTP consists of conventional filtration and chlorine disinfection. The Roseville WTP feeds water into the City's distribution system.

Roseville Water Treatment Plant

The Roseville WTP is located in proximity to the City of Roseville, in the community of Granite Bay. Water is diverted from Folsom Lake at the Dam. Roseville is a conventional filtration water treatment plant. The plant has two parallel process trains. Both utilize pre-chlorination, one train implements horizontal flow coagulation/sedimentation while the other train implements upflow clarification, and both trains provide filtration, post-chlorination and fluoridation. The plant design flow is 100 mgd, with an average winter flow of 16 mgd and an average summer flow of 36 mgd.

Golden State Water Company (GSWC)

GSWC owns and operates two water treatment plants that utilize American River water supply: Coloma and Pyrites WTPs. Water from the American River is diverted out of the Folsom South Canal and feeds both water treatment plants. The water in the Folsom South Canal is diverted out of Lake Natoma just upstream of Nimbus Dam. The Coloma and Pyrites WTPs are located on the same property but are independent processes which are treated as separate plants; see below. The two plants combined produce a winter average flow of 5.3 mgd and a summer average flow of 11.5 mgd. Both water treatment plants feed water into the Cordova distribution system.

Coloma Water Treatment Plant

The Coloma WTP is located in Rancho Cordova. Water is diverted from the Folsom South Canal downstream of the diversion from Lake Natoma. The plant utilizes coagulation/sedimentation and pressure filtration followed by chlorine disinfection. Coloma WTP is classified as an alternative technology because of undersized flocculation and sedimentation basins that do not fall under either traditional direct or conventional treatment. The plant design flow is 10.7 mgd.

Pyrites Water Treatment Plant

The Pyrites WTP is located in Rancho Cordova. Water is diverted from the Folsom South Canal downstream of the diversion from Lake Natoma. Pyrites consists of two US Filter Actifloc® package plants operating in parallel which are considered by DPH as alternative technology that is equivalent to direct filtration. Each package plant employs a four stage microsand ballasted clarification pretreatment process followed by rapid sand gravity filtration. The plant design flow is 3,500 gpm, with average flows ranging from 1,750 to 3,500 gpm.

Carmichael Water District (CWD)

CWD owns and operates one water treatment plant that utilizes American River water supply, Bajamont WTP. Water from the American River is diverted near Rossmoor Bar on the Lower American River using Ranney Collectors. The Bajamont WTP consists of membrane filtration and sodium hypochlorite disinfection; see below. The Bajamont WTP feeds water into the CWD distribution system.

Bajamont Water Treatment Plant

The Bajamont WTP is located in the community of Carmichael and diverts off the Lower American River using Ranney Collectors. Bajamont is a membrane microfiltration water treatment plant, utilizing membrane microfiltration, post-disinfection with sodium hypochlorite, and sodium hydroxide for corrosion control in the distribution system. The plant

design flow is 22 mgd, with an average winter flow of 4.8 mgd and an average summer flow of 12 mgd.

City of Sacramento

The City of Sacramento owns and operates one water treatment plant that utilizes American River water supply, E.A. Fairbairn WTP (Fairbairn WTP). Water from the American River is diverted directly out of the Lower American River and into the water treatment plant. The Fairbairn WTP consists of conventional filtration and chlorine disinfection; see below. The Fairbairn WTP feeds water into the City's main distribution system.

E.A. Fairbairn Water Treatment Plant

The Fairbairn WTP is located in the City of Sacramento. Water is diverted directly from the Lower American River. Fairbairn is a conventional filtration water treatment plant. The plant utilizes pre-chlorination, coagulation/sedimentation, filtration, post-chlorination, and fluoridation. The plant design flow is 160 mgd, with an average winter flow of 44 mgd and an average summer flow of 66 mgd.

Sacramento County Water Agency (SCWA) and East Bay Municipal Utility District (EBMUD)

The SCWA and EBMUD jointly own and operate (as members of a separate, public entity called the Freeport Regional Water Authority) a surface water diversion off the Sacramento River at Freeport, which is located downstream of the confluence with the American River. SCWA diverts water to the Vineyard Surface WTP where it receives conventional treatment, filtration, and chlorine disinfection. The treated water feeds into the SCWA Laguna/Vineyard distribution system. EBMUD can divert the raw water to the Folsom South Canal for conveyance to the Mokelumne Aqueducts and further conveyance to their terminal reservoirs in the East Bay. This water can be blended with water from the Mokelumne River source and local sources prior to treatment at EBMUD's local water treatment plants.

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This section provides an overall review of the American River 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 utilities. In addition to those data sets, there were four ambient water quality monitoring programs/studies with relevant water quality data during the study period. Work conducted by the Sacramento Coordinated Water Quality Monitoring Program (Sacramento CMP) and various studies directed under the Central Valley Regional Water Quality Control Board's (Regional Board) Surface Water Ambient Monitoring Program will be discussed separately from the data collected by the participating water utilities.

Table 3-1 shows the ambient monitoring programs from which 2008 through 2012 data was collected for this review. There is some data included from 2007 because it was not available for the 2008 Update Report (Sacramento CMP) or it is part of a comprehensive study (Regional Board Safe to Swim). The frequency of data collection varies by constituent and monitoring program. **Appendix B** contains summaries of the water treatment plants' intake data used for this review.

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 reporting period, which is 2008 through 2012. Finally, the section will discuss water quality impacts to the Folsom Lake water treatment plants as a result of the temperature control device installed at their diversion from Folsom Dam, which began operation in June 2003.

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

Table 3-1
Summary of Water Quality Data Sources

Agency	Data Collected	Sampling Location	Period of Record
Sacramento Coordinated Monitoring Program (Sacramento CMP)	Inorganics, Organics (Volatile and Synthetic), organic carbon, Coliform	American River – Business 80 Overpass Nimbus Dam Discovery Park	2007/2008 – 2011/2012
Regional Board – Central Valley Bacterial ID Study	*E. coli, E. coli* O157:H7, *Salmonella*, and *Bacteroidales*.	Discovery Park	2009
Regional Board – Central Valley Integrator Sites	*E. coli*, organic carbon, toxicity, and bioassessment	Discovery Park	2009 - 2010
Regional Board – Safe to Swim	pH, Electrical conductivity, total coliform and *E. coli, Giardia* and *Cryptosporidium* at selected sites	Various locations through watershed	2007 - 2010

AMBIENT MONITORING PROGRAM DESCRIPTIONS

Sacramento CMP

The Sacramento CMP is a cooperative voluntary program initiated and implemented by the Sacramento Regional County Sanitation District, the City of Sacramento, and the County of Sacramento Department of Water Resources. The City and County stormwater programs participate as part of the Sacramento Stormwater Quality Partnership and those countywide agencies that are part of the National Pollutant Discharge Elimination System (NPDES) municipal separate stormwater sewer system (MS4) permit (i.e., the co-permittees). These public agencies are responsible for the management of most municipal wastewater and stormwater in the Sacramento urban area within Sacramento County. The Sacramento CMP was established in July 1991 through a Memorandum of Understanding between these entities.

The fundamental purpose of the Sacramento CMP is to develop high-quality data to aid in the development and implementation of water quality policy and regulations in the Sacramento area. The Ambient Monitoring Program (AMP) is the primary water quality monitoring element of the Sacramento CMP. Sampling under the AMP began in December 1992, and samples are currently collected about six times per year at each monitoring site. Monitoring sites of interest to this study are Business 80 Overpass, Nimbus Dam, and Discovery Park (just above the confluence of Sacramento River) on the Lower American River. Sampling at the Business 80 Overpass concluded in February 2008. Episodic storm events are sampled for the Sacramento Stormwater Quality Partnership which conducts dry and wet weather monitoring as required by their MS4 NPDES stormwater permit for the City and County of Sacramento and the cities of Folsom, Citrus Heights, Elk Grove, Galt, and Rancho Cordova.

Turbidity, total organic carbon (TOC), *Escherichia coli (E. coli)*, and detected organics will be discussed further under selected constituent review.

Central Valley Regional Water Quality Control Board – Bacterial Identification (ID) Study

The Regional Board conducted a preliminary investigation of the occurrence of bacteria and potential sources throughout the Central Valley. Between May and December 2009, a total of four sampling events were conducted: May 26, July 20, October 19, and December 14, 2009, representing spring runoff, summer irrigation, fall dry, and winter runoff. Water samples were collected for *E. coli, E. coli* O157:H7, *Salmonella*, and *Bacteroidales*. There were five sampling sites within the Sacramento River Basin, but only one site located within the American River watershed: American River at Discovery Park.

The study has limited applicability to the American River watershed, as only one site location was sampled four times. However, the results for *E. coli,* in most probable number per 100 milliliters (MPN/100 mL), are shown in **Table 3-2.**

Table 3-2
***E. coli* (MPN/100 mL) Concentrations by Season, Central Valley Bacterial Source ID Study**

Site Location	Spring Runoff Season (5/26/09)	Irrigation Season (7/20/09)	Dry Season (10/19/09)	Winter runoff Season (12/14/09)
American River at Discovery Park	547.5	816.4	191.8	307.6

When taking into consideration all of the five Sacramento River Basin sampling sites, some of the key highlights were:

- About six percent of the water samples had detectable human fecal sources, and about six percent had cow fecal sources. None of the *E. coli* water samples collected at American River at Discovery Park could be correlated to human or cow fecal sources.
- There was not a significant difference between seasons for *E. coli* concentrations. However, the concentrations were generally the highest during the irrigation and winter runoff seasons.
- Salmonella was detected once at American River at Discovery Park in the winter runoff season sample. No *E. coli* O157:H7 was detected at this location.

The study was limited in scope due to the small number of samples taken and sampling frequency. However, the study contains a number of recommendations for future study.

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

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 were being attained at these recreation sites. The initial sampling conducted in 2007 and 2008 was conducted prior, during, and after Labor Day. Samples were collected for pH, electrical conductivity, total coliform, and *E. coli.* In 2009 and 2010, follow-up sampling was conducted for *E. coli O157:H7*, *Giardia*, and *Cryptosporidium* for sites with historic elevated *E. coli* levels. **Figures 3-1 through 3-5** show where samples were collected in 2009 and 2010 for the American River watershed.

Figure 3-1. Sampling Locations for 2009 Safe to Swim Studies, American River Watershed

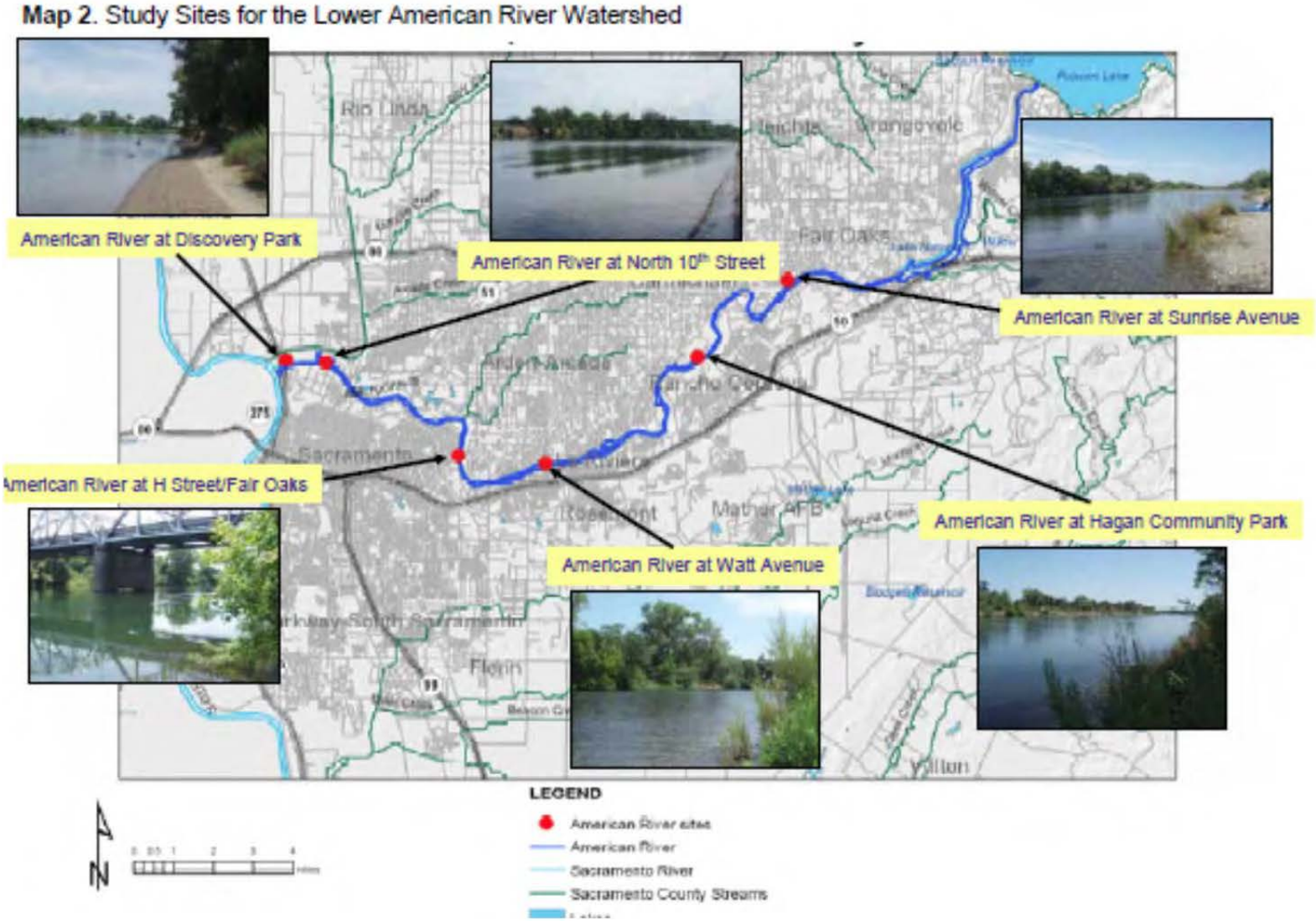


Figure 3-2. Sampling Locations for 2010 Safe to Swim Studies, American River Watershed, Folsom Lake

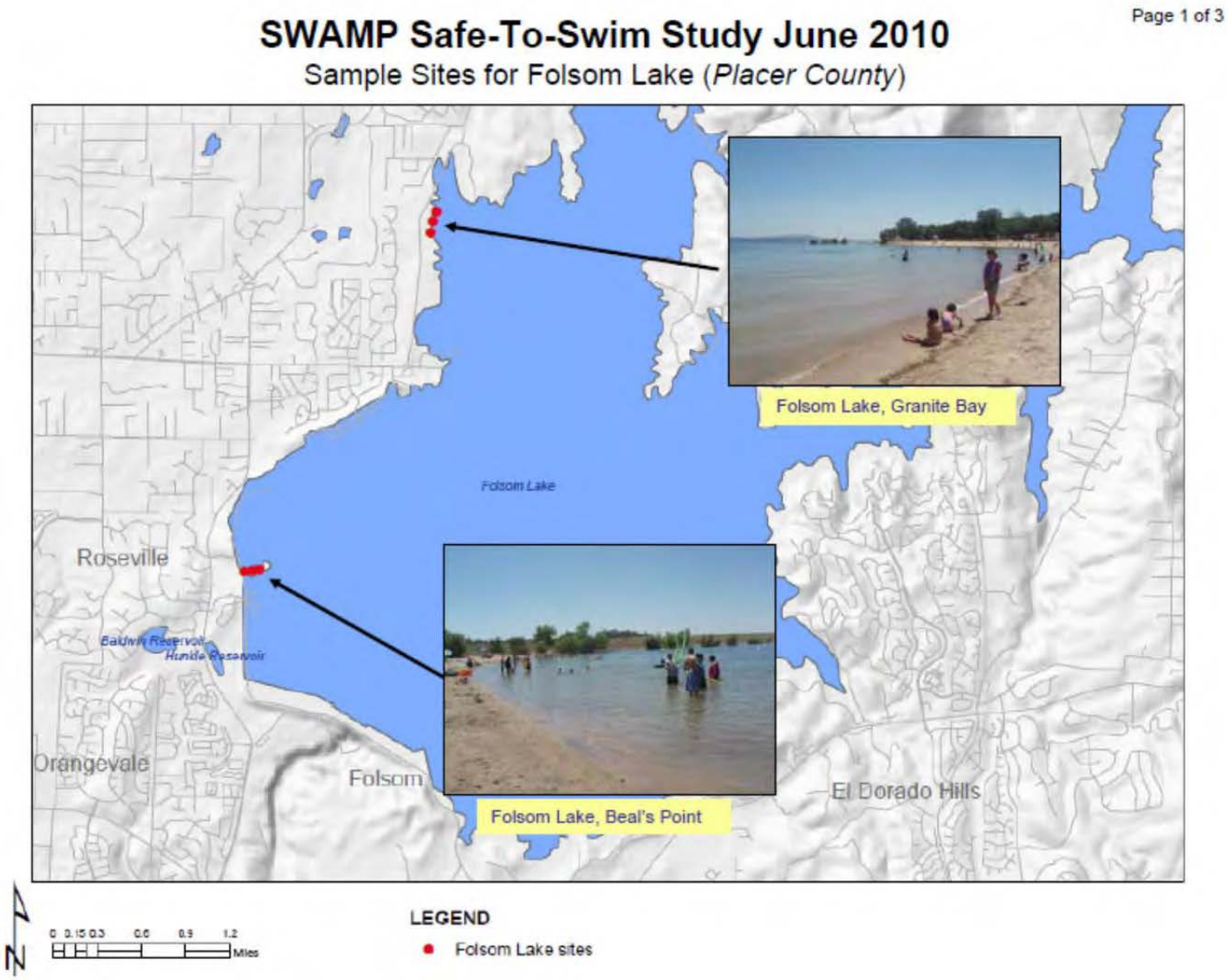


Figure 3-3. Sampling Locations for 2010 Safe to Swim Studies, American River Watershed, Lake Natoma

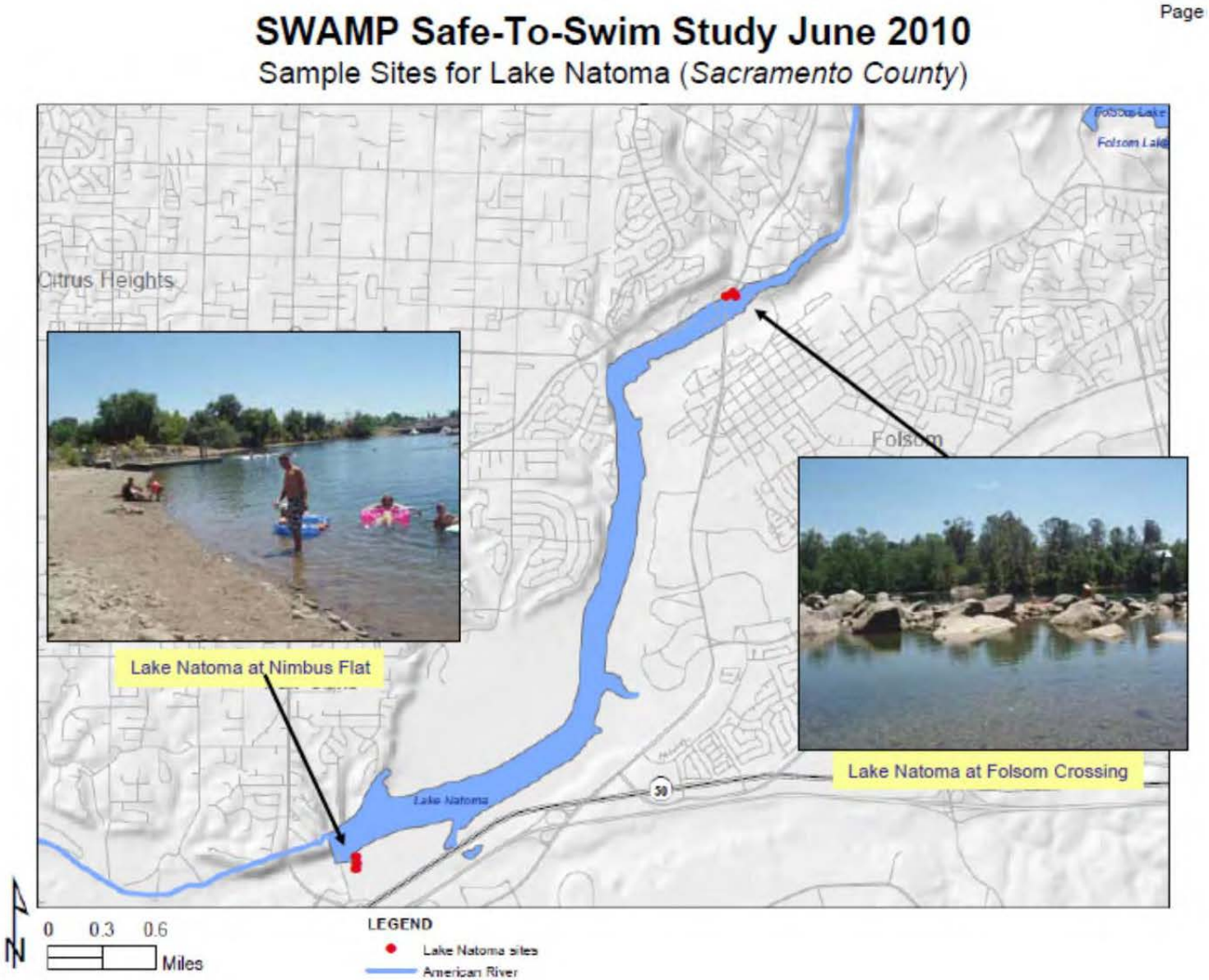


Figure 3-4. Sampling Locations for 2010 Safe to Swim Studies, American River Watershed, Silver and South Forks

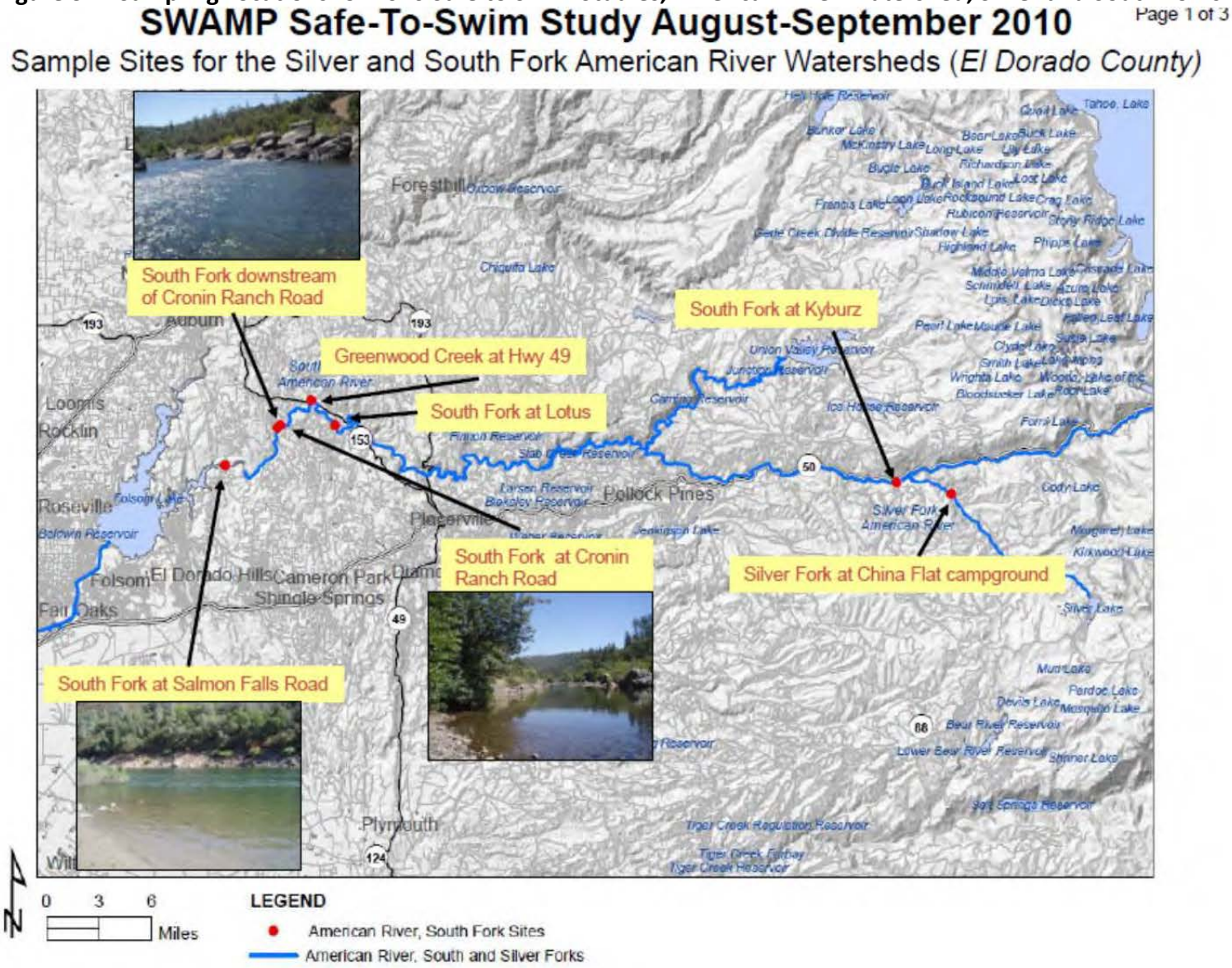
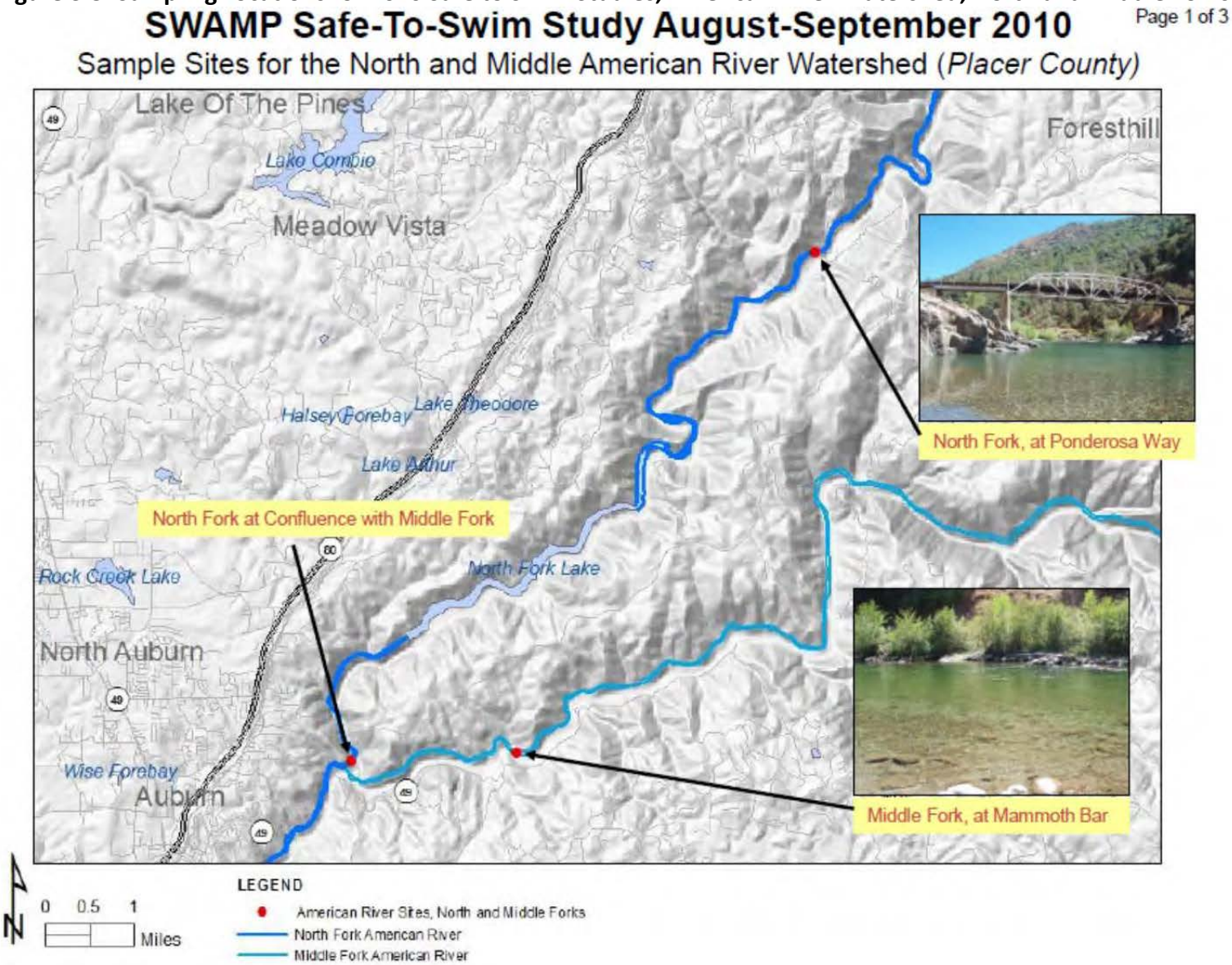


Figure 3-5. Sampling Locations for 2010 Safe to Swim Studies, American River Watershed, North and Middle Forks



The Regional Board uses the United States Environmental Protection Agency (USEPA) Contact Recreation Guideline single sample for *E. coli* less than 235 MPN/100mL and the 30–day geometric mean for *E. coli* less than 126 MPN/100mL to determine if recreational beneficial uses are being met. **Tables 3-3 through 3-7** show results for 2007 through 2010 at sampling sites within the American River watershed. It should be noted that in 2010, samples were collected in the Lower American River watershed as well as Folsom Lake, Lake Natoma, and the North, Middle, South, and Silver Forks of the American River.

Table 3-3
***E. coli* (MPN/100 mL) Results for Safe to Swim Studies, 2007**

Sample Location	Date	Date	Date
	8/30/2007	9/2/2007	9/5/2007
Silver Fork of American River at Wildwood	< 1.0	4	6.3
American River at Sunrise Blvd.	91	43	35
American River at Discovery Park	57	86	62

Table 3-4
***E. coli* (MPN/100 mL) Results for Safe to Swim Studies, 2008**

Sample Location	Date	Date	Date
	8/27/2008	8/31/2008	9/3/2008
American River at Discovery Park	1413.6	275.5	187.2

Table 3-5
***E. coli* (MPN/100 mL), *Giardia* (cysts/L), and *Cryptosporidium* (oocysts/L) Results for Safe to Swim Studies, June 30, 2009**

Sample Location	*E. coli*	*Cryptosporidium*	*Giardia*
American River at Sunrise Ave.	74.9	0	0
American River at Hagan Park	307.6	No sample	No sample
American River at Watt Ave.	980.4	No sample	No sample
American River at Fair Oaks	36.4	No sample	No sample
American River at North 10th St.	82	No sample	No sample
American River at Discovery Park	110	0	0

Samples collected at sites listed in **Table 3-6** were also analyzed for *E. coli* O157:H7 and Salmonella, and all sites were negative. *E. coli* results in **Table 3-6** and **Table 3-7** are based on one sample collected per site.

Of the entire Safe to Swim sampling sites, the highest *E. coli* was found at Folsom Lake Beal's Pt. in June 2010 at 1,732.9 MPN/100mL. The next two highest *E. coli* values were at Discovery Park on August 27, 2008 at 1,413.6 MPN/100mL and at Folsom Lake Granite Bay (1,119.9 MPN/100mL). However, these *E. coli* values are still lower than wet weather samples collected by the Sacramento CMP at Discovery Park, which can reach 4,000 to 5,000 MPN/100mL.

Table 3-6
***E. coli* results for Safe to Swim Studies, June 28 and June 29, 2010**

Sample Location	*E. coli, MPN/100mL*
Folsom Lake – Granite Bay (left)	58.1
Folsom Lake - Granite Bay (middle)	76.3
Folsom Lake – Granite Bay (right)	1119.9
Folsom Lake – Beal's Pt. (left)	87.6
Folsom Lake – Beal's Pt. (middle)	1732.9
Folsom Lake – Beal's Pt. (right)	547.5
Lake Natoma at Folsom Crossing (left)	110.6
Lake Natoma at Folsom Crossing (middle)	13.4
Lake Natoma at Folsom Crossing (right)	75.9
Lake Natoma at Nimbus Flat (left)	7.5
Lake Natoma at Nimbus Flat (middle)	38.9
Lake Natoma at Nimbus Flat (right)	235.9
American River at Sunrise Ave.	23.3
American River at Hagan Park	23.8
American River at River Bend Park	18.5
American River at Harrington St.	7.5
American River at Watt Ave.	38.8

Table 3-7
***E. coli* results for Safe to Swim Studies, August and September 2010, various dates**

Sample Location	Sample Date	*E. coli, MPN/100mL*
North Fork at Confluence with Middle Fork	8/30/2010	2
North Fork at Ponderosa Way	9/1/2010	3.1
Middle Fork at Mammoth Bar	9/1/2010	13.2
Silver Fork, China Flat Campground	8/29/2010	6.3
South Fork, Kyburz	8/29/2010	1
South Fork, Salmon Falls Road	8/30/2010	1
South Fork, Camp Lotus	8/30/2010	24.3
South Fork, Cronin Ranch Road	8/30/2010	18.7
South Fork, Downstream of Cronin Ranch Road	8/30/2010	11
Greenwood Creek at Hwy 49	8/30/2010	23
American River at Sunrise	8/30/2010	27.5
American River at Discovery Park	8/29/2010	15.6

Some additional observations from the Safe to Swim Studies are:

- *E. coli* results are very localized. For example, **Table 3-6** shows there was much variability within three samples taken at the same general location at Folsom Lake at the same time, such as Granite Bay or Beal's Point.
- *E. coli* samples were not always the highest during Labor Day; sometimes the samples collected before and after Labor Day were higher.
- *E. coli* samples collected in August and September 2010 in the North, Middle, South, and Silver forks of the American River had very low results.

Central Valley Regional Water Quality Control Board – Central Valley Integrator Sites Study

The purpose of the Central Valley Integrator Sites Study is to identify seasonal trends by monitoring a network of lower watershed integrator sites. Integrator sites were selected to represent discharge points at the base of large watersheds. Out of the 30 study sites, there was only one site within the American River watershed – American River at Discovery Park.

Study parameters include field parameters, *E. coli*, organic carbon, toxicity, and bioassessment. **Table 3-8** summarizes the organic carbon and *E. coli* data. It should be noted that samples were taken to represent spring snowmelt, irrigation, dry season, and winter runoff. The American River at Discovery Park sample site was sampled quarterly, from 2009 through 2012. According to Regional Board staff, the study will continue but not likely to include organic carbon in 2013 (Personal communication, Alisha Wenzel, March 2013). Currently, there is no report available, but the data through May 2010 was available and was downloaded from the California Environmental Data Exchange Network (CEDEN) website, as shown in **Table 3-8**.

Similar to the Bacterial ID Study, there is limited data and the Sacramento CMP data provides a much more comprehensive dataset for *E. coli* and TOC at the Discovery Park location.

Table 3-8
Results to Date for Central Valley Integrator Sites Study,
American River at Discovery Park

	5/12/2009	8/4/2009	10/27/2009	2/9/2010	5/11/2010
E. coli, MPN/100mL	121	62	224.7	45.5	133.3
DOC, mg/L	1.46	1.93	1.74	1.8	2.61
TOC, mg/L	1.52	3.27	2.45	2.16	1.32

OVERALL WATER QUALITY REVIEW

The review of overall water quality is largely based on comparison of the participating water utilities' intake water (also called raw water) to drinking water standards for the constituents currently regulated. This includes all constituents with primary and secondary Maximum Contaminant Levels (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. Compliance with MCLs and Notification Levels is ultimately based on treated water sample results. **Appendix C** provides the Regulatory Framework used as the basis for evaluation and contains a summary of each of the contaminants currently regulated in drinking water by both the USEPA and the California Department of Public Health (DPH).

Overall, the American River provides excellent quality water. The raw water can be treated to meet all drinking water standards using conventional, direct, or membrane filtration processes. There are no constituents present in the raw water that necessitate additional treatment processes at this time. Summary tables of selected raw water intake data, tabulated from the water systems treating American River water, are discussed later in this section. Consumer Confidence Reports (CCR) for all of the participating water utilities were reviewed and any MCL violations were summarized. The individual water treatment plant intake evaluations for treated water and regulatory compliance are presented in **Section 5**.

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, fecal coliform, *E. coli*, and TOC. An updated evaluation for *Giardia* and *Cryptosporidium* was not conducted as no new data has been required to be collected by the participating water utilities since the 2008 American River Watershed Sanitary Survey Update (2008 Update). Total coliform was evaluated in this report only if fecal coliform or *E. coli* data were not available. 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**.

In order to efficiently show graphical results for all the water treatment plants, the turbidity and TOC data are graphically presented in three categories: 1) Above Folsom Lake water treatment plants, 2) Folsom Lake water treatment plants, and 3) Lower American River water treatment plants. As the water treatment plants sample differently for coliforms (some sample total coliform only, some sample total and fecal coliform, and some sample total coliform and *E. coli*), the monitoring results for these constituents could not be grouped together. Individual graphs were generated for each water treatment plant and included in **Appendix B.**

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 3-9** shows the relationship between potential contaminating activities reviewed in this report and water quality constituents.

Table 3-9
Relationship Between Potential Contaminating Activities and Water Quality

Constituent	Forest Activities	Recreation	River Corridor	Urban Runoff	Wastewater	Industrial Activities	Spills
Turbidity	√	√	√	√	√	√	
Microbial Constituents	√	√	√	√	√		√
TOC	√		√	√	√		
VOC/SOC				√	√	√	√

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 optimize pretreatment processes to maximize 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 organism 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 (typically 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 pathogens. The principal source of turbidity is general watershed runoff, and it can also be contributed by other potential contaminating activities such as urban runoff and wastewater. It is common for turbidities to vary seasonally as a result of precipitation intensity 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. Monthly averages of the peak daily raw water turbidities were used to calculate a range, average, and median for each water treatment plant and these have been summarized and are presented in **Table 3-10**. **Table 3-10** also includes additional ambient data from the Sacramento CMP. Time series plots have been developed for raw water turbidity over the reporting period for each of the water treatment plants (**Figures 3-6 through 3-8**).

Table 3-10
Monthly Average of Peak Daily Raw Water Turbidity Summary Statistics, NTU

Sample Site	Monthly Average of Peak Daily		
	Range	Average	Median
North Fork at American River Pump Station (PCWA)[1]	0.57 – 71.8	4.3	2.2
South Fork at Strawberry WTP (El Dorado Irrigation District [EID])	1.8 – 10.8	4.6	4.0
Main Canal at Reservoir One WTP (EID)	9.5 – 42.9	23.1	22.2
Folsom Lake at El Dorado Hills WTP (EID)	2.5 – 22.3	6.8	5.8
Folsom Dam (City of Folsom)	1.9 – 15.4	4.1	3.7
Folsom Dam (Folsom State Prison)	1.2 - 9.7	2.74	2.3
Folsom Dam (San Juan Water District)	0.59 – 11.0	1.97	1.55
Folsom Dam (City of Roseville West Train)	0.7 – 12.3	2.0	1.5
Nimbus Dam (CMP)	1 - 33	3.7	2.4
Folsom South Canal (GSWC - Coloma and Pyrites WTP)	1.05 – 13.8	4.6	3.5
Lower American River near Mile 17.5 (Carmichael Water District)	0.74 - 10.5	1.9	1.3
Lower American River at Fairbairn WTP (City of Sacramento)	1 – 10.3	2.3	1.8
Lower American River at Discovery Park (CMP)	1 - 20	5.6	4

[1] Based on periods of American River usage (10/19/08 – 11/8/08, 10/18/09 – 11/9/09, 10/17/10 – 11/8/10, 4/19/11 – 6/5/11, 10/16/11 – 12/10/11, and 10/14/12 – 11/23/12)

Figure 3-6 shows that the Foothill Water Treatment Plant (WTP) and the Strawberry WTP monthly average of peak daily raw water turbidities stay generally below 10 NTU, while the peak raw water turbidities at Reservoir One WTP were always above 10 NTU and El Dorado Hills (EDH) WTP were occasionally above 10 NTU. Reservoir One WTP had the highest monthly average of peak raw water turbidity, which were 42.9 NTU in June 2009 and 38.7 NTU in February 2009 and January 2012. Reservoir One WTP turbidities were not consistently over 10 NTU in the 2008 Update report (2003 to 2007), but they were during this study period. EID

staff believes that the higher summer turbidities in 2010 and 2011 may be caused by higher flows, as well as recreation in the summertime, in the canal supplying Reservoir One WTP that caused sediment to be re-suspended.

Figure 3-6. Raw Water Turbidity, Above Folsom Lake WTPs, 2008 – 2012

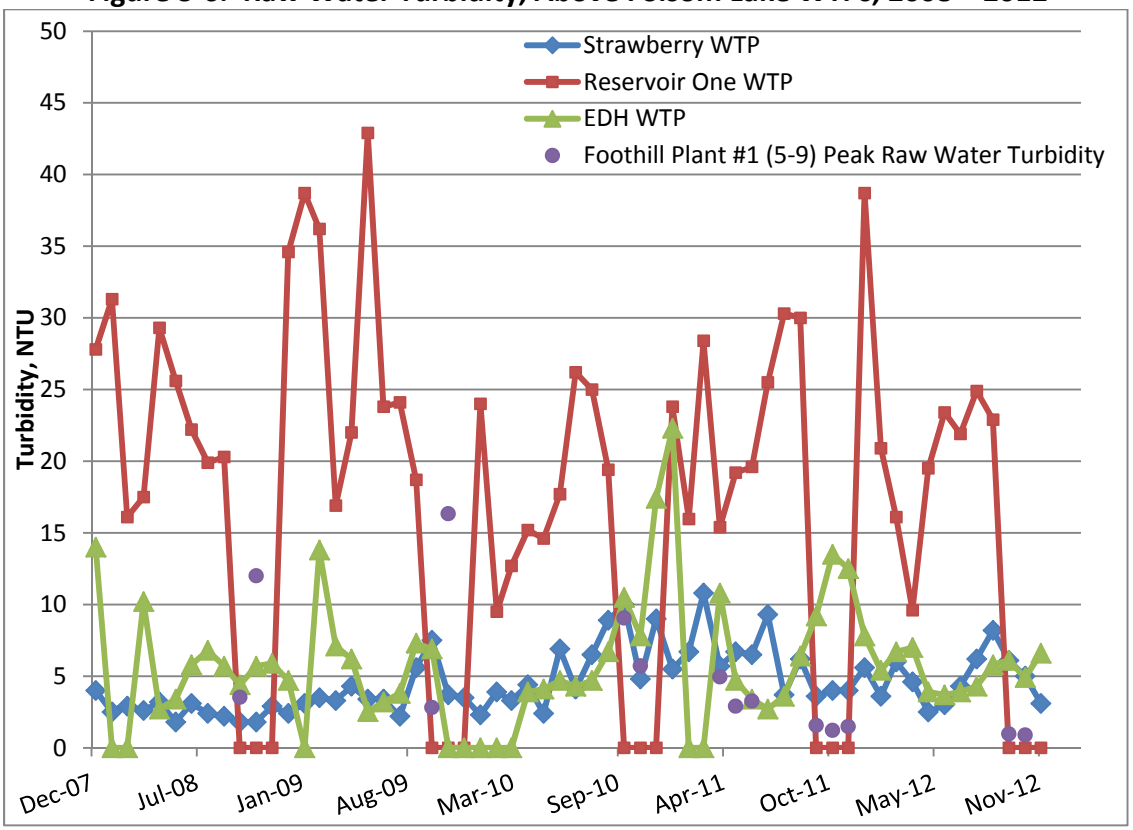


Figure 3-7 shows that the average monthly of peak daily raw water turbidity for all of the Folsom Lake water treatment plants were below 10 NTU, except in December 2012. There was a series of storms in December 2012 that likely contributed to increases in turbidity. In addition, all of the water treatment plants show similar raw water turbidity trends.

Figure 3-8 shows that the Bajamont WTP turbidity was below 10 NTU all of the time, the Fairbairn WTP was above 10 NTU only once, and the Coloma WTP was occasionally above 10 NTU. Coloma WTP had the highest monthly average of peak daily raw water turbidity, which were 13.3 NTU in July 2011 and 13.8 NTU in April 2012. Increased turbidities are likely due to the presence of geese in Lake Natoma or algae growth in the Folsom South Canal.

Figure 3-7. Raw Water Turbidity, Folsom Lake WTPs, 2008 – 2012

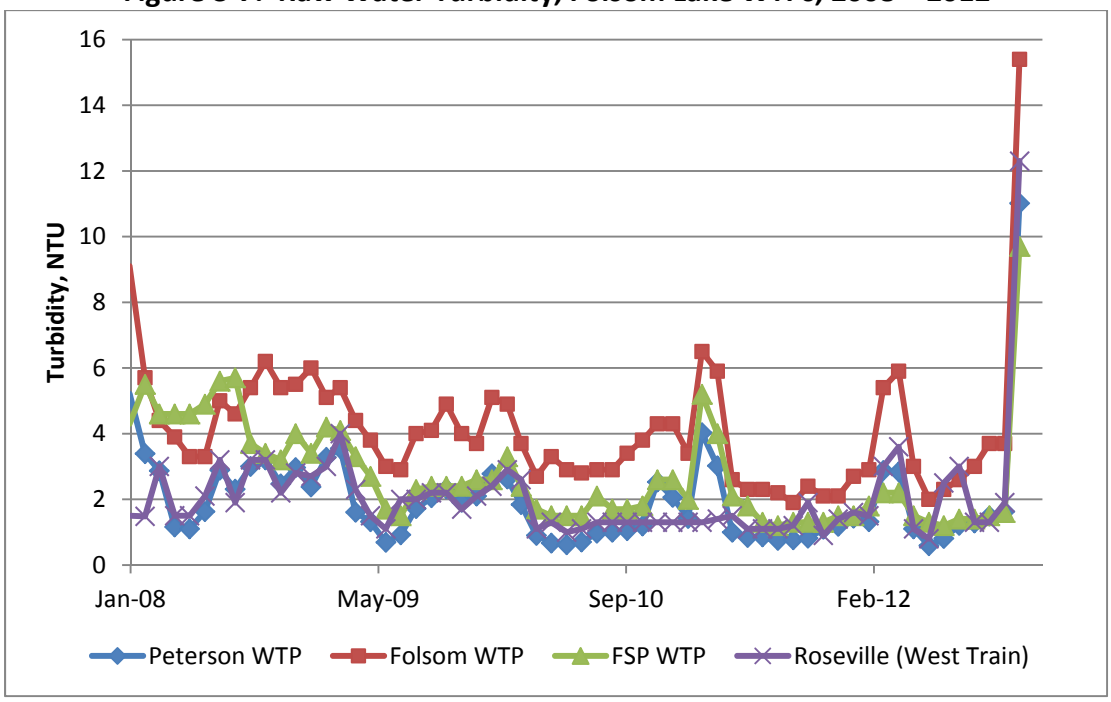
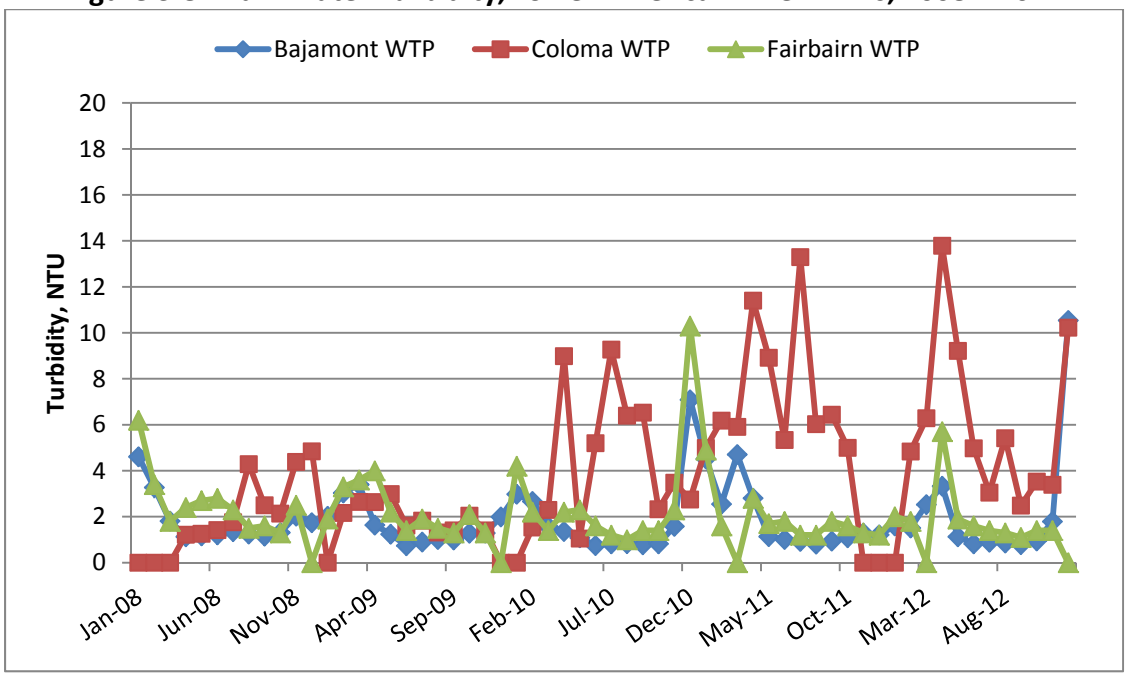


Figure 3-8. Raw Water Turbidity, Lower American River WTPs, 2008 – 2012



Summary of Results for Turbidity

- The average of the monthly average of peak daily raw water turbidities ranged from 1.9 NTU at the Bajamont WTP to 23.1 NTU at the Reservoir One WTP.

- Over the reporting period, the Strawberry WTP, Reservoir One WTP, and the Coloma WTP had slightly higher medians during 2008 to 2012, compared to 2003 to 2007.

- Most of the time, peak daily raw water turbidity was less than 10 NTU for all water treatment plants, except for Reservoir One WTP. Reservoir One WTP had the highest peak daily raw water turbidity average over the entire study period, at 23.1 NTU.

- Turbidity levels in the raw water generally increased during the winter storm season; however, the Coloma WTP and Reservoir One WTP had unique seasonal patterns. Turbidity at Reservoir One WTP increased during the summer, likely due to recreation in the summertime that causes sediment to be re-suspended in the supply canals. The Coloma WTP has higher turbidities during the April to July time period, which may be due to geese at Nimbus Flats. Both of these facilities are also susceptible to potential algae growth in their off-stream supply canals.

Microbiological Constituents

General Characteristics and Background

The major microbiological constituents of concern include fecal 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, though detected pathogens and pathogen indicators may not be capable of infecting humans.

Fecal coliform and *E. coli* have been used to indicate the potential presence of pathogenic microorganisms in source waters. Although coliform levels do not 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 in the American River watershed include general watershed runoff, recreation, wastewater, urban runoff, homeless populations, 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, including both wild and domestic animals.

Giardia lamblia is currently regulated by the Surface Water Treatment Rule (SWTR) and the Interim Enhanced Surface Water Treatment Rule (IESWTR). Surface water supplies must provide for 3-log reduction of *Giardia* through physical removal and chemical inactivation. Additional reduction may be required for impaired water supplies. The DPH guidance provides that 3-log reduction is appropriate when monthly median levels of total coliform are less than 1,000 MPN/100 mL, fecal coliform or *E. Coli* levels are less than 200 MPN/100 mL, or when directly measured confirmed *Giardia* levels are less than 0.01 cysts per liter.

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 true 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, including both wild and domestic animals.

Cryptosporidium is currently regulated through the IESWTR and the Long Term 1 ESWTR (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 *Cryptosporidium*. Under the IESWTR (applicable to public water systems serving at least 10,000 population) and LT1ESWTR (applicable to public water systems serving fewer than 10,000 population) well-operated conventional and direct water treatment plants are granted a 2-log removal credit for *Cryptosporidium* if they meet all treated water turbidity standards. The LT2ESWTR (applicable to all public water systems) further regulates *Cryptosporidium* and requires additional action (treatment or protection) if the source water quality is determined to be impaired based on the required direct *Cryptosporidium* monitoring of the source (as discussed in **Appendix C**), if running annual average levels are greater than 0.075 oocysts per liter.

The DPH also developed the *Cryptosporidium* Action Plan (CAP) in the mid-1990s 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 Fecal Coliform and E. coli

Table 3-11 is a summary of fecal coliform and *E. coli* monitoring results for all participating water utilities over the reporting period. Additional ambient data from the Sacramento CMP monitoring is included. An examination of **Table 3-11** indicates that *E. coli* and fecal coliform levels generally increase from upstream to downstream, but only by a single order of magnitude. Overall, fecal coliform and *E. coli* medians and averages were highest at the Lower American River at the Discovery Park CMP sampling location. The CMP sampling location is likely biased higher due to the nature of the monitoring program (lower frequency and focus on wet weather), and the site represents many potential contaminating activities, such as urban runoff, corridor activities (such as wildlife and homeless encampments), and recreation.

Graphs of *E. coli* and fecal coliform were prepared for the applicable water treatment plants, and these are provided in **Appendix B**. Coliform data for the San Juan Water District (SJWD) was selected to show typically how these constituents vary over time. **Figure 3-9** shows that fecal coliform levels peak during storm events, and remain low during the summer, as similar for all the water treatment plants except for the Fairbairn and Coloma WTPs. For those water treatment plants, there are localized issues in the raw water which cause coliform levels to be elevated outside of storm event periods, as discussed below.

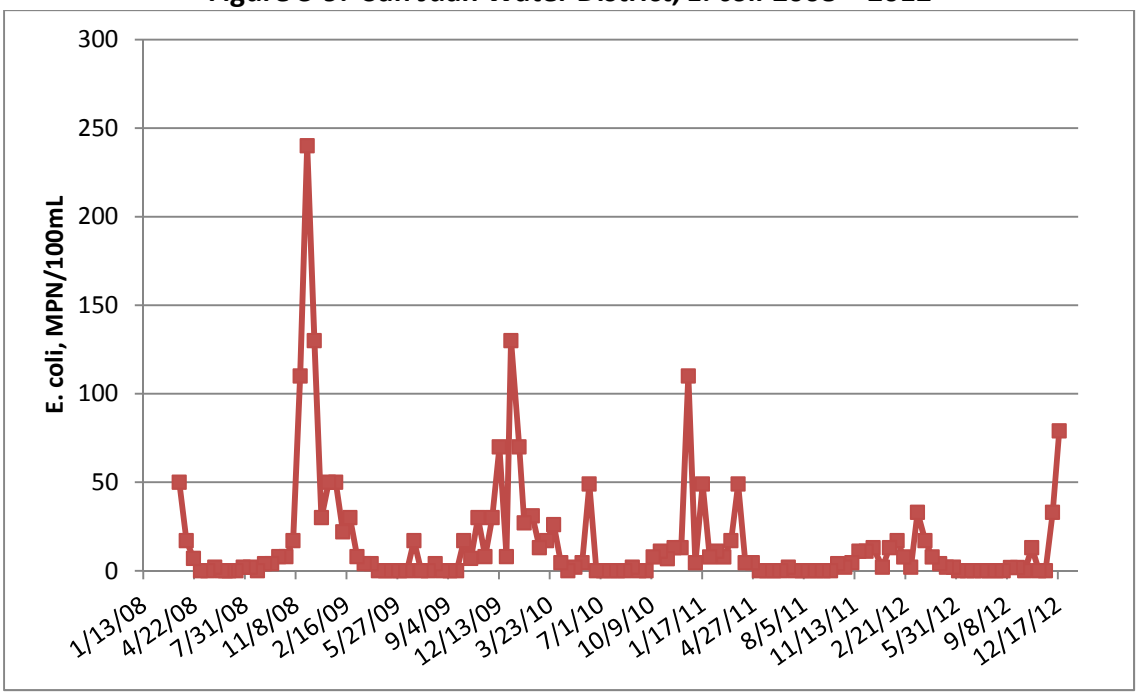
It is important to note that although the coliform graphs in **Appendix B** show peaks in the data, most of the water treatment plants have 95th percentiles for fecal coliform or *E. coli* below 100 MPN/100mL, except for the Folsom State Prison (FSP) WTP, the Bajamont WTP, and the Fairbairn WTP. The fecal coliform 95th percentile for the FSP WTP was 164 MPN/100mL. Carmichael Water District collects the *E. coli* sample for the Bajamont WTP as a raw river sample, prior to their Ranney Collector. Therefore, although the *E. coli* 95th percentile for the Bajamont WTP was 281 MPN/100mL, this is expected to be much higher than the diverted raw water received at the Bajamont WTP influent. The *E. coli* 95th percentile for the Fairbairn WTP was 176 MPN/100mL.

Table 3-11
***E. coli* and Fecal Coliform Summary Statistics, MPN/100mL, 2008 - 2012**

	Fecal Coliform, MPN/100mL			*E. coli*, MPN/100mL			
Sample Site	**#Samples**	**Average**	**Median**	**#Samples**	**Ave.**	**Median**	**Frequency of Monitoring**
North Fork at ARPS (PCWA)[1]	NA	NA	NA	60	12	4	Monthly
South Fork at Strawberry WTP (EID)[1]	NA	NA	NA	76	5.2	2	Monthly
Main Canal at Reservoir 1 WTP (EID)	NA	NA	NA	43	26.9	14.6	Monthly
Folsom Lake at El Dorado Hills WTP (EID)	NA	NA	NA	52	8.2	4.1	Monthly
Folsom Dam (City of Folsom)	260	8.9	2	260	7.1	2	Weekly
Folsom Dam (Folsom State Prison)	37	46.7	4	13	10.5	4.5	Monthly
Folsom Dam (San Juan Water District)[1]	131	19.9	4.5	126	16.3	4	Every two weeks
Folsom Dam (City of Roseville)	NA	NA	NA	NE	NE	NE	Monthly
Nimbus Dam (CMP)	28	346	30	28	327	30	Three wet weather and one dry weather per year
Folsom South Canal (GSWC)[1,]	NA	NA	NA	238	14	8.6	Weekly
Lower American River, Mile 17.5 (Carmichael Water District)	60	59.7	23	60	54.7	23	Monthly
Lower American River at Fairbairn WTP (Sacramento)[2]	NA	NA	NA	218	55.7	17	Weekly
Lower American River at Discovery Park (CMP)	28	588.5	75	28	1951	110	Three wet weather and one dry weather per year

NA – Not analyzed; NE – Not enumerated
[1] SJWD and GSWC *E. coli* data from March 2008 to December 2012
[2] Based on data from January 2008 through November 2012

Figure 3-9. San Juan Water District, *E. coli* 2008 – 2012



The North Fork at the American River Pump Station, Strawberry WTP, and Coloma WTP had lower *E. coli* medians from 2008 to 2012, compared to 2003 to 2007.

The City of Roseville collects monthly samples for both total coliform and *E. coli*. However, *E. coli* was not quantified; only the presence/absence was confirmed. Based on the total coliform data, the 2008 to 2012 data ranged from ND to 500 MPN/100mL, with an average of 20.1 MPN/100mL and a median of 7 MPN/100mL. Overall, total coliforms levels were very low.

Monthly medians for *E. coli* were also examined, as DPH requires an additional log reduction for *Giardia* and viruses if the monthly median for fecal coliform or *E. coli* is 200 MPN/100mL or greater. Alternatively, if no fecal coliform or *E. coli* data is available then monthly median total coliform levels greater than 1,000 MPN/100mL trigger increased log reduction. Golden State Water Company's (GSWC) Cordova system is the only participating water utility where DPH requires an additional log reduction for *Giardia* and viruses in their water supply permit if either the monthly median for *E. coli* is greater than 200 MPN/100mL or the monthly median for total coliform is greater than 1,000 MPN/100mL.

Total coliform is evaluated only for Coloma/Pyrites WTPs, since they have a permit condition requiring increased log reduction based on total coliform monthly median values. Twenty-four out of 58 total coliform monthly medians exceeded 1,000 MPN/100mL in the raw water for this diversion, indicating that 4/5-log reduction would be required in over 40 percent of months. As the median total coliform count exceeded 1,000 MPN/100 mL for several months during most years, GSWC elects to provide 4- and 5-log reduction on a routine basis, year-round.

All but four of the water treatment plants had *E. coli* monthly median coliform levels below the trigger levels. The Reservoir One WTP had one *E. coli* monthly median above 200 MPN/100mL in July 2008, which represented only one sample. The Bajamont WTP had four monthly *E. coli* medians (January 2008, October 2010, May 2012, and December 2012) above 200 MPN/100mL. However, these samples were collected prior to the Ranney Collector and do not reflect the lower levels of the diverted raw water at the Bajamont WTP influent. The Fairbairn WTP had one *E. coli* monthly median above 200 MPN/100mL in January 2010. The FSP WTP had two fecal coliform monthly medians above 200 MPN/100mL in January 2009 and January 2010, which each represented only one sample.

E. coli monthly medians for the Folsom WTP, Fairbairn WTP, and the Coloma WTP were calculated (**Figures 3-10 through 3-12)** as these water treatment plants sample for coliforms on a weekly basis. **Figure 3-10** shows an increase in *E. coli* at the Folsom WTP during the rainy season, with lower levels during the summer months. Similarly in **Figure 3-11,** the Fairbairn WTP also shows lower levels during the summer months (June through September), but elevated levels are also seen in May and October, as well as the winter months. Samples collected during May and October may be elevated due to storms and runoff from storm events. For example, **Figure 3-11** indicates elevated *E. coli* in May 2009 and there was precipitation from May 1 to May 3, 2009. However, elevated *E. coli* levels in May 2008 could not be correlated with any storm. The difference between the Folsom and the Fairbairn WTP *E. coli* data is that the *E. coli* levels are higher at Fairbairn WTP, which may be contributed to by the urban runoff, recreation, natural sources such as wildlife, and other river corridor sources (such as homeless encampments), along the Lower American River.

Figure 3-12 shows a unique seasonal trend at the Coloma WTP, as the highest *E. coli* levels only occur in the late spring/early summer. This is likely due to the presence of geese in Lake Natoma.

Figure 3-10. City of Folsom *E. coli* Average Monthly Medians, 2008 – 2012

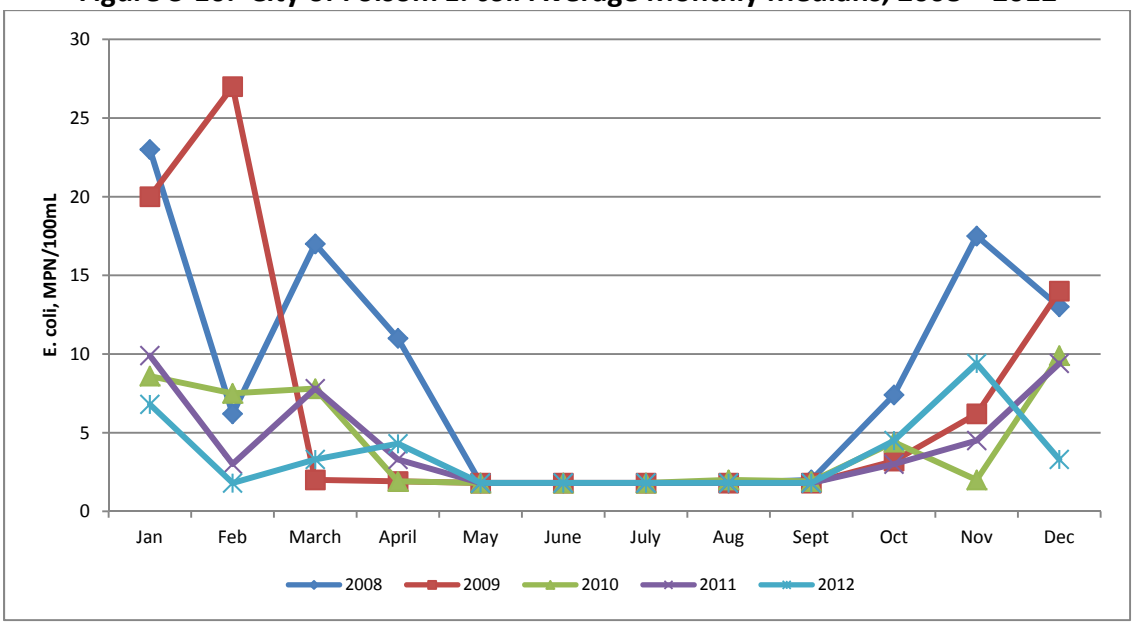


Figure 3-11. City of Sacramento Fairbairn WTP *E. coli* Average Monthly Medians, 2008 – 2012

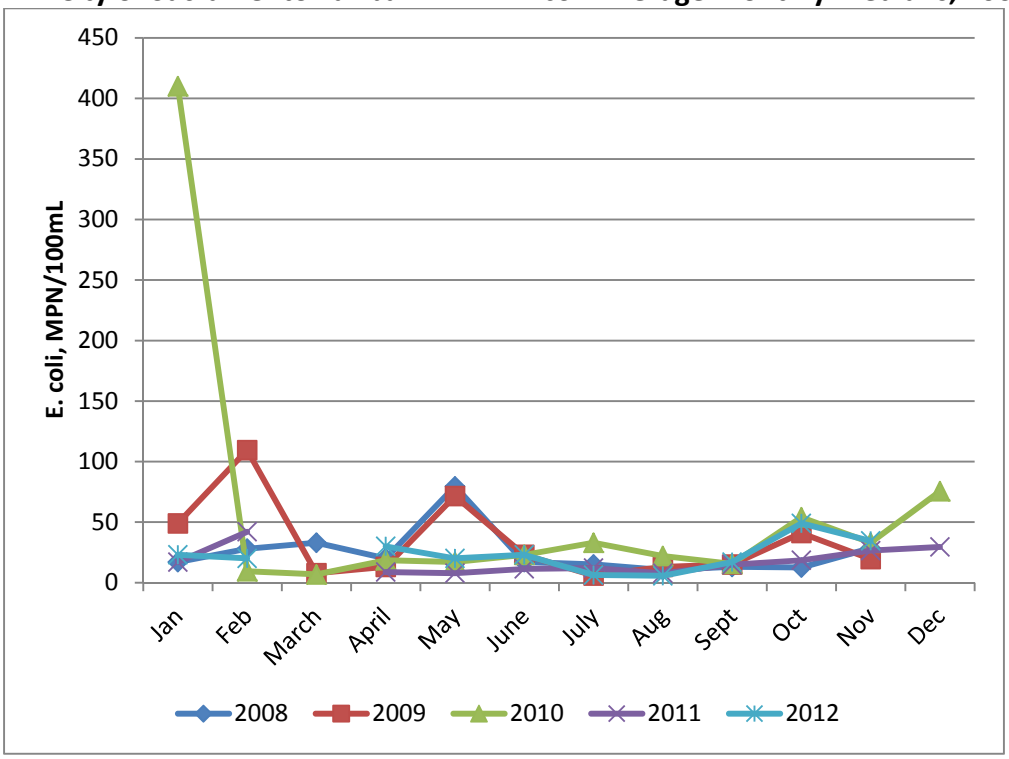


Figure 3-12. Golden State Water Company - Coloma WTP *E. coli* Average Monthly Medians, 2008 – 2012

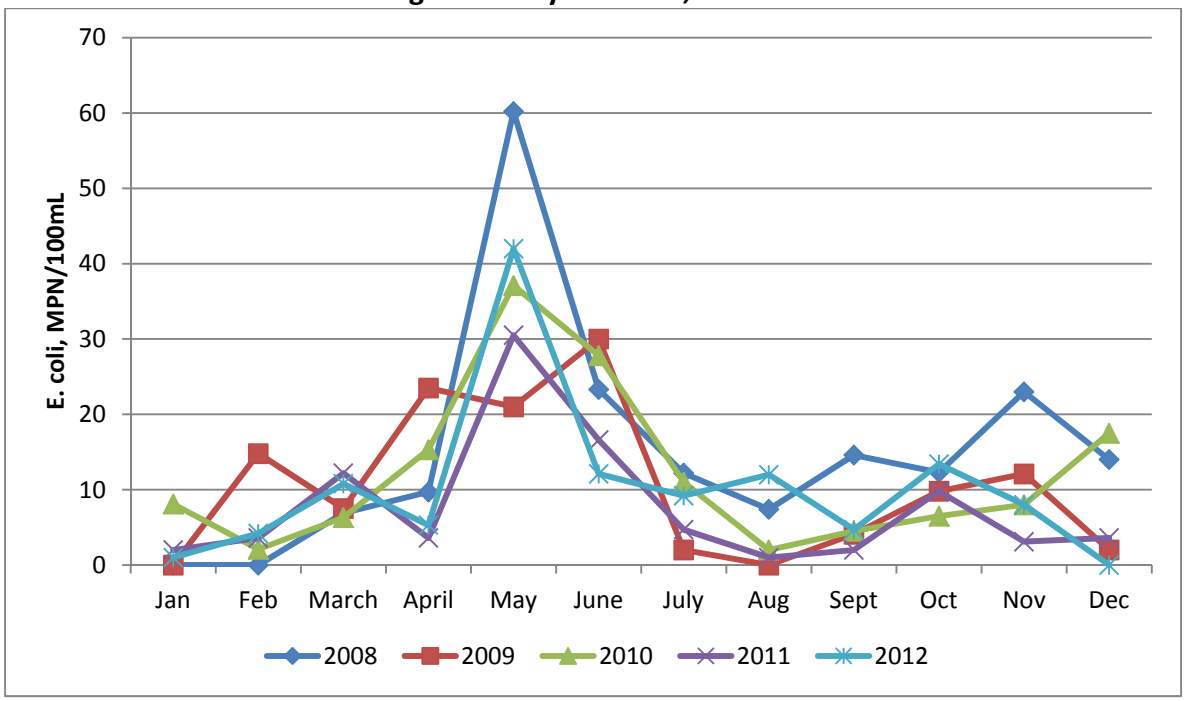


Figure 3-13 is a plot of precipitation and *E. coli* at the Fairbairn WTP. Precipitation accounted for the three highest *E. coli* samples at the Fairbairn WTP. However, there were three *E. coli* samples higher than 300 MPN/100mL, and neither precipitation nor sewage spills could account for the elevated levels.

As shown previously in **Figure 3-12**, the Coloma WTP shows a different seasonal trend, with higher *E. coli* levels in the late spring/early summer. **Figure 3-14** is a plot of precipitation and *E. coli* at the Coloma WTP. It shows that higher *E. coli* levels in the late spring/early summer were potentially related to precipitation in May 2008 and May 2011, but not for the remaining years. There were also no sewer spills in the late spring and early summer over the five year period. The cause of this seasonal pattern is unknown, but may be related to the presence and type of waterfowl at Lake Natoma.

Figure 3-13. Precipitation and *E. coli* at Fairbairn WTP

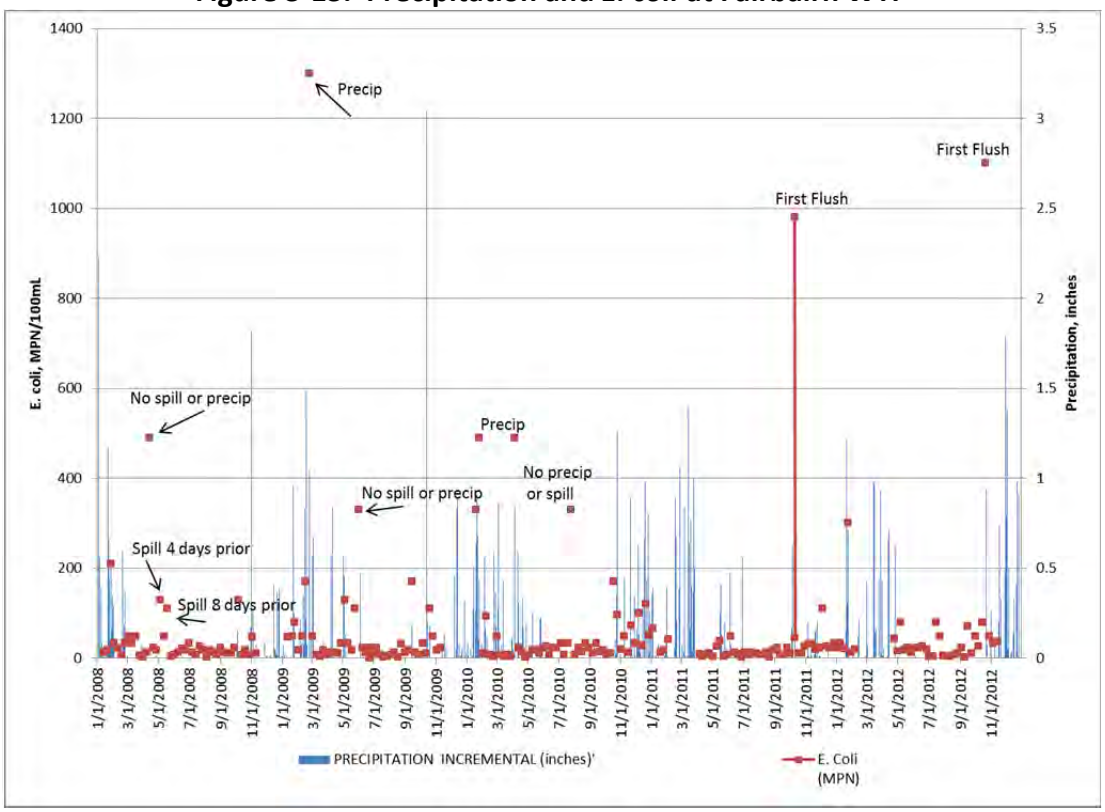
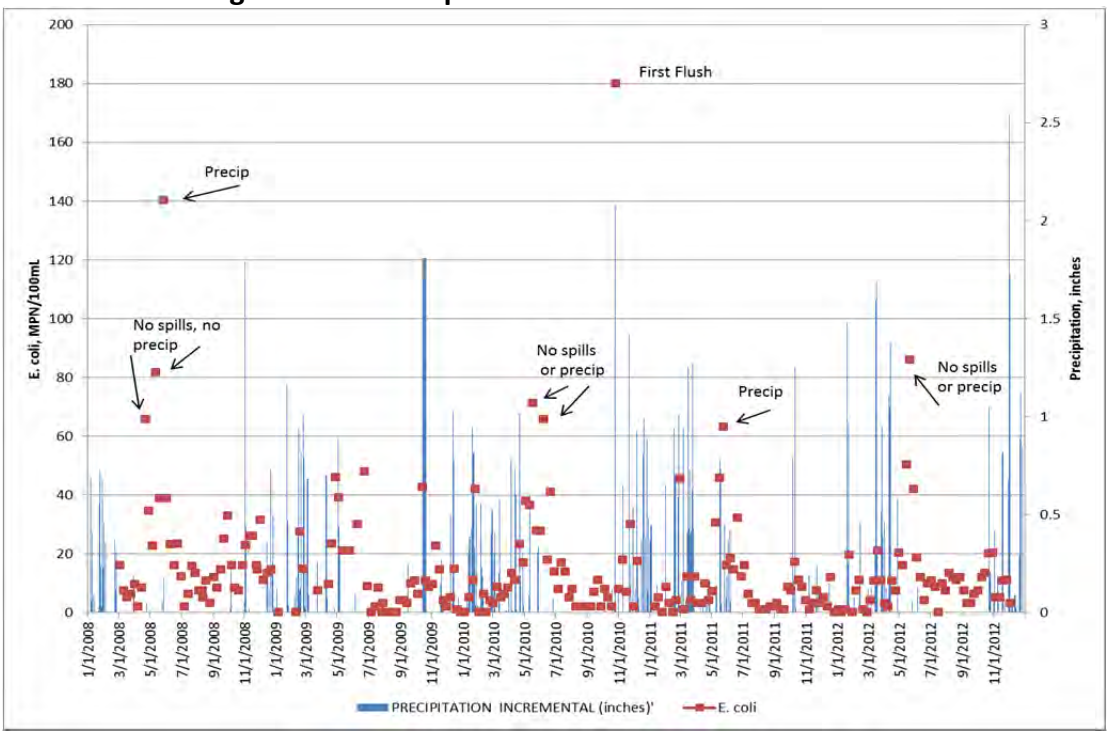


Figure 3-14. Precipitation and *E. coli* at Coloma WTP



Summary of Results for Fecal Coliform and E. coli

- Median *E. coli* and fecal coliform values range from 2 MPN/100mL at the City of Folsom and Strawberry WTPs, to 23 MPN/100mL at Lower American River, Mile 17.5 (Carmichael Water District).

- Median *E. coli* values generally appear to increase from upstream to downstream. As expected, average *E. coli* values are much higher than the median, indicating the influence of peak storm events.

- Generally, fecal coliform and *E. coli* monthly medians are below 200 MPN/100mL for all the water treatment plants. The Bajamont WTP had four monthly medians above 200 MPN/100mL; however, these samples were collected prior to the Ranney Collector and do not reflect the lower levels of the diverted raw water at the plant influent. Therefore the current level of treatment of 3/4-log reduction for *Giardia* and viruses appears to continue to be appropriate for all water treatment plants.

- Coloma WTP source water is impacted by storm events, but may also be impacted by waterfowl on Lake Natoma as *E. coli* increases in late spring and early fall.

- Fairbairn WTP source water is primarily impacted by winter storm events and first flush events.

Evaluation for Giardia and Cryptosporidium

An updated evaluation for *Giardia* and *Cryptosporidium* was not conducted as no new data has been required to be collected by the participating water utilities since the 2008 Update report.

Disinfection By-Product Precursors (Total Organic Carbon)

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. These are discussed in **Appendix C**. Since the American River does not have detectable levels of bromide, TOC is the key precursor for DBPs. The most common DBPs are total trihalomethanes (TTHM), which can cause liver, kidney, or central nervous system problems, as well as an increased risk of getting cancer. 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, recreation, wastewater sources, as well as natural sources such as wildlife, in the American River watershed.

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

Evaluation

Table 3-12 provides a summary of TOC data at each of the plant intake locations as well as the CMP data. **Table 3-12** shows that the average water treatment plant intake TOC levels range from 0.97 mg/L at the North Fork American River Pumping Station (ARPS) to 3.1 mg/L at Discovery Park. Overall, the highest averages and medians in the source water are associated with the CMP data for Nimbus Dam and Lower American River at Discovery Park. This is likely due to the use of TOC analytical method Standard Method (SM) 5310B which uses combustion. The combustion method causes complete destruction of the carbon material (including both dissolved and particulate organic matter) and typically results in higher detected values than SM 5310C, which uses wet oxidation.

Table 3-12
Total Organic Carbon Summary Statistics, mg/L, 2008 - 2012

Sample Site	Total Organic Carbon, mg/L			Frequency of Monitoring
	# Samples	Average	Median	
North Fork at ARPS (PCWA)[1]	20	0.97	0.96	Quarterly
South Fork at Strawberry WTP (EID)	62	1.87	1.78	Monthly
Main Canal at Reservoir One WTP (EID)	46	1.8	1.76	Monthly
Folsom Lake at El Dorado Hills WTP (EID)	51	1.68	1.58	Monthly
Folsom Dam (City of Folsom)	60	1.39	1.4	Monthly
Folsom Dam (Folsom State Prison)	60	1.8	1.6	Monthly
Folsom Dam (San Juan Water District)	60	1.5	1.0	Monthly
Folsom Dam (City of Roseville)	59	1.5	1.4	Monthly
Nimbus Dam (CMP)[3]	28	2.5	2.4	Every other month
Folsom South Canal (GSWC)	39	1.6	1.5	Monthly/ Quarterly (2011/2012)
Lower American River at Fairbairn WTP (City of Sacramento)[1]	51	1.49	1.42	Monthly
Lower American River at Discovery Park (CMP)[2]	28	3.1	3	Every other month

[1] Based on data from January 2008 through November 2012
[2] Based on data from August 2007 through May 2012

Figure 3-15 shows that for the water treatment plants above Folsom Lake, source water TOC levels are higher at Reservoir One, Strawberry and EDH WTPs compared to the Foothill WTP.

Figure 3-15. Total Organic Carbon, WTPs Above Folsom Lake, mg/L

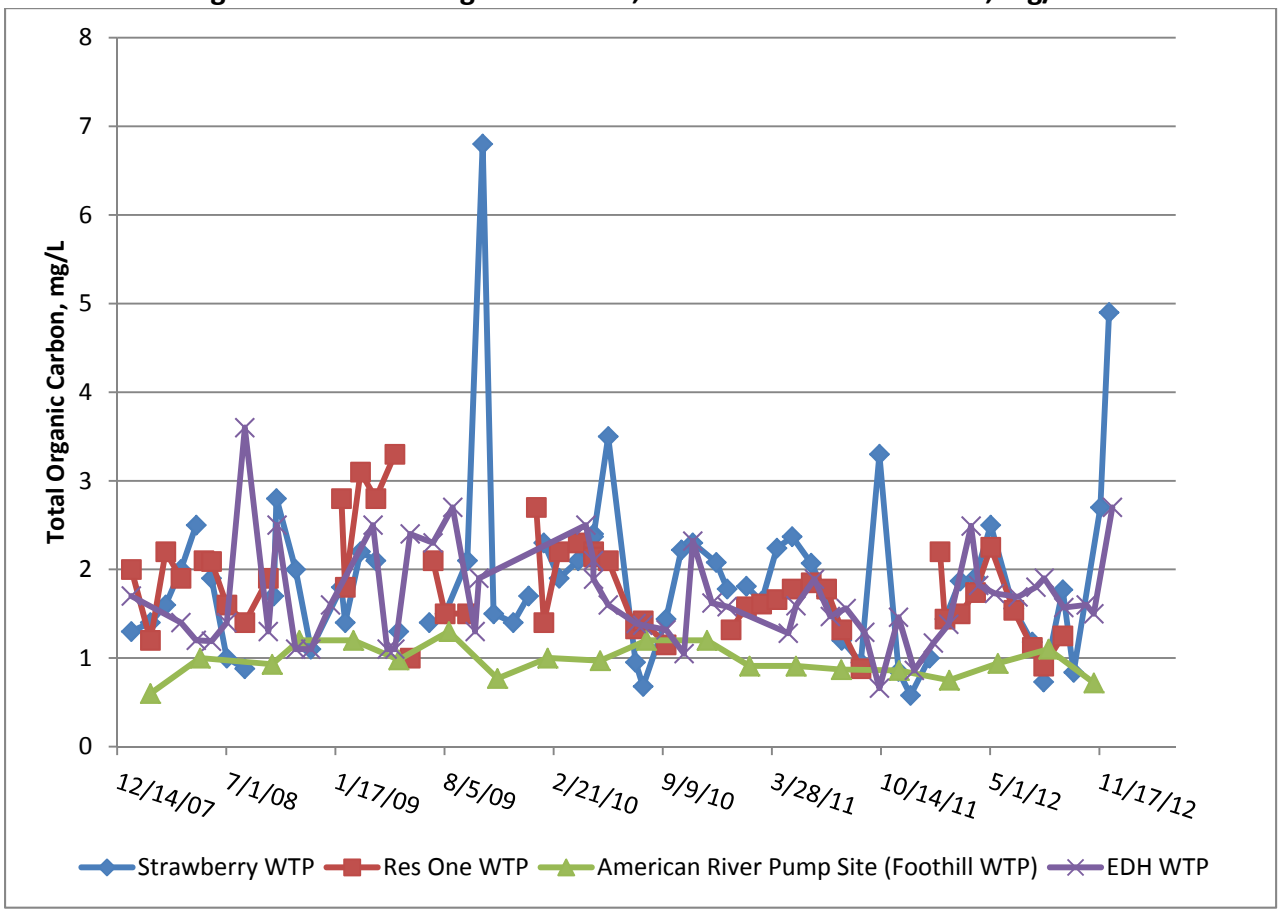
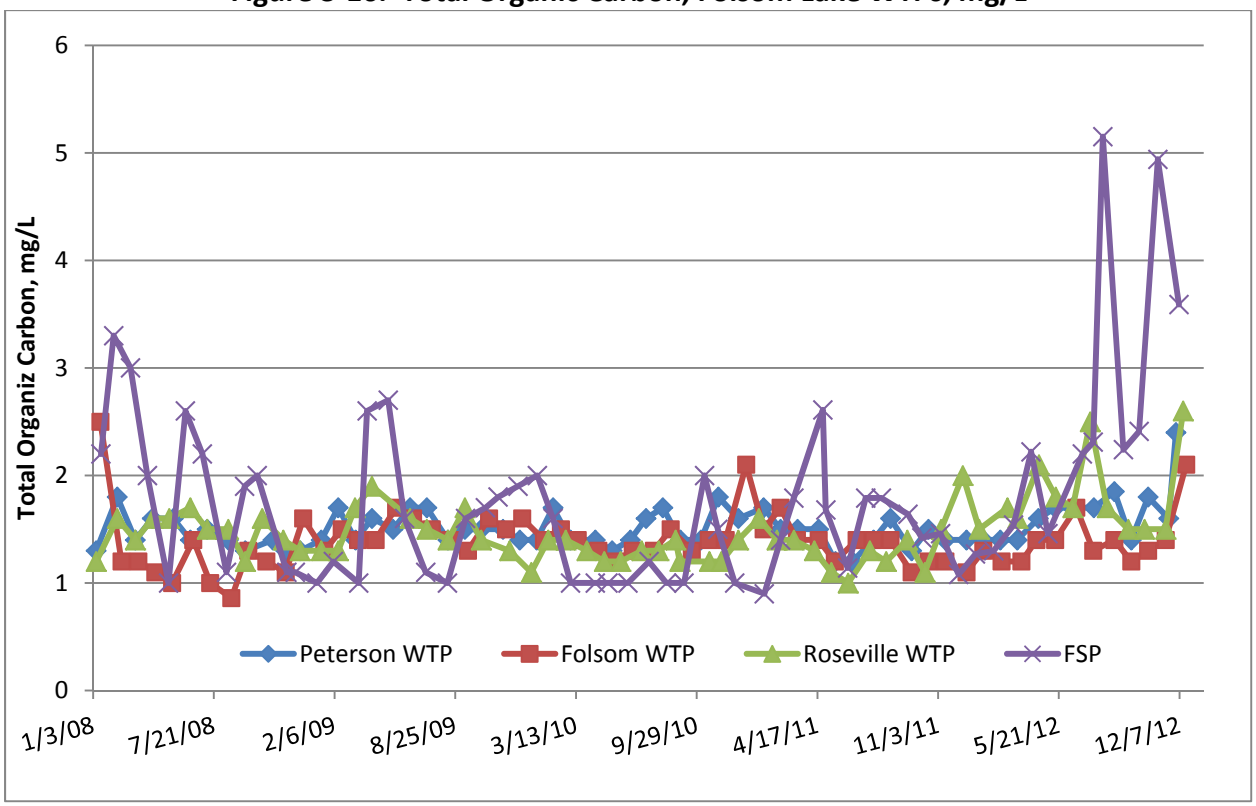


Figure 3-16 shows that for the Folsom Lake water treatment plants, TOC levels are similar for all of the water treatment plants except for the FSP WTP, which shows higher TOC concentrations. FSP WTP lab reports indicate that the TOC analytical method switches between SM 5310B and SM 5310C. The other Folsom Lake water treatment plants use analytical method SM 5310C, which employs wet oxidation. This is likely why some of the FSP WTP TOC concentrations are higher. It should be noted that both methods are acceptable to USEPA and DPH for analyzing the amount of TOC in the source and treated water. Many agencies utilize wet oxidation because it assesses the amount of carbon readily available in the water to react with disinfectants to contribute to DBP levels in the treated water.

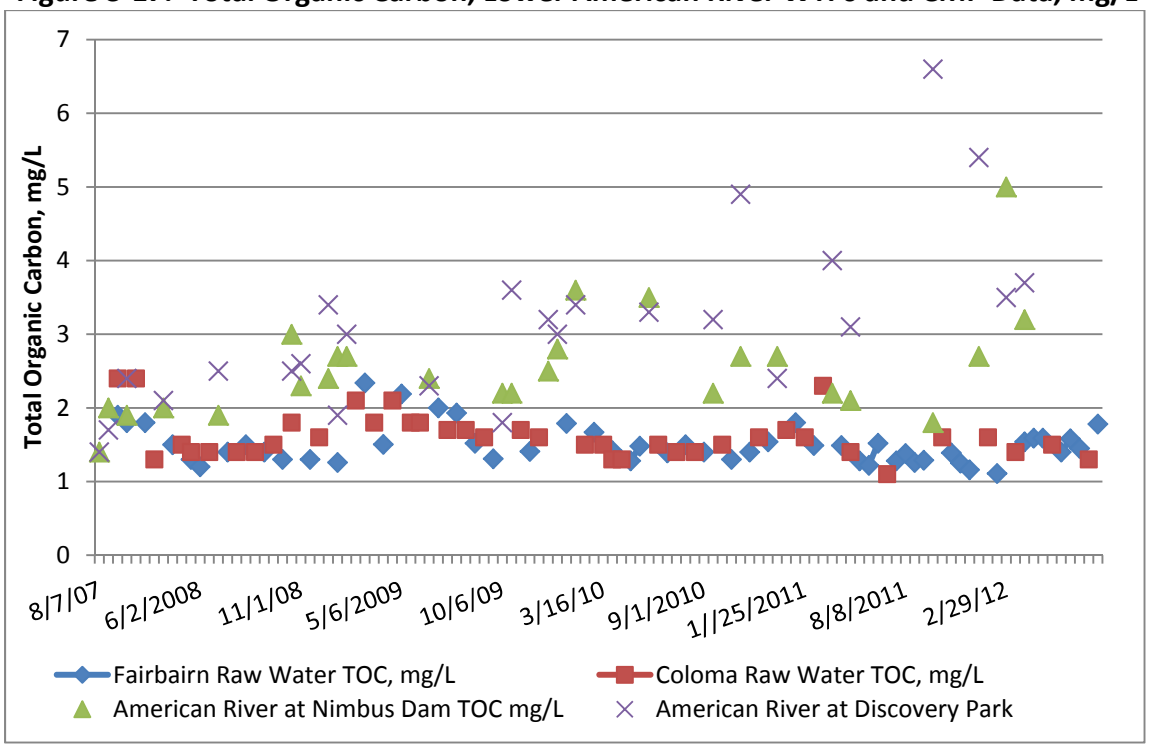
Figure 3-16. Total Organic Carbon, Folsom Lake WTPs, mg/L



There does not appear to be a strong seasonal trend with source water TOC levels, although peaks are normally associated with storm events. The highest source water concentrations for the Folsom, Roseville, and Peterson WTPs occurred in the winter. The highest Folsom WTP TOC concentration was 2.5 mg/L in January 2008, the highest Roseville WTP TOC concentration was 2.6 mg/L in December 2012, and the highest Peterson WTP TOC concentration was 2.4 mg/L in December 2012.

Figure 3-17 shows that TOC concentrations are fairly similar for the Lower American River water treatment plants, with most values less than 2.0 mg/L. The Fairbairn WTP only had two samples above 2.0 mg/L, and the Coloma WTP had four samples above 2.0 mg/L. All samples were below 2.5 mg/L. The Sacramento CMP data is consistently higher than the water treatment plant data. In addition to the differences in test method and sampling locations, this may also be due to the majority of the Sacramento CMP data being sampled during storm events. Additionally, as discussed earlier, the CMP uses SM 5310B for TOC analysis, which is a combustion method; this method typically produces higher results.

Figure 3-17. Total Organic Carbon, Lower American River WTPs and CMP Data, mg/L



Summary of Results for Disinfection By-Product Precursors (TOC)

- Average water treatment plant intake TOC levels range from 0.97 mg/L to 1.9 mg/L.
- Similar to turbidity, TOC levels continue to be relatively stable throughout the watershed.
- With the exception of the Strawberry, Reservoir One, EDH, and FSP WTPs, all other water treatment plants have source water TOC levels less than 2.0 mg/L, 90 percent of the time or greater. Higher TOC values at Strawberry, Reservoir One, EDH, and FSP WTPs were likely due to usage of analytical method SM 5310B. Additional information on TOC levels at EID's water treatment plants will be discussed further in **Section 5.**
- Peaks in TOC data are typically associated with storm events.

Volatile and Synthetic Organic Compounds

General Characteristics and Background

Most volatile organic compounds (VOCs) and synthetic organic compounds (SOCs) are formulated for, or are by-products from, industrial, agricultural, and urban use. Pesticides are a main subgroup of the SOCs used for agriculture and urban application. Many of these constituents have been regulated by the Phase I, II, and V regulations. These USEPA regulations

updated National Interim Primary Drinking Water Regulations for VOCs and SOCs in the late 1980s and early 1990s; they are discussed further in **Appendix C**.

Evaluation

Throughout the period of study there were no reported detections of any VOCs or SOCs monitored at the drinking water intakes. There have been very low-level detects, in nanograms per liter (ng/L), of regulated and unregulated organics at Sacramento CMP sites as shown in **Tables 3-13 through 3-15.** At Nimbus Dam, organics were detected in four percent of all samples collected from October 2007 to May 2012. At Business 80 Overpass, organics were detected in 11 percent of all samples collected from October 2007 to June 2008. Sampling was discontinued at the Business 80 Overpass location after June 2008. At Discovery Park, organics were detected in 14 percent of all samples collected from October 2007 to May 2012. There was only one detect above an MCL, and one detect above a DPH Notification Level (NL). Specifically, N-nitro-di-n-propylamine was detected at Nimbus Dam at 50 ng/L on February 9, 2010, which is above its Notification Level of 10 ng/L. Bis (2-ethylhexyl) phthalate was detected at Discovery Park on October 24, 2010 at 4,220 ng/L, which is slightly above its MCL of 4,000 ng/L. This constituent has numerous uses but is largely used as a plasticizer for polyvinyl chloride materials, including medical and laboratory devices, and it has been noted as a possible laboratory contaminant if proper quality assurance and quality control are not implemented.

Potential sources for these organic chemicals in the American River watershed include urban runoff from the Sacramento urban area or upstream urban areas, illegal discharges, industrial stormwater runoff, and wastewater spills. Sacramento area urban runoff has been extensively tested for organic chemicals and reports show that many of the VOCs and SOCs detected in the river system have also been detected in urban runoff. The sporadic, low level, detection of organic chemicals is not expected to currently pose any complications for water treatment.

Summary of Results for Volatile and Synthetic Organic Compounds

- There were no detects of any VOCs or SOCs at any of the existing water treatment plant intakes.

- Discovery Park had more detections of organics compared to Nimbus Dam. The most frequently detected organics at Discovery Park were pyrene, fluoranthene, phenanthrene, and naphthalene. The most frequently detected organics at Nimbus Dam were naphthalene and phenanthrene.

- N-nitro-di-n-propylamine was detected at Nimbus Dam above its DPH Notification Level of 10 ng/L. Bis (2-ethylhexyl) phthalate was detected at Discovery Park at 4,220 ng/L, which is slightly above its MCL of 4,000 ng/L.

Table 3-13
Detected VOCs and SOCs at Nimbus Dam, 2007/2008 – 2011/2012

Date	Constituent	Concentration, ng/L	MCL or (NL), ng/L
10/9/2007	Fluoranthene	1.4	
	Naphthalene	3.1	17,000 (NL)
	Phenanthrene	2.7	
	Pyrene	1.2	
	Bis(2-ethylhexyl)phthalate	109	4,000
1/4/2008	Acenaphthene	1.5	
	Benzo(g,h,i)perylene	2.4	
	Fluoranthene	3	
	Napthalene	5.9	17,000 (NL)
	Phenanthrene	1.8	
	Pyrene	2.7	
	Bis(2-ethylhexyl)phthalate	310	4,000
2/5/2008	Napthalene	7	17,000 (NL)
6/11/2008	Napthalene	7.2	17,000 (NL)
10/7/2008	Napthalene	3.5	17,000 (NL)
	Phenanthrene	1.9	
11/1/2008	Phenanthrene	1.3	
2/3/2009	Napthalene	3.2	17,000 (NL)
	Phenanthrene	1	
2/12/2009	Napthalene	2.3	17,000 (NL)
12/11/2009	Phenanthrene	2.1	
1/18/2010	Napthalene	5.9	17,000 (NL)
	Bis(2-ethylhexyl)phthalate	622	4,000
2/9/2010	Phenanthrene	2.4	
	Bis(2-ethylhexyl)phthalate	144	4,000
	N-nitro-di-n-propylamine	50	10

Table 3-14
Detected VOCs and SOCs at Business 80 Overpass, 2007/2008 – 2011/2012

Date	Constituent	Concentration, ng/L	MCL or (NL), ng/L
10/9/2007	Bis(2-ethylhexyl)phthalate	104	4,000
1/4/2008	Acenaphthene	1.5	
	Benzo(g,h,i)perylene	3.1	
	Benzo(k)fluoranthene	2.8	
	Chrysene	5.4	
	Fluoranthene	7.2	
	Fluorene	1.7	
	Indeno(1,2,3,c,d)pyrene	5.3	
	Napthalene	8	17,000
	Phenanthrene	7.6	
	Pyrene	8.4	
	Bis(2-ethylhexyl)phthalate	635	4,000
2/5/2008	Bis(2-ethylhexyl)phthalate	153	4,000

Table 3-15
Detected VOCs and SOCs at Discovery Park, 2007/2008 – 2011/2012

Date	Constituent	Concentration, ng/L	MCL or (NL), ng/L
10/10/2007	Anthracene	1.2	
	Chrysene	1	
	Fluoranthene	1.8	
	Fluorene	1.3	
	Pyrene	1.8	
1/5/2008	Acenaphthene	1.4	
	Benz(a)anthracene	1.8	
	Chrysene	4.6	
	Fluoranthene	7.5	
	Fluorene	2.5	
	Napthalene	8.1	17,000 (NL)
	Phenanthrene	6.6	
	Pyrene	7.1	
	Bis(2-ethylhexyl)phthalate	143	4,000
2/6/2008	Napthalene	10.7	17,000 (NL)
	Bis(2-ethylhexyl)phthalate	141	4,000
6/11/2008	Fluoranthene	2.6	
	Napthalene	4.9	17,000 (NL)
	Pyrene	2.3	
10/7/2008	Bis(2-ethylhexyl)phthalate	101	4,000
11/1/2008	Fluoranthene	2.5	
	Fluorene	2.1	
	Napthalene	1.4	17,000 (NL)
	Phenanthrene	2.3	
	Pyrene	2.3	
12/15/2008	Fluoranthene	7.1	
	Fluorene	1.6	
	Napthalene	17.3	17,000 (NL)
	Phenanthrene	8.8	
	Pyrene	5.9	
2/3/2009	Fluoranthene	1.4	
	Napthalene	4	17,000 (NL)
	Phenanthrene	1.5	
	Pyrene	1	

Table 3-15 Cont'd
Detected VOCs and SOCs at Discovery Park, 2007/2008 – 2011/2012

Date	Constituent	Concentration, ng/L	MCL or (NL), ng/L
2/12/2009	Acenaphthene	1	
	Chrysene	2.7	
	Fluorene	2.1	
	Napthalene	1.4	17,000 (NL)
	Phenanthrene	2.3	
	Pyrene	2.3	
6/9/2009	Fluoranthene	1.3	
	Phenanthrene	1.3	
	Pyrene	1.6	
10/6/2009	Napthalene	2.1	17,000 (NL)
10/13/2009	Benz(a)anthracene	4	
	Chrysene	2.2	
	Fluoranthene	2.1	
	Napthalene	9.8	17,000 (NL)
	Pyrene	3.2	
	Bis(2-ethylhexyl)phthalate	225	4,000
12/11/2009	Benz(a)anthracene	3.1	
	Chrysene	1.7	
	Fluoranthene	2.8	
	Fluorene	1.5	
	Bis(2-ethylhexyl)phthalate	115	4,000
	Phenanthrene	2.3	
	Pyrene	2.1	
1/18/2010	Benz(a)anthracene	1.6	
	Benzo(a)pyrene	4.6	200/7
	Benzo(g,h,i)perylene	1	
	Benzo(k)fluoranthene	4.4	
	Chrysene	4.6	
	Bis(2-ethylhexyl)phthalate	139	4,000
	Fluoranthene	5.1	
	Indeno(1,2,3,c,d)pyrene	6.1	
	Napthalene	6.3	17,000 (NL)
	Phenanthrene	3.6	
	Pyrene	5.6	

Table 3-15 Cont'd
Detected VOCs and SOCs at Discovery Park, 2007/2008 – 2011/2012

Date	Constituent	Concentration, ng/L	MCL or (NL), ng/L
2/9/2010	Fluoranthene	1.3	
	Phenanthrene	2.2	
	Pyrene	1.5	
6/8/2010	Benz(a)anthracene	1.26	
	Benzo(g,h,i)perylene	2.84	
	Benzo(k)fluoranthene	1.3	
	Chrysene	2.88	
	Dibenz(a,h)anthracene	2.45	
	Fluoranthene	3.07	
	Indeno(1,2,3,c,d)pyrene	3.62	
	Phenanthrene	2.48	
	Pyrene	2.35	
10/24/2010	Benz(a)anthracene	2	
	Benzo(g,h,i)perylene	7.64	
	Chrysene	4.71	
	Fluoranthene	9.66	
	Fluorene	1.77	
	Indeno(1,2,3,c,d)pyrene	3.56	
	Phenanthrene	5.67	
	Pyrene	12.5	
	Bis(2-ethylhexyl)phthalate	4,220	4,000
1/21/2012	Pyrene	5.62	

Detectable Title 22 Constituents of Interest

A review of the Consumer Confidence Reports (CCRs) and Public Health Goal (PHG) Reports was conducted for each participating water utility to identify detectable constituents of interest in the source water. This review resulted in no persistently detected constituents of interest based on currently available source water data. There were four MCL violations over the reporting period for the participating water utilities.

The Folsom WTP had an MCL violation reported on the 2010 and 2011 CCR for manganese. The average manganese concentration was 327 micrograms per liter (µg/L) in 2010, ranging from ND to 1,500 µg/L, which exceeded the MCL of 50 µg/L. The average manganese concentration was 200 µg/L in 2011, ranging from ND to 1,400 µg/L. The cause was attributed to the use of potassium permanganate at the water treatment plant several years ago.

In November 2009, the Golden State Water Company's (GSWC) Cordova water system had 9 percent of the monthly samples positive for total coliform. This occurred on November 3, 2009 when six out of twelve routine coliform samples were reported as total coliform positive. No *E. coli* was present. Eighteen follow-up samples were collected on November 5th, and all samples were absent for coliforms. GSWC evaluated the status of physical works and operating procedures which may have attributed to the occurrence, but no definitive cause was identified.

The other MCL violation occurred at EID's Strawberry WTP for exceeding the MCL for HAA5 in the distribution system, as reported on the 2012 CCR.

Hexavalent Chromium and NDMA Monitoring

Many of the utilities have initiated sampling for hexavalent chromium and n-Nitrosodimethylamine (NDMA). Hexavalent chromium will soon have a primary MCL and NDMA has a current DPH Notification Level. As shown in **Table 3-16**, the City of Sacramento, EID, GSWC, and Carmichael Water District have sampled for NDMA in the American River. Placer County Water Agency (PCWA), SJWD and the City of Sacramento have also monitored for hexavalent chromium during the study period, as shown in **Table 3-17**.

The detectable levels of NDMA in EID's Main system were found in the distribution system and are not suspected of being associated with the American River source water. Specifically, NDMA at the "275 Hidden Bridges" distribution site was detected at 2.6 ng/L in 2009 and at 3 ng/L in 2010. The detectable levels in GSWC's Cordova system are due to levels found in groundwater, and not from the American River supply.

Hexavalent chromium is currently regulated under the total chromium MCL of 50 µg/L. In July 2011 the Office of Environmental Health Hazard Assessment (OEHHA) established a PHG for hexavalent chromium of 0.02 µg/L. DPH has developed a draft MCL that is specific for hexavalent chromium, using that PHG. The draft MCL was proposed in August 2013 at 10 µg/L.

An enforceable MCL is anticipated to be established in 2014 as discussed in **Appendix C**. USEPA is conducting a human health assessment to determine if the current chromium standard should be revised.

Table 3-16
NDMA Sampling Results for Treated American River

Year Sampled	Agency	Result (ng/L)	DL (ng/L)
2009	EID (Main system)	ND – 2.6	2
2010	EID (Main system)	ND- 3	2
2009	GSWC (Cordova system)	ND – 7.8	1.9
2010	GSWC (Cordova system)	ND – 4.2	1.9
2008	CWD treated	ND	2
2009	CWD treated	ND	2
2009	City of Sacramento, 5 SJ	ND	2
2010	City of Sacramento, 5 SJ and EAWTP treated water	ND	2
11/21/2008 2/12/2009 5/14/2009 8/13/2009	SJWD, 8025 Ramsgate and Clearwell	ND	2

Table 3-17
Hexavalent Chromium Sampling Results for American River

Year Sampled	Agency	Result (µg/L)	DLR (µg/L)
2/7/2013	PCWA	0.13	0.020
4/23/2013	PCWA	0.19	0.030
11/30/2009	SJWD Peterson WTP (Raw)	ND	10
10/28/2010	SJWD Peterson WTP (Raw)	ND	10
7/10/2012	City of Sacramento – Fairbairn WTP Raw	0.061	0.03
7/10/2012	City of Sacramento – Fairbairn WTP Tap	0.07	0.03

Summary of Results for Hexavalent Chromium and NDMA Monitoring

- Very low levels of NDMA have been detected in EID's Main system treated water, but the source is unknown. Detectable levels of NDMA in GSWC's Cordova system are due to levels found in their groundwater supply system, and not from the American River source. All results were below the current DPH Notification Level of 10 ng/L.

- Limited monitoring for hexavalent chromium has been conducted by the participating water utilities and indicates it will not be a regulatory concern for an MCL of 10 µg/L.

IMPACT OF TEMPERATURE CONTROL DEVICE AT FOLSOM DAM

Operation of the Temperature Control Device (TCD) for the water diverters at Folsom Dam began in June 2003. In evaluating water quality impacts to the participating water utilities diverting at Folsom Dam, water temperature, DBPs, and TOC were examined.

Water Temperature

Figure 3-18 shows water temperature at Folsom Dam from 1992 to 2012. It is apparent that since the TCD began operating in June 2003, the duration of the peak water temperature period has been lengthened for each year. Prior to the operation of the TCD, peak water temperature for each year normally lasted one to two months; however, since June 2003 this can now last for three to four months, typically from July to October.

Figure 3-18. Monthly Average Temperature at Folsom Dam, 1992 - 2012

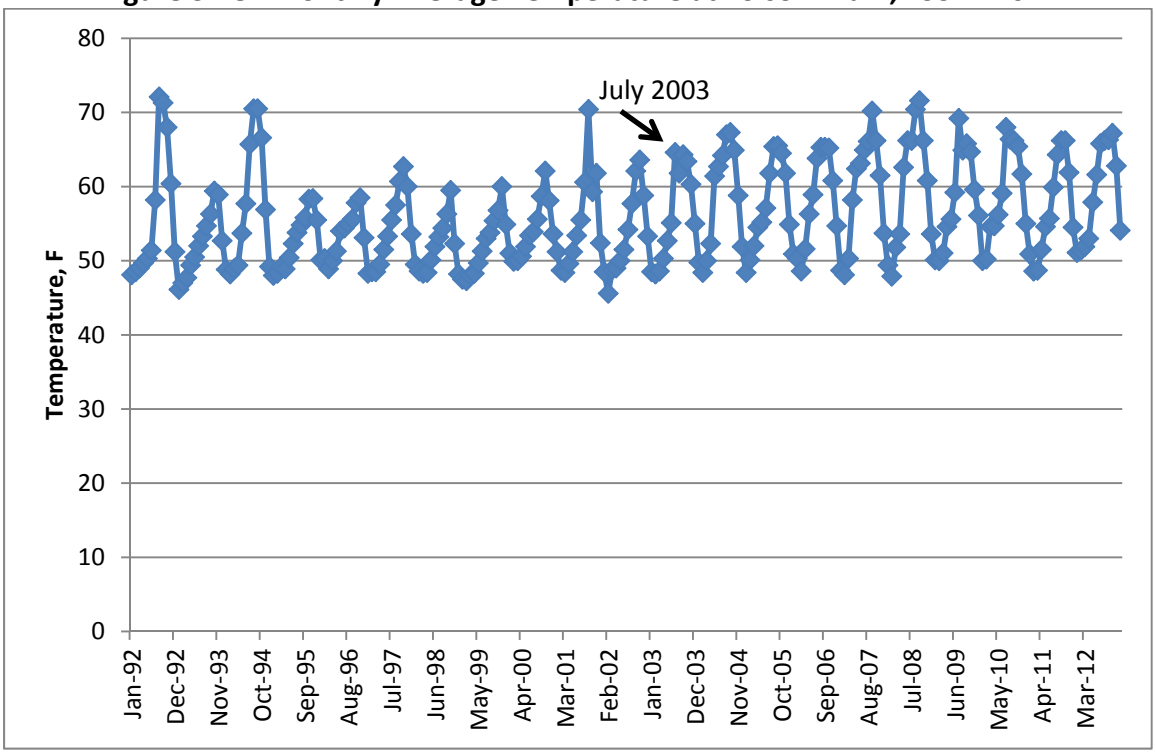


Table 3-18 shows the historic water temperature at Folsom Dam, broken into two time periods to represent pre-TCD and post-TCD operation. The pre-TCD time period is from January 1992 to June 2003, and the post-TCD time period is from July 2003 to December 2012. On average, the temperature has increased 4.9°F since the operation of the TCD. In the 2008 Update report the average temperature increased 4.3°F, so the warming trend continues.

Table 3-18
Water Temperature (°F) at Folsom Dam, pre- and post-TCD Time Periods

	Pre-TCD operation (January 1992 to June 2003)	Post-TCD operation (July 2003 to December 2012)	Difference
Minimum	45.6	47.9	
Maximum	72.1	71.6	
Average	53.8	58.6	4.9
Median	52.6	59.2	6.6

To further examine changes in water temperature, pre- and post-TCD time periods were compared for the July through November time periods only, as shown in **Table 3-19**. In the 2008 Update report, the data showed that since the TCD had been in operation, the average water temperature from July through November increased 5°F, from 59.1°F to 64.2°F after the TCD began operation. Using the current data through 2012, the average water temperature from July through November increased 5.7°F, from 59.1°F to 64.8°F after the TCD began operation. Again, this supports an overall increase in temperature and further evidence of a warming trend.

Table 3-19
Water Temperature (°F) at Folsom Dam, pre- and post-TCD Time Periods, July through November Data Only

	Pre-TCD operation (January 1992 to June 2003) July through November only	Post-TCD operation (July 2003 to December 2012) July - November only	Difference
Minimum	52.3	58.8	
Maximum	72.1	71.6	
Average	59.1	64.8	5.7
Median	58.2	65.3	7.1

Disinfection By-Products

A detailed evaluation of DBPs was conducted only for the SJWD data for this evaluation, as their water treatment plant and distribution system operations have had little changes during the 1992 to 2010 evaluation period and can provide good pre- and post-TCD comparison. The DBP data for the City of Folsom dated back only to 2002 which provided a limited data set; in addition, they have been implementing distribution system management strategies since 2006 to address rising DBP concerns, so this data set was not evaluated in detail. The City of Roseville changed monitoring sites in 2002, which would also not allow a comparison over an extended period of time. In order to evaluate the same four monitoring sites since 1999, the

2011 and 2012 SJWD DBP data were not included in the analysis as they began monitoring for Stage 2 D/DBP Rule compliance and two of the four Stage 1 sites were revised.

As shown in **Figure 3-19**, there has been an increase in TTHMs since the TCD began operation in June 2003.

Figure 3-19. SJWD Distribution System – Quarterly Average TTHM, 1999 – 2010

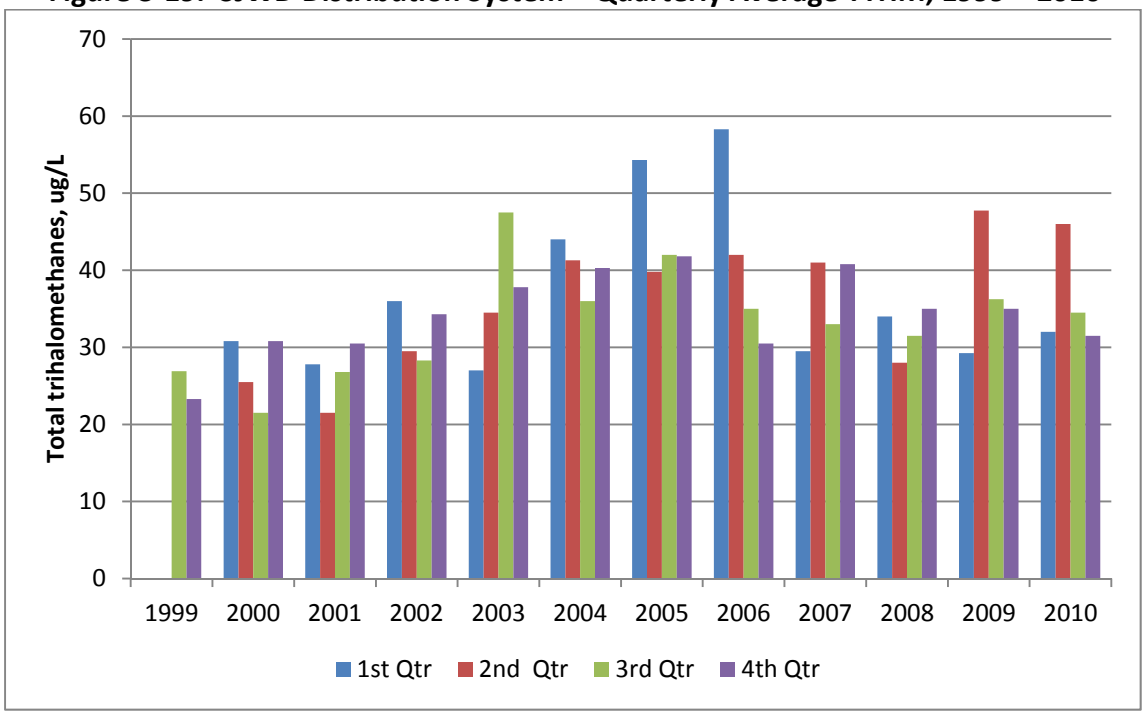


Table 3-20 shows that TTHM formation has increased for all quarters, continuing the same trend from the 2008 Update report. However, only a small percent increase (4.4 percent) was seen in the most recent first quarter TTHM data. The percent increases for the second, third and fourth quarter averages have increased by 46.2 percent, 31.7 percent, and 13.8 percent, respectively, from the pre-TCD period to the most recent post-TCD period.

Table 3-20
Comparison of SJWD Distribution System Average TTHM (µg/L) by Quarter, Pre- and Post-TCD Operation

	Pre-TCD (1999-2003)	Post-TCD (2004-2007)	Post-TCD (2008-2010)	Percent Increase from Pre-TCD to Post TCD 2004-2007	Percent Increase from Pre-TCD to Post TCD 2008-2010
First Qtr. Average	30.4	46.5	31.8	53.0	4.4
Second Qtr. Average	27.8	41.0	40.6	47.8	46.2
Third Qtr. Average	25.9	38.7	34.1	49.6	31.7
Fourth Qtr. Average	29.7	38.2	33.8	28.6	13.8

Overall, the average TTHM RAA prior to the operation of the TCD was 28 µg/L, which increased to 38.4 µg/L after the TCD began operation, representing a 37 percent increase.

As shown in **Figure 3-20**, there has been an increase in HAA5 levels also since the TCD began operation in June 2003.

Figure 3-20. SJWD Distribution System – Quarterly Average HAA5, 1999 - 2010

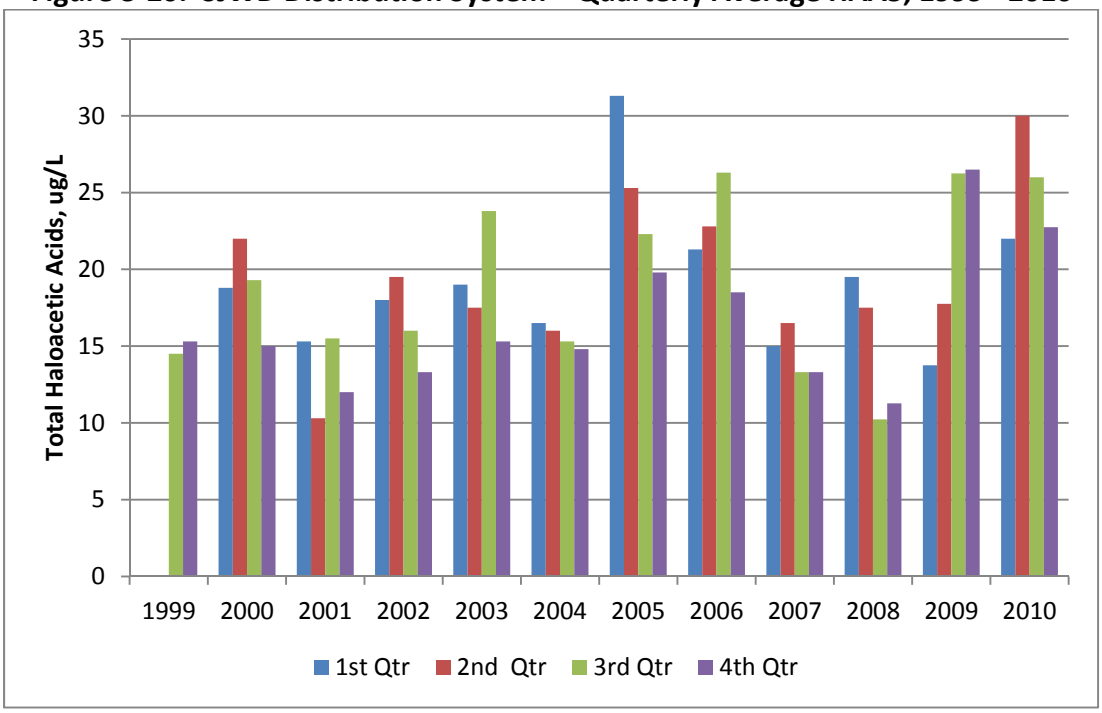


Table 3-21 shows that HAA5 formation has increased for all quarters, continuing the same trend from the 2008 Update report. However, only a small percent increase (3.6 percent) was seen in the most recent first quarter HAA5 data. The percent increases for the second, third and fourth quarter averages have increased by 25.5 percent, 27.6 percent, and 45.1 percent, respectively, from the pre-TCD period to the most recent post-TCD period.

Table 3-21
Comparison of SJWD Distribution System Average HAA5 (µg/L) by Quarter, Pre- and Post-TCD Operation

	Pre-TCD (1999-2003)	Post-TCD (2004-2007)	Post-TCD (2008-2010)	Percent Increase from Pre-TCD to Post TCD 2004-2007	Percent Increase from Pre-TCD to Post TCD 2008-2010
First Qtr. Average	17.8	21.0	18.4	18.3	3.6
Second Qtr. Average	17.3	20.2	21.8	16.3	25.5
Third Qtr. Average	16.3	20.2	20.8	23.7	27.6
Fourth Qtr. Average	13.9	16.3	20.2	17.6	45.1

Overall, the average HAA5 RAA prior to the operation of the TCD was 16 µg/L, which increased to 19.3 µg/L after the TCD began operation, representing a 20.6 percent increase.

Total Organic Carbon

TOC levels in source water were also examined. The water quality analysis is limited as SJWD only collected 25 samples from February 1998 through June 2003, representing the pre-TCD condition. However, the average of the available data from February 1998 through June 2003 was 1.4 mg/L, and the average from July 2003 through December 2007 (2008 Update report) and from July 2003 through December 2012 was 1.5 mg/L. Median TOC in American River water at the Peterson WTP intake was the same pre-TCD and for both post-TCD (July 2003 to December 2007 and July 2003 to December 2012) time periods, at 1.4 mg/L.

Conclusion

Data provided by the SJWD shows that there has been an increase in TTHM and HAA5 since the TCD at Folsom Dam became operational in June 2003. Although all quarters shown an increase in DBP levels, the first quarter TTHM and HAA5 show the least increase compared to the other three quarters. Since source water TOC levels have remained fairly stable from 1998 to 2012, it seems likely that the increase in water temperature of the diverted water caused by the installation and use of the TCD has contributed to higher DBP formation in the treated water and distribution systems of the participating water utilities diverting at Folsom Dam.

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SECTION 4 - WATERSHED CONTAMINANT SOURCES REVIEW

This section contains an evaluation of the seven watershed potential contaminant sources selected for review for the 2013 Update. The potential contaminating activities that were selected for review as part of the 2013 Update include:

- Forest activities, including timber harvesting, forest fires, and off-highway vehicle use,
- Recreation, including body and non-body contact and white-water rafting,
- River corridor activities, including goose management at Lake Natoma, illegal camping, and pet waste management,
- Source water spills,
- Urban runoff,
- Wastewater collection and treatment facilities, and
- Aerojet industrial facility.

In addition, six special topics were identified for investigation and summary. This included; projected population growth in the watershed, upper watershed management programs, the Central Valley Regional Water Quality Control Board's (Regional Board) Drinking Water Policy, climate change, selected invasive species, and reservoir operations. These topics are summarized only for informational purposes.

It should be noted that there are other potential contaminating activities in the watershed, such as wildlife, other industrial dischargers, and agriculture, which have been assessed previously and were not selected for inclusion in this 2013 Update due to their historically stable nature. Research programs on local wildlife as pathogen sources has had limited funding, and the other industrial dischargers were previously assessed and determined to be of low significance to the American River water utilities. General watershed runoff is discussed through the presentation of the potential contaminating activities that may impact the quality of the runoff, such as forest activities, recreation, and river corridor activities.

Agriculture in the upper watershed was briefly reviewed to ensure that there have not been significant changes in portions of the watershed that may have the potential to impact water quality. The United States Department of Agriculture agricultural census was reviewed for 2002 and 2007 to see if there have been any changes in the acreage of irrigated agriculture in El Dorado and Placer County, and any changes were negligible. A review of the Sacramento Valley Water Quality Coalition Conditional Waiver of Waste Discharge through the Irrigated Lands Regulatory program was conducted to look at potential areas of water quality impact or concern, and none were identified in the American River watershed. Also, a review of the California Department of Pesticide Regulation's pesticide use reporting showed that there have been no significant increases in acreage or pounds applied in agricultural pesticides. Therefore, it was determined by the Technical Committee that agricultural activities would not be added to this survey, but this topic would be considered during the scoping of the next update.

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.

FOREST ACTIVITIES

Since much of the watershed is covered by coniferous forest and a large portion of the upper watershed is part of the Tahoe and Eldorado National Forests, the activities occurring on these lands are critical to the long-term quality of the water supply. This study identified timber harvesting, wildfires, and off-highway vehicle use 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 increased access for other forest users, increased soil erosion, and increased nutrient loading to the tributary waterways. The United States Department of Agriculture Forest Service (USFS) and the State Water Resources Control Board (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 based on type of ownership.

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. Associated with the solids can be total organic carbon (TOC) and nutrients. Another less significant concern is the use of pesticides and herbicides in silviculture and revegetation programs.

Presence in the Watershed

As described in **Section 2,** much of the upper American River watershed, above Folsom Lake, is covered with coniferous forest. Harvesting activities can occur in much of the upper watershed, but more commonly in those locations greater than 3000 feet of elevation. 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. These agencies do not track statistics on the quantity of acres actually harvested in a timely manner, so there are limited means to accurately estimate this activity 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.

The Placer and El Dorado counties Agricultural Commissioners track 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 counties. **Table 4-1** provides a summary of the annual timber harvest between 2008 and 2012, as available by the county crop reports.

This table shows that over the study period nearly 310,000,000 board feet of timber was harvested in the upper watershed, with the slight majority occurring in El Dorado County (60 percent). This was significantly less than during the previous five year period (860,000,000), with most of that reduction occurring in El Dorado County. A large amount of the timber harvesting in the American River watershed is by commercial growers, such as Sierra Pacific Industries, who have management plans for regular harvesting.

Table 4-1
Timber Harvested in Placer and El Dorado Counties, board feet

	2008	2009	2010	2011	2012
Placer	23,129,000	11,092,000	42,071,000	28,703,000	20,951,000
El Dorado	47,169,000	22,256,000	21,840,000	42,628,000	48,547,000

CalFIRE also provided information on the number of Timber Harvest Plans (THPs), non-industrial Timber Management Plans (TMPs), emergency notifications, and exemptions approved or acted upon during the study period, and this is shown in **Table 4-2**.

Table 4-2
CalFIRE Timber Harvesting Approved in Placer and El Dorado Counties

	No. THPs/ Acreage	No. TMPs/ Acreage	No. Emergency Notifications/ Acreage	No. Exemptions/ Acreage	Total Acreage
Placer	28/13,353	2/249	13/888	263/108,325	122,815
El Dorado	30/10,602	5/863	14/434	212/121,433	133,332

The data presented in **Table 4-2** shows that there was a 35 percent decrease in the acreage for THPs and TMPs during the past five years, as compared with the last study period (2003 to 2007). There was a larger decrease in El Dorado County (40 percent) than in Placer County (30 percent). The numbers for emergency notifications and exemptions were not included in the 2008 Update report so a comparison was not made for change over time, but it can be seen that exemptions account for a very large amount of the total acreage (nearly 90 percent). This includes removals associated with fire hazards, dead/dying/diseased trees, forest fire prevention, fuel wood, Christmas trees, and utility right-of-ways.

Regulation and Management

As mentioned previously, there are two separate, parallel regulatory programs for timber harvesting. The USFS governs timber harvesting on federal lands according to the Forest Service Directives and the Land Management Plan for the region, while the 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. 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.

US Forest Service

The USFS requires proposed harvesters to submit a THP, prepared by a Registered Professional Forester (RPF), in accordance with the Forest Service Manual, Chapter 1921. 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 irreversible damage to soil slope or watershed conditions allowed
- Waterbodies must be protected from blockage, sediment, or temperature impacts
- Clear cutting is only allowed if it is the optimum method for forest health (rarely the case in Tahoe or Eldorado National Forests)
- Only trees of 30-inch diameter or greater (at breast height) can be harvested
- Maximum size limit for harvest is 40 to 60 acres in California
- No herbicide application is allowed

- Thinning from below is the preferred harvest method
- Revegetation plan is required and must be restocked within five years

In addition, both the Tahoe National Forest (TNF) and the Eldorado National Forest (ENF) implement fuel reduction and forest health projects (including timber harvesting) on an on-going basis to enhance watershed conditions.

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. THPs are valid to be operated on for three years, and then an owner may apply twice for annual extensions on the THP. The THPs are reviewed by CalFIRE, as well as the Regional Board, for possible impacts to receiving waters and cumulative impacts to the area. 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 (Restocking for Industrial Permittees)
- Pre-harvest on-site inspection by CalFIRE and other related state regulatory agencies (conducted for 95 percent of THPs).

Central Valley Regional Water Quality Control Board

In January 2003, the Regional Board adopted the Conditional Waiver of Waste Discharge Requirements Related to Timber Harvest Activities. The Waiver was subsequently renewed by the Regional Board in 2010 (R5-2010-0022) and modified by the State Board in 2011 (Order WQ 2011-0014 DWQ) to simplify the enrollment process. The Regional Board reviews approximately 200 THPs per year, and as of March 2011 there were 767 plans enrolled in the Central Valley.

The Waiver applies to all federal and state lands and must be completed prior to harvest activities. The Waiver specifies eligibility criteria and conditions that must be met in order to qualify for the waiver of waste discharge requirements. The Waiver must be obtained for all lands in the Central Valley, both public and private, prior to the commencement of activities.

The Waiver allows five categories of permittees, each with a specific set of eligibility criteria and conditions. The Waiver also contains monitoring and reporting conditions, which includes investigations of impacts to waterbodies. The Regional Board has developed guidance documents to assist with implementation of the Waiver, specifically related to monitoring requirements.

State Water Resources Control Board

The State Board began development of statewide waiver for USFS (including timber harvest, roads, range, recreation, and fuel management) in order to streamline management policies 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 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 revised management practices to improve water quality protection related to the activities prioritized in the proposed statewide order. Some key new provisions include road, range, and recreation management policies; BMPs with adaptive management; and an expanded monitoring program.

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 continues to show that the water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season. This could be contributed to by timber harvesting and associated activities, such as storm runoff from dirt access roads and watercrossings. It should be noted that most of the water treatment plant intakes are downstream of reservoirs that serve to buffer many water quality impacts downstream, including turbidity.

As noted in **Sections 3** and **5**, there were again no detects of pesticides in the source or treated water for any water treatment plants. Also, there are no nutrient water quality concerns 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 can contribute to increased solids in

the receiving water and an increase in the turbidity of the raw water at the water treatment plants, especially from the first rains after significant wildfires.

It should be noted that in the western United States, a common wildfire fighting practice is to implement the use of aerial application of fire retardants. There is a variety of fire retardants used, but they are primarily 85 percent water and 15 percent ingredients. The active ingredients account for 60 to 90 percent of the ingredients and are typically inorganic fertilizers, such as ammonia sulfate and ammonia polyphosphates. The remaining inactive ingredients are thickeners, such as guar gum and clay, and corrosion inhibitors. The purpose of the retardant is to slow the rate of fire spread by cooling and coating fuels. These are typically applied in front of the fire as a suppression tactic, most often on ridge tops and near fire breaks. The fire breaks can sometimes include aquatic breaks such as rivers, streams and lakes.

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 fall in the American 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, when precipitation falls on the recently burned area causing erosion. It has been documented by the United States Geological Survey that fire impacts to source water quality can be seen for up to 15 years after the event.

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 increased soil erosion in the American River watershed could also increase the levels of metals (such as aluminum, iron, and manganese), TOC, and possibly organic compounds (such as herbicides) in the source water. Depending on their use and proximity to water bodies, retardants may result in water quality impacts since they contain active ingredients.

Presence in the Watershed

There were numerous minor fires, most were smaller than 50 acres and caused by lightning. There were only four significant wildfires, greater than 300 acres, in the watershed during the study period: American River Complex, Mammoth, ENF Wind Complex, and Robbers.

American River Complex Fire

The American River Complex Fire occurred from June 21 through July 30, 2008. It was caused by a lightning strike and was located near Foresthill, see **Figure 4-1**. The fire burned 20,541 acres and was located on the North Fork American River on primarily public lands. There was no planned revegetation effort discovered from the TNF.

Mammoth Fire

The Mammoth Fire occurred from July 16 through 19, 2009. The cause was not determined. It was located in the Mammoth Bar recreation area east of Auburn, see **Figure 4-2**. The fire burned nearly 650 acres and was located on the North Fork American River canyon on primarily state or private lands.

ENF Wind Complex Fire

The ENF Wind Complex Fire occurred from December 1 through 4, 2011. It was caused by human activity and made worse by wind storms. It was located in various locations of eastern El Dorado County, see **Figure 4-3**. The fire burned 300 acres and was located on the Middle and South Forks American River on primarily public lands. No information could be attained from ENF on the fire assessment and reforestation efforts.

Robbers Fire

The Robbers Fire occurred from July 11 through 20, 2012. It was caused by human activity. It was located northwest of Foresthill, see **Figure 4-4**. The fire burned 2,650 acres and was located on the North Fork American River on primarily private lands.

Figure 4-1. American River Complex Fire Location Map

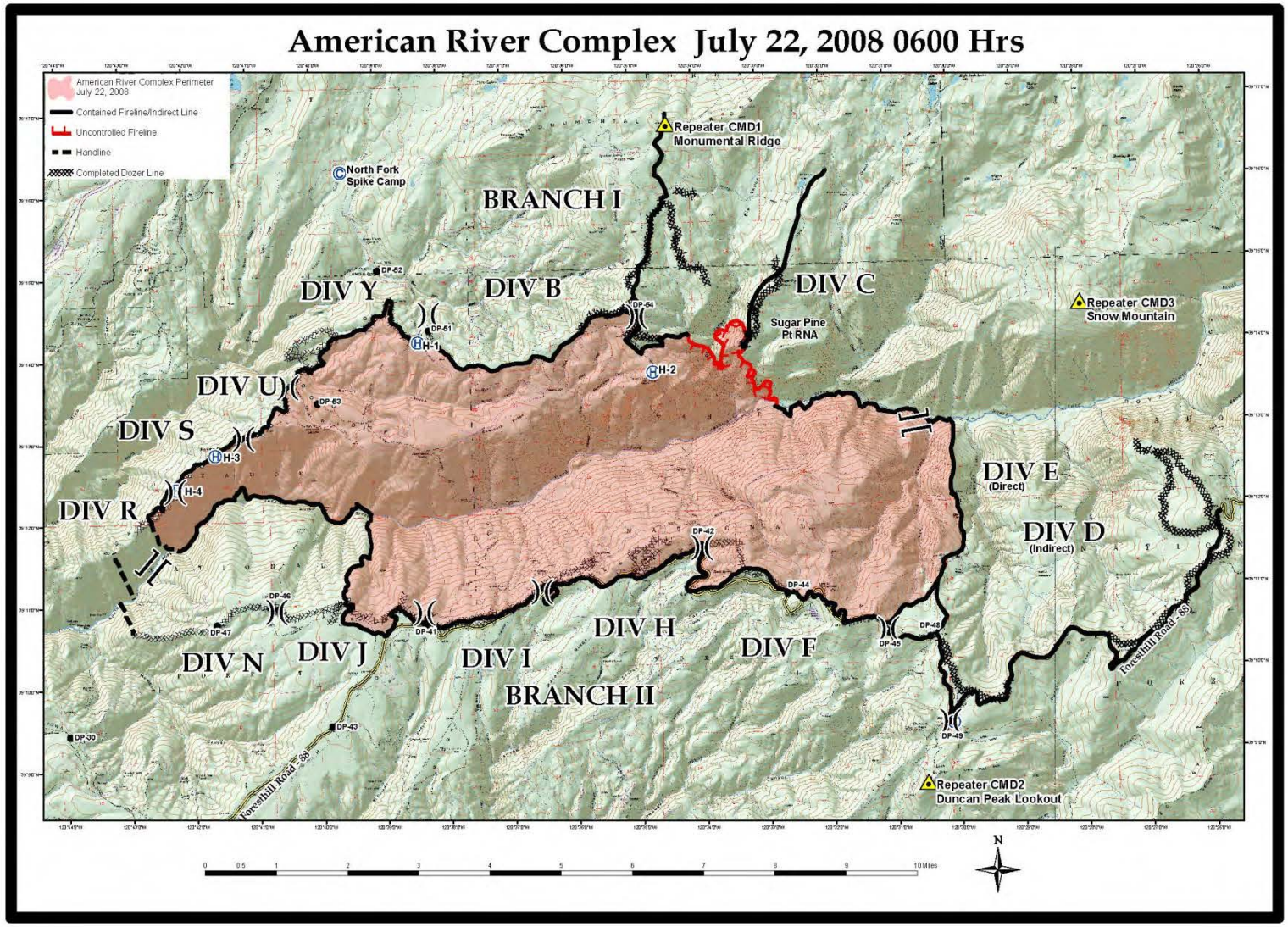
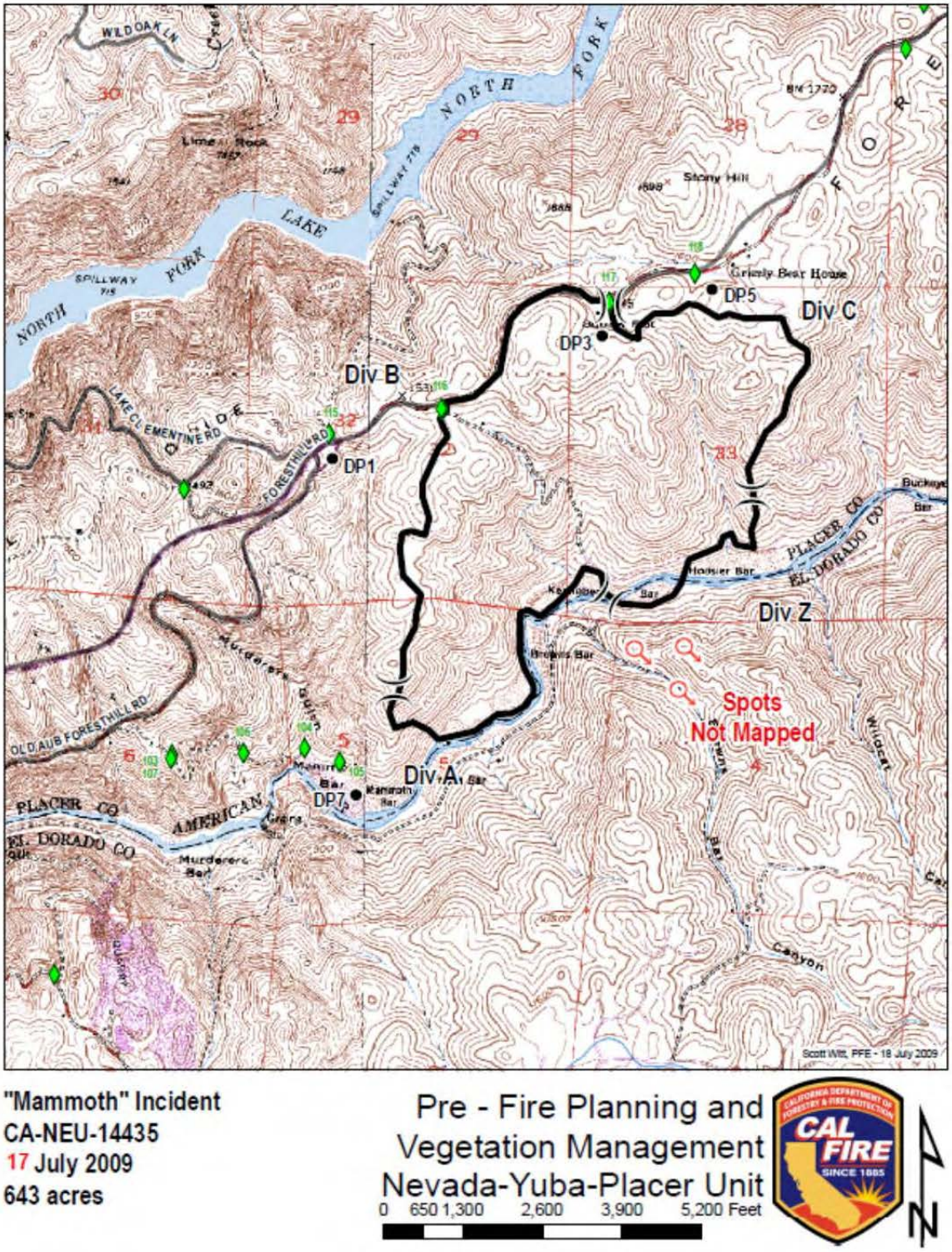


Figure 4-2. Mammoth Fire Location Map



"Mammoth" Incident
CA-NEU-14435
17 July 2009
643 acres

Pre - Fire Planning and
Vegetation Management
Nevada-Yuba-Placer Unit

0 650 1,300 2,600 3,900 5,200 Feet

Figure 4-3. ENF Wind Complex Fire Location Map

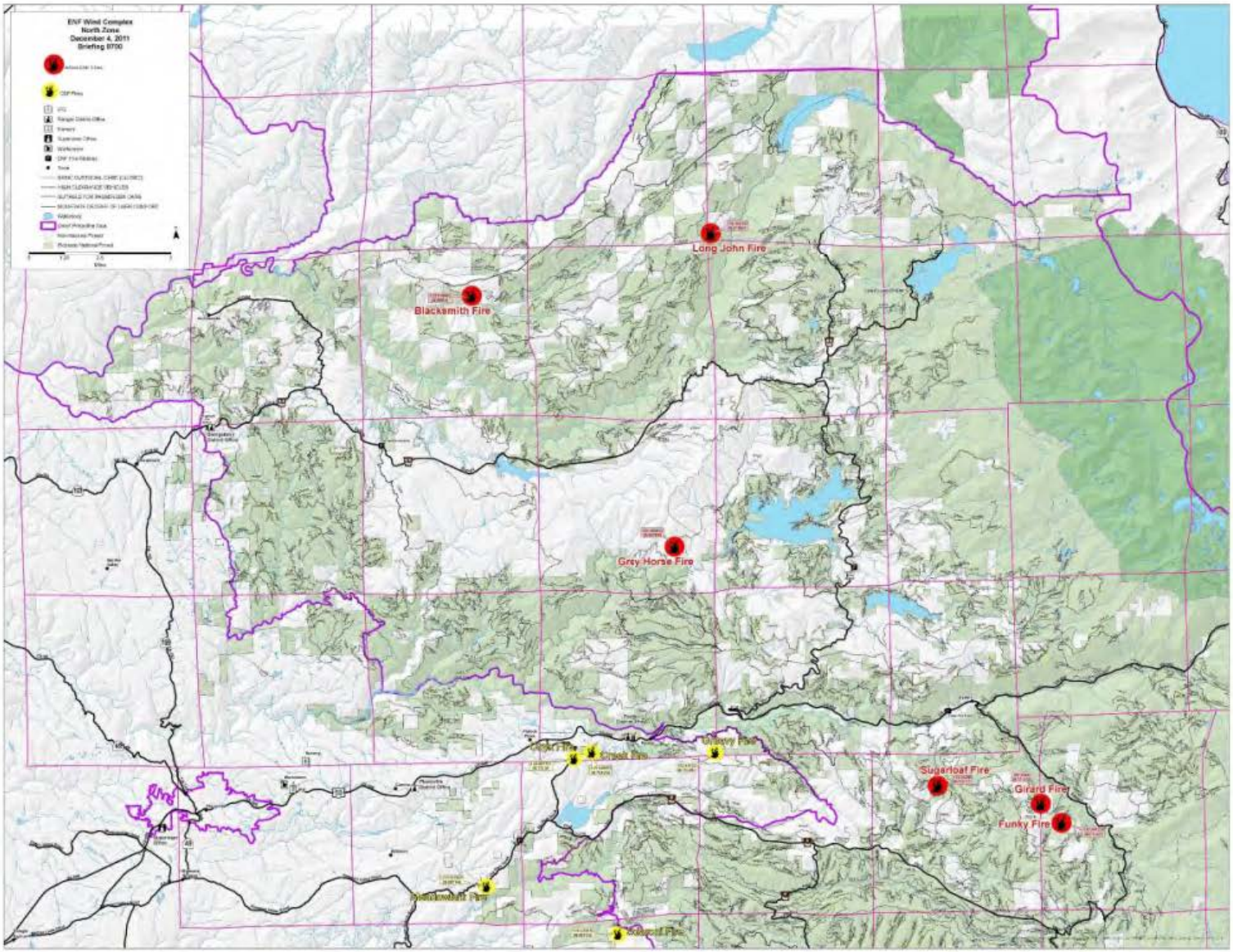
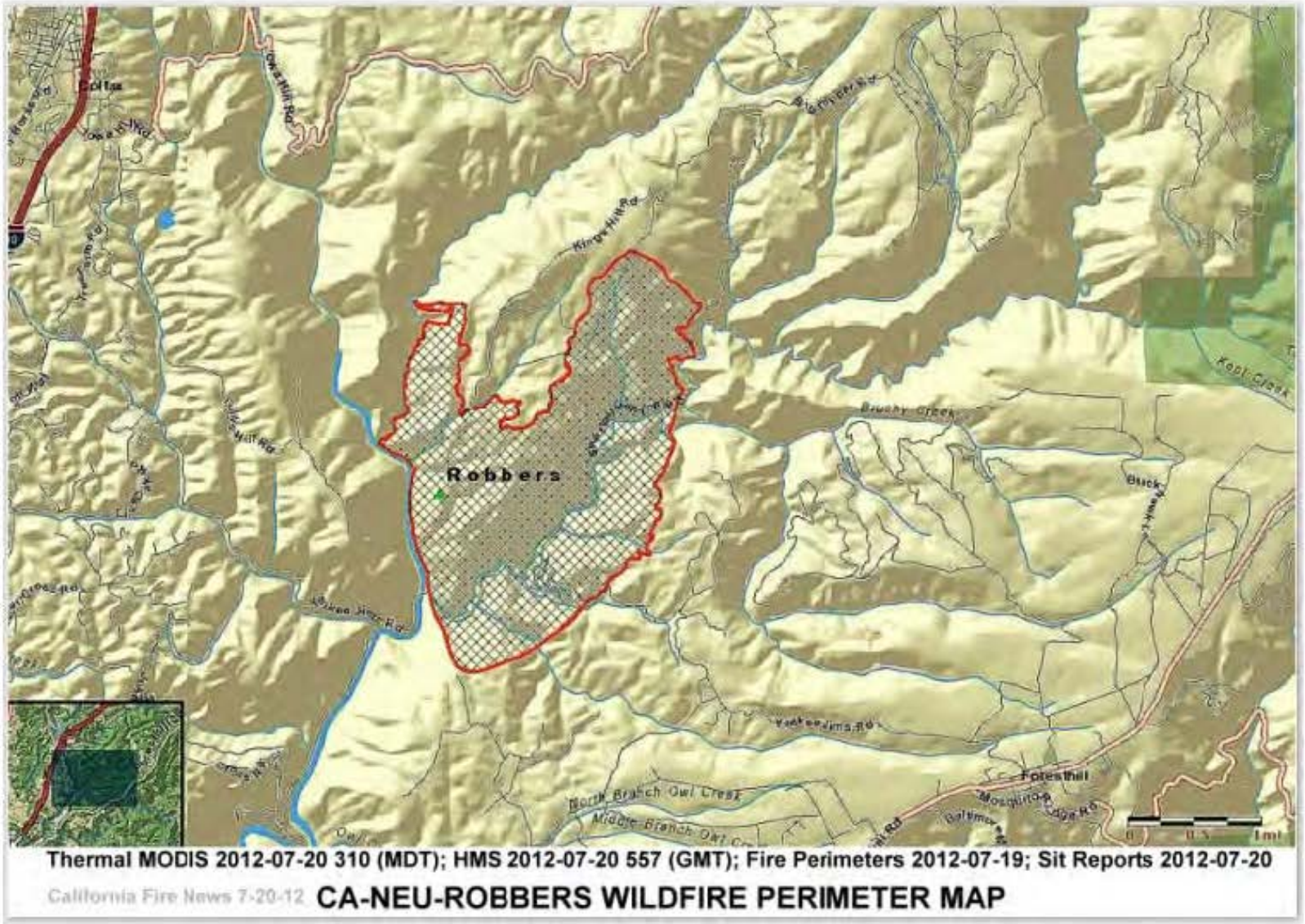


Figure 4-4. Robbers Fire Location Map



Regulation and Management

Wildfire response and management is led either by the USFS or by 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. On federal lands, typically 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.

California Forest Improvement Program

CalFIRE has continued implementation of a fuels reduction program funded by Proposition 40, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002. The goal of the program is to reduce wildland fuel loadings that pose a threat to watershed resources and water quality. Non-federal lands in fifteen Sierra Nevada counties are eligible for the program, including Placer and El Dorado. A large portion of the American River watershed has been ranked as high priority. The county lands have been prioritized for risk, but projects outside of the priority areas will be considered for funding as long as the applicant can demonstrate the project's watershed and/or water quality protection values. Participants can be reimbursed up to 90 percent for the costs of forest improvement and fuel reduction, such as management plans, site preparation, tree purchase and planting, timber stand improvements, habitat improvements, and land conservation practices. Applicants must have 20 to 5,000 acres, and reimbursements cannot exceed $50,000.

Guidelines for Aerial Delivery of Retardants and Foam Near Waterways

In April 2000 the USFS, along with the United States Bureau of Land Management, the National Park Service, and the United States Fish and Wildlife Service, published “Guidelines for Aerial Delivery of Retardants and Foam Near Waterways”. The purpose of this document was to provide guidance to incident commanders on how to protect waterways, and in particular aquatic species, from these chemicals. The Guidelines were adopted in 2008, along with several companion investigations, which require avoiding application of retardants and foam within 300 feet of a waterway as well as a monitoring and testing program for foams and retardants. There are specific directions on how to do this for the various aerial applications, as well as exceptions if an application endangers the aircraft, others, structures, or ground personnel. The USFS primarily uses Phos-Check, which is a Class A foam with water enhancers (gels).

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 water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season.

Three fires were in the North Fork American River watershed, but due to the seasonal use of the American River supply for Placer County Water Agency (PCWA) it is difficult to draw conclusions based on their source water data. During their fall use during the study period there was no significant increase in turbidity.

Only one fire (ENF Wind Complex) was upstream of the El Dorado Irrigation District (EID) El Dorado Hills WTP, but they saw no specific impact to source water quality.

Raw water quality data for the Folsom Lake diverters was reviewed, and there were peak turbidity and TOC values in late 2012 which could have been attributable to the Robbers Fire the previous summer, but since they occurred during a storm event it is hard to determine how much was caused by the fire as compared with general watershed erosion.

Source Water Protection Efforts

The upper watershed is most vulnerable to wildfires. These wildfires have the potential to impact source water quality, as well as the hydroelectric power facilities located along the rivers. For this reason, both PCWA and EID conduct regular coordination with the USFS and CalFIRE in the event of a wildfire that has the potential to impact utility facilities.

Off-Highway Vehicle Use

Background

Off-Highway Vehicle (OHV) use in the watershed has grown over the past five years according to the Tahoe and Eldorado National Forests. Unmanaged recreation, which includes unmanaged OHV use, has been identified by the USFS as one of the four greatest threats to the National Forests. Most of the OHV trails are historic mining or logging roads that were not designed for long-term use. The USFS is not able to maintain all of the roads, so some are not maintained while others are maintained by service organizations. The USFS has prioritized management of this activity to prevent damage to the land and its resources, such as water bodies. The USFS has created management systems in each National Forest as part of the Travel Management Program to address design and maintenance concerns associated with use as well as prohibit use on non-designated areas (as discussed below).

Seasonal Patterns

Generally, wheeled motorized vehicle use in the watershed occurs from spring through fall when snow melts in the upper portions of the watershed and the trails are accessible.

Related Constituents

Wheeled motorized vehicles can result in a variety of contamination issues from a drinking water quality perspective. The vehicles use dirt or rock trails and the use often causes soil compaction and rutting that can result in the increased erosion potential of these trails, which results in more solids transport to the waterways. Also, many vehicles directly cross through waterways which can result in petroleum hydrocarbon and metals contamination in and adjacent to the creeks, streams, rivers, and lakes. Finally, since this type of use often results in recreation away from sanitation facilities it can result in human fecal waste deposition along the trails (as discussed below in the El Dorado County - Rubicon Trail subsection).

Presence in the Watershed

There are nearly 4,200 miles of trails and roads used by OHVs in the TNF and nearly 2,200 miles of road and trails in the ENF. In addition, there are numerous trails through private lands within Placer and El Dorado counties. The most significant is the Rubicon Trail area in El Dorado County. Another area within the TNF is the Foresthill Divide OHV Area that has over 100 miles of trails, which includes three staging areas: China Wall, Parker Flat, and Sugar Pine.

Regulation and Management

United States Department of Agriculture Forest Service

The Pacific Southwest Region of the USFS completed a national travel management program to designate routes for wheeled motorized vehicle use. The purpose is to enhance management of National Forest System resources including motorized transportation systems. The Route Designation Project resulted in designation of selected routes for motorized travel in the National Forests as well as seasonal restrictions placed on some routes or areas.

The TNF completed the designation process and finalized an Environmental Impact Statement (EIS) for the project in September 2010. It states that possessing or using a motorized wheeled vehicle off National Forest System roads is prohibited, except for the non-system routes, open areas, and National Forest System trails shown on regional maps. The Travel Management Plan has a defined area for OHV use, including approximately 650 miles of roads and trails, and calls for wet weather closure of dirt trails. TNF is working on preparing a final Motor Vehicle Use Map (MVUM) to present the designated routes, and then it will begin implementation and enforcement of the program.

The ENF has completed the designation process and now has a final Travel Management Plan for wheeled motorized vehicle use, along with a MVUM. The Record of Decision was published on April 2, 2008 and allows for motorized vehicle use on 1,847 miles of roads and trails. Three of the four districts within the ENF are located within the American River watershed. The MVUM was updated based on the final Travel Management Plan for the Forest, and it is available in both electronic and hardcopy. The map is updated annually to reflect any revisions

to the program. The plan includes a wet season closure requirement (January 1 to March 31) for dirt roads and trails to protect drainage structures, such as earthen mounds placed across roads to channel water off the road, to protect the road or trail tread from rutting or other damage, and to minimize impacts to water quality. This closure could be extended if the roads are still wet and susceptible to damage. It also specifically prohibits all motor vehicle cross-country travel. The MVUM is being updated to include revisions to trail routes that included meadow crossings, and were closed due to a court order.

El Dorado County – Rubicon Trail

The Rubicon Trail is located due west of Lake Tahoe, approximately 35 miles east of Placerville. This four-wheel drive "road" leads from Georgetown (at Highway 49) to Lake Tahoe (near Tahoma), a distance of approximately 22 miles. The trail is a non-maintained County road located in El Dorado and Placer counties. Parts of the trail pass through the ENF and portions of private lands, but it is not considered part of the travel management plan described above.

The El Dorado County Airports, Parks and Grounds Division (County Parks) of the General Services Department proposes to implement a Rubicon Trail Master Plan (RTMP) to guide El Dorado County's management of off-highway vehicle operations and other activities on the El Dorado County portion of the Rubicon Trail. A Draft Environmental Impact Report (DEIR) was finalized in September 2008, but no further action was taken because of insufficient funding.

The Regional Board issued a Cleanup and Abatement Order (CAO), R5-2009-0030, to El Dorado County and the USFS in April 2009 to cease the discharge of sediment and other wastes (including human fecal matter and petroleum fluids) to the waters of the state. The CAO required these entities to prepare a *Rubicon Trail Saturated Soil Water Quality Protection Plan* to evaluate and propose a means to address water quality impacts caused by vehicle use during saturated soil conditions. The Plan was completed in December 2010. The CAO also required formal maintenance plans and agreements for the Trail and a long-term management plan for the Trail.

In response to the CAO, the County Department of Transportation implemented a trail maintenance program in 2009 and 2010 jointly with the California Department of Parks and Recreation (DPR). This included survey of the trail and development of trail locations and maps. The maintenance program was subsequently adopted by the County Board of Supervisors in January 2010.

The Rubicon Trail Foundation, a volunteer organization supporting the trail, has developed an extensive public education and outreach campaign focused on four major topics: safety, sanitation, spills, and sedimentation. This includes a colored bandana for each topic which highlights key words related to prevention of issues associated with each one. The sanitation bandana includes "Eradicate the white flowers of the Rubicon"; meaning to stop leaving toilet paper behind. The spills bandana includes "Every Last Drop, Leave No Trace". The sedimentation bandana includes "Keep Your Rubber on the Rocks", to prevent erosion.

In April 2012 the USFS issued a Record of Decision (ROD) for an EIS on the Rubicon Trail. This is an agreement with El Dorado County to provide for an easement for the trail and resources to assist the County with maintenance and management. This includes numerous components; of interest are a new FOTR bridge, a new bridge at Ellis Creek, closure of three miles of the route in sensitive areas, installation of vault toilets along the Trail, and additional of erosion control elements near waterbodies.

Water Quality Data and Issues Review

A review of the ambient water quality for the water treatment plants in **Section 3** for turbidity and TOC confirms that the water treatment plants show a distinct seasonal trend with most peaks occurring during the wet weather season. It is undetermined what measure of impact OHV use has on these constituents, but in addition to other sources it is likely that it also contributes to the overall levels.

RECREATION

Background

There is a large amount of recreation that occurs in the American River watershed. Recreation occurs from the headwaters in the Sierra Nevada to Sacramento, at varying levels. Recreation includes body and non-body contact activities. Body contact recreation includes swimming, wading, and rafting; it is allowed on all major reservoirs and river reaches in the watershed. 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, OHV use, fishing, hiking, biking and winter activities such as snow play, skiing and snowmobiling. Non-body contact recreation is more prevalent in the upper watershed.

Seasonal Patterns

Body contact recreation occurs primarily between Memorial and Labor days. Most non-body contact recreation can occur throughout the year. Most recreational 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, snowmobiling, and snowplay primarily occur in the upper watershed only. Recreation in the lower watershed consists of more day-use activities focused around the Folsom State Recreation Area (SRA) and the American River Parkway. Activities such as boating, OHV use, fishing, hiking, and biking can occur throughout the year, but are 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 that can be 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. The more significant concern is associated with erosion caused by land-based recreation activities that 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' intakes.

Presence in the Watershed

Multiple agencies own and manage recreational facilities in the American River watershed, including the USFS, DPR, Pacific Gas and Electric (PG&E), and Sacramento County Department of Regional Parks, Recreation and Open Space. Recreational facilities are located from the headwaters down to the lower reaches of the watershed. The major reservoirs and river reaches and their recreational operators are shown in **Table 4-3**. Most of these waterbodies are designated for multiple uses including water supply, recreation, flood protection, and power generation.

Upper Watershed

A majority of the Upper Watershed includes recreational facilities in the Tahoe and Eldorado National Forests. These activities are closest to the intake facilities for PCWA and EID on the North and South Forks of the American River, upstream of Folsom Lake. No formal user statistics were able to be obtained from the USFS. Overnight camping occurs throughout the upper watershed. 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.

Some of the key day-use activities that occur in the watershed include hiking, boating, fishing, cross-country skiing, and snowmobiling. Hiking, cross-country skiing, and snowmobiling largely occurs on public lands. Boating and fishing can occur on public and private lands. There are two formal OHV areas located within the Eldorado National Forest: Mace-Mill-Rock Creek OHV Area and the Barret Lake OHV Area; there is one formal area in the TNF, the Foresthill OHV Area (as discussed previously in the Forest Activities section).

Table 4-3
Characteristics of Major Reservoirs and River Reaches

River Reach/ Reservoir	Recreational Operator(s)*
North Fork American River	DPR Auburn SRA
Lake Valley Reservoir	Pacific Gas & Electric
Lake Clementine	DPR Auburn SRA
Middle Fork/Rubicon River	DPR Auburn SRA
Loon Lake	USFS Eldorado National Forest
Hell Hole Reservoir	USFS Eldorado National Forest PCWA
French Meadows Reservoir	USFS Tahoe National Forest PCWA
Stumpy Meadows Reservoir	USFS Eldorado National Forest
South Fork American River	El Dorado County
Caples Lake	USFS Eldorado National Forest EID
Silver Lake	USFS Eldorado National Forest EID
Ice House Reservoir	USFS Eldorado National Forest
Union Valley Reservoir	USFS Eldorado National Forest Sacramento Municipal Utility District
Slab Creek Reservoir	USFS Eldorado National Forest
Folsom Lake	DPR Folsom Lake SRA
Lake Natoma	DPR Folsom Lake SRA
Lower American River	County of Sacramento Department of Regional Parks, Recreation and Open Space

Whitewater Rafting

On the North Fork, whitewater rafting occurs on about 37 miles of river, from Euchre Bar to Upper Lake Clementine. This reach of the river has four boat access points and three restroom facilities. On the Middle Fork, rafting occurs on about 20 miles of river from the Oxbow Access to the confluence with the North Fork, with five boat access points and three restroom facilities. There is also whitewater rafting on about 20 miles of the Rubicon River. Nearly 40 private outfitters are licensed to offer whitewater trips in the Auburn SRA. Overnight camping is available for rafters on both these tributaries in restricted areas.

The most significant amount of whitewater rafting in the watershed is along the South Fork below Chili Bar Reservoir. There is a total of 86 miles of river that rafting occurs on, but the heaviest use is the lower 20 miles between Chili Bar Reservoir and Folsom Lake. The lower 20 miles includes four camping areas and 12 restroom facilities. El Dorado County manages the rafting use on the South Fork of the American River under the River Management Plan adopted in October 2001.

User statistics were obtained from El Dorado County River Management Plan Annual Reports during the study period. User statistics obtained from El Dorado County for whitewater rafting along South Fork American River show that total use (commercial, non-commercial, and institutional) has increased through the study period, see **Table 4-4**.

Table 4-4
South Fork American River Whitewater Rafting User Statistics, 2003 - 2012

Year	Use Type			TOTAL USE
	Non-Commercial	Commercial	Institutional	
2003	28,024	59,450	2,376	89,850
2004	25,649	65,343	2,556	93,548
2005	29,850	71,814	-	101,664
2006	27,388	71,494	4,165	103,047
2007	24,858	65,541	4,381	94,780
2008	28,382	70,607	4,282	103,271
2009	31,554	61,612	4,198	97,364
2010	31,413	66,925	3,759	102,097
2011	31,324	79,935	2,625	113,884
2012	33,611	73,337	3,401	110,349

There are about 90,000 to 100,000 users per year, with 85 percent of that use occurring between Memorial and Labor days. Annual use is still less than historical peaks in the mid-1990s, but there is a clear increasing trend.

Weekend use is monitored closely, and the peak use varied during the study period (with a low in 2009 of 900 boaters and a high in 2011 of 1,500 boaters) and was less than the carrying capacity of the river in the Chili Bar run (set at 2,100 boaters). The carrying capacity of the river in the Gorge run (set at 3,100 boaters) was also not exceeded (with a low in 2009 of 2,000 boaters and a high in 2011 of 2,600 boaters).

Auburn State Recreation Area (SRA)

The Auburn SRA includes 38,000 acres and 40 miles of the North and Middle Forks American River. Major recreational uses include hiking, swimming, boating, fishing, camping, mountain biking, gold panning, equestrian riding, whitewater rafting, and off-highway motorcycle riding. Over 100 miles of hiking, biking and equestrian trails are located in the Auburn SRA. There are two primitive campgrounds, Mineral Bar (18 sites) and Ruck-A-Chucky (5 sites), in the Auburn SRA with a total of 23 sites. In addition, there are 15 boat-in campgrounds on Lake Clementine open seasonally from May 1 through September 30.

The marina facilities on Lake Clementine include 56 boat slips and a gas pump. Three floating toilets are located on the lake, and three pit toilets and five portable toilets are located around the lake. Only 25 motorized boats are allowed on the lake at any given time. There is one OHV area, Mammoth Bar, in the Auburn SRA that includes 12 miles of trails. The Auburn Equestrian Staging Area is just downstream of the PCWA intake facility. The staging area provides parking and toilet facilities for horseback riders. **Table 4-5** provides a summary of the use statistics over the study period. The data show that the Auburn SRA has had a significant, and consistent, increase in annual day-use visitors, 49 percent over the study period.

Table 4-5
Recreational Use Statistics for Auburn SRA

Type of Use	Fiscal Years				
	07/08	08/09	09/10	10/11	11/12
Day Use Visitors	619,397	735,853	837,507	804,843	1,060,176
Overnight Camping	15,934	8,529	10,548	9,712	9,906

Marshall Gold Discovery State Historic Park

The South Fork includes recreational facilities in Marshall Gold Discovery State Historic Park. This includes picnicking, wading, fishing, and hiking. **Table 4-6** provides a summary of the use statistics over the study period. The data show that the Park has continued to have a decrease in annual day-use visitors, nearly 50 percent over study period.

Table 4-6
Recreational Use Statistics for Marshall Gold Discovery State Historic Park

	Day Use				
Fiscal Year	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**
Marshall Gold Discovery SHP	275,500	140,535	158,448	155,800	140,242

Folsom Lake State Recreation Area (SRA)

Folsom Lake SRA includes Folsom and Natoma lakes. It supports swimming, water-skiing, sailing, cruising, fishing, and jet-skiing. There are about 100 miles of trails around the lake used for hiking, horseback riding, and mountain biking. Major shoreline use areas include Beals Point, Granite Bay, Rattlesnake Bar, Mormon Island, Brown's Ravine, and the Peninsula Area. Folsom Lake also has two on-shore campgrounds with 149 campsites and allows overnight boat camping.

The Folsom Lake Marina, located in Brown's Ravine, has 685 wet boat slips, 175 dry boat slips, boat launches, concessions, and a gas pump. There is a sewage pumpout station for boats with on-board sanitary facilities next to the marina. The DPR maintains the pumpout station, and the marina concessionaire operates it. Folsom Lake is equipped with three floating toilets. Boat campers on Folsom Lake must register either at the Granite Bay entrance or at Folsom Lake Marina at Brown's Ravine. During registration, the vessel is inspected by the DPR staff to verify that it meets all requirements, including the presence of a self-contained sanitary unit that is U.S. Coast Guard-approved and having a holding tank with tight and perfect closure.

Table 4-7 provides a summary of the use statistics over the study period. The data show that the day use at Folsom Lake SRA is again increasing over the study period. There has been a nearly 57 percent increase in day use visitors and a nearly 20 percent increase in overnight camping over the five year study period.

Table 4-7
Recreational Use Statistics for Folsom Lake SRA

	Fiscal Years				
	07/08	**08/09**	**09/10**	**10/11**	**11/12**
Day Use Visitors	932,252	1,029,114	1,199,970	1,228,427	1,461,800
Overnight Camping	24,520	32,939	32,686	30,413	29,225

Lower Watershed

Lake Natoma

Lake Natoma is particularly known for fishing and non-motorized boat recreation. Power boats are allowed at the upstream end of the lake as long as they do not interfere with the more passive recreational pursuits that are the focus of Lake Natoma. There is one boat launch on the lake. There are three restroom facilities located around the lake. There are three group campsites at Negro Bar on the north shore of Lake Natoma. These sites can accommodate up to a total of 125 people. The California State University Sacramento Aquatic Center is located on the south shore of Lake Natoma and offers a wide variety of flatwater sports, such as rowing, wind-surfing, and canoeing. These activities are close to the intake facilities of Golden State Water Company (GSWC), Carmichael Water District (CWD), the City of Sacramento, and the confluence with the Sacramento River.

American River Parkway

The American River Parkway is a 4,600 acre open space area that borders the 23 miles of the Lower American River. The Parkway contains several community parks, numerous access points for the general public, a bike and walking trail, and a horseback riding trail. Recreational activities along the Lower American River include fishing, wading and swimming, canoeing, kayaking, rafting, trail use, and picnicking. The most popular reach for rafting is from Sunrise Avenue to Watt Avenue. These activities are close to the intake facilities of CWD, the City of Sacramento, and the confluence with the Sacramento River. The following is a summary of key recreational facilities and activities along various reaches of the American River Parkway.

Nimbus Dam to CWD:

- Seven restrooms and three boat ramps;
- Low to medium swimming use; medium to high fishing use, kayaking and canoeing use; and medium to low boat use; and
- Access points at Hazel Avenue, Sailor Bar, Upper and Lower Sunrise Recreation Areas, Sacramento Bar, and Rossmoor Bar.

CWD to the City of Sacramento E.A. Fairbairn Water Treatment Plant:

- Seven restrooms and three boat ramps;

- Medium to low swimming use, medium to high fishing use, medium to high kayaking and canoeing use, and medium boat use; and
- Access points at Sarah Court, Chase Drive, Ancil Hoffman Park (including Golf Course), Effie Yeaw Nature Center, William B. Pond Recreation Area, River Bend Park, Waterton Way, Rogue River Way, Gristmill Dam, Harrington Park, Watt Avenue, Northrop Avenue, Northgate Boulevard, and Howe Avenue.

The E.A Fairbairn Water Treatment Plant to the confluence with the Sacramento River:

- Two restrooms and one boat ramp;
- Medium to high swimming use, medium to high fishing use, medium to high kayaking and canoeing use, and high boat use; and
- Access points at Paradise Beach, Bushy Lake, and Discovery Park.

Regulation and Management

There is overall limited regulation over recreation in the American River watershed. As described previously, the owners and operators of the developed recreational facilities are required to conduct on-going maintenance and operations, and they appear to be vigilant in their activities.

Tahoe and Eldorado National Forests

The USFS completed Recreation Facility Analyses for developed recreation sites in both the TNF and ENF during the study period. This included a review of the developed recreation sites, nearly 150 in the TNF and over 100 in the ENF, to identify which sites would be prioritized for investment. The USFS completed inventories of the developed sites, identified capital and operations and maintenance costs for each site, and rated the sites. The ratings were used to develop Programs of Work (a five year workplan) for each National Forest to implement management options and priorities on recreational facilities. This will govern operational and maintenance operations, such as facility closure, fee changes, seasonal use changes, repairs, construction of new facilities, or revisions to facility uses.

California Department of Parks and Recreation

The DPR and the United States Department of the Interior Bureau of Reclamation (USBR) approved the Folsom Lake General Plan/Resource Management Plan Update (General Plan) on October 8, 2009. The Update is a comprehensive revision of the General Plan. The purpose of the General Plan is to provide a purpose and management direction for the Folsom Lake SRA as well as Lake Natoma. The General Plan will guide the day-to-day decision making and help with developing specific project plans. Some of the key guidelines of interest to drinking water supply are marina capacity, motorized boating at Lake Natoma, Mississippi Bar, and OHV use.

Marina Capacity

The General Plan outlines a 30-50 percent expansion in slip capacity at Folsom Lake Marina, which is between 200 and 340 additional slips. It also indicates the need for "necessary upland facilities" to support such expansion. Necessary upland facilities would include additional parking and restrooms. Dredging of Brown's Ravine is still being considered as an alternative to allow for extension of the boating season at Folsom Lake Marina (when water levels are low). Due to the State's budget crisis, there has been no activity on the expansion or dredging and there are no current plans to implement these actions.

Motorized Boating at Lake Natoma

The final General Plan states that personal water craft at Lake Natoma is prohibited, and that the use of two-stroke engines will be phased out, according to California Air Resources Board emissions standards.

Redevelopment of Mississippi Bar

The final General Plan states that the stables will not be phased out, but that the intent is to "work with the concessionaire to improve the equestrian stable and riding facility as necessary in order to reduce the impact of operations here on area resources, and to improve the services provided to the public." There will be a facility manure management program to prevent water quality impacts from runoff. The General Plan also mentions the possibility of having a limited number of equestrian camping sites at Mississippi Bar. Again, due to the State's budget crisis, there has been no activity on these actions.

Reduce and Limit OHV

At several locations in the Folsom SRA, visitors drive their vehicles off designated roadways and parking areas to access the receding lakeshore. The General Plan addresses off-road vehicle use by restricting vehicles to designated roads and parking areas and by providing formal shoreline access in limited locations as appropriate.

The General Plan also recommends the development of a number of more detailed and specific management plans, including a trail management plan and a fire management plan. Additional project specific environmental analysis will be conducted as appropriate for facility development, management plans, or other proposed improvements. According to USBR staff there have been few projects completed since the General Plan was completed, including a small pushdown boat ramp and dock at Willow Creek on the south shore of Lake Natoma.

The DPR was also developing a new General Plan and Interim Resource Management Plan for Auburn SRA, but suspended that effort in May 2010 at the suggestion by the USBR. During the study period the DPR did implement an expansion of the day use fee program in the Auburn SRA. This requires users to pay a daily use fee. Some areas are self-pay, using "Iron Rangers".

The current day use fees apply to: Cherokee Bar, China Bar, Confluence Area, Cool Trailhead Parking, Drivers Flat Trailhead Parking, Grizzly Bear Parking Area (Gate 118), Lake Clementine, Long Point Trail Parking Area (8 Mile Curve - Gate 128), Upper Lake Clementine, Mammoth Bar, Mineral Bar, Ponderosa Way, Quarry Trailhead Parking, Ruck-A-Chucky, and Yankee Jims Parking Area.

County of Sacramento Department of Regional Parks, Recreation and Open Space

The County of Sacramento is the owner and operator of the American River Parkway. The Department has the responsibility for operation and maintenance of the Parkway and its facilities. There have been no changes to the Parkway Plan during the study period. Sacramento County implemented Measure A during the study period which is a new sales tax (0.5 percent) for roadway and transit improvements. This will be effective through 2039. The County receives monies from this fund for improvements to the American River Parkway bike path.

During the study period the Department has completed numerous capital improvement projects in the Parkway, including:

- Trail repair and replacement projects,
- Bridge repair and replacement projects,
- Levee improvement projects,
- Restroom replacement project at Lower Sunrise, and
- Erosion prevention projects.

Federal Energy Regulatory Commission (FERC) Relicensing

<u>El Dorado Irrigation District – Project 184</u>

EID completed its FERC re-licensing in October 2006 for Project 184 for 40 years. This is a hydroelectric project on the South Fork American River and its tributaries. Water is diverted into the El Dorado Canal at Kyburz for power generation. As part of the re-licensing process, EID was required to conduct many follow up projects related to watershed efforts, including recreation. EID completed a “Recreation Implementation Plan” in April 2007 which presented the plan for coordination with the USFS on recreational issues as required in the FERC license. The plan identified four key areas where EID will work with the USFS, including:

- Conduct a recreational survey every six years (2012),
- Meet with USFS representatives to review recreational facilities and identify maintenance, rehabilitation, and construction needs (2012),
- Implement a list of specific recreation construction projects, related to campgrounds, boat launches, and parking, and an information kiosk (2012), and
- Public education and information.

EID conducted water quality monitoring throughout the project area for a variety of constituents, including turbidity, coliform, and aluminum in 2010 and 2012. These results were generally low. The EID website indicates that a recreational survey was conducted in 2012, but no results have yet been posted.

Sacramento Municipal Utility District (SMUD) and Pacific Gas and Electric (PG&E)

SMUD operates the Upper American River Project (FERC #2101), a hydroelectric project on the South Fork American River. PG&E operates the Chili Bar Project (FERC #2155), a hydroelectric project on the South Fork American River. These two projects are operated together since their facilities are sequential, so the operators determined to submit a Joint application to the FERC for re-licensing. SMUD and PG&E completed a Final EIS for the project in March 2008, with a supplement in June 2008. Similar to EID, SMUD was required to complete a Recreation Implementation Plan. This plan includes a provision for a recreational survey every six years (2014), funding to provide to the USFS to manage recreational facilities, and coordination with the USFS every six years (2014) to identify maintenance, rehabilitation, and construction needs for recreational facilities within the Project. No action has been reported by SMUD or PG&E.

Placer County Water Agency – Middle Fork American River Project

PCWA initiated its FERC re-licensing effort in 2004 for the Middle Fork American River Project (FERC #2079) since their permit expired on March 1, 2013. A Pre-Application Document was submitted to the FERC in December 2007 to formally initiate re-licensing. The Final Application was submitted in February 2011. As part of re-licensing, PCWA evaluated impacts on Recreation and Water Quality. Technical Study Plans to guide activities were developed.

The Recreational Resources Technical Study was finalized in 2010. This study identified all recreational facilities and uses in the project area as well as the estimated level of use (based on one year of user counts). This included a survey of recreational users. The survey determined that most users are local (within the three county region of Placer, El Dorado, and Sacramento); most are long-term users of the facilities; most users prefer these facilities because of a lack of crowding, their scenic quality, and direct access to water; and recreational use is often connected to the water surface elevation of the reservoirs.

The Water Quality Technical Study was finalized in January 2008. This investigated water quality through the Project area, including near recreation facilities. PCWA sampled twice in 2007 at designated sites. Sampling for drinking water constituents included general water quality constituents (metals, minerals, TOC, and hydrocarbons) at 46 sites and coliform at 17 sites. All data supports continued low levels of these constituents in this upper watershed.

Other Programs

Folsom Lake Bilge Oil Control Program

The El Dorado County Environmental Management Department, in cooperation with the City of Folsom, Folsom Lake Marina, and Folsom Lake Recreation Area, has developed a comprehensive marina program to educate boaters, including those using Folsom and Echo lakes. This program focuses on clean boating practices, to make users aware of the potential risk to the environment. Information is provided on the impacts of illegal disposal of used oil, operating poorly maintained watercraft, and pumping bilge water overboard. The main effort of the program is to have boat owners use oil absorbent pads and pillows. The oil absorbent pads are used to keep oil and gasoline out of the lakes during fueling. There are locations for collection and disposal of the pads and pillows at each marina, including Folsom Lake Marina. These oil absorbent pads and pillows are handed out to the public in a boat bucket kit, which also includes a bucket, a floating key chain, towel, and a ski flag. In order to receive a kit the boat owner must fill out a survey regarding oil changing and disposal. The boaters can return the spent pad or pillow back to the marina and exchange for a new one.

State Water Resources Control Board

Marinas and recreational boating are considered non-point sources of pollution. Regulation and management falls under the State Board Non-Point Source Program. Management has focused on Tier 1, which means that implementation is met through implementation of self-determined non-regulated management practices. The State Board adopted the "Policy for Implementation and Enforcement of the Non-Point Source Pollution Control Program" in 2004. The Policy covered marinas and indicated that a non-voluntary Clean Marina Program would be developed to include 26 best management practices as well as monitoring. This was subsequently revised to continue to be a voluntary program.

The Clean Water Act prohibits untreated vessel discharges in US waters, and the Porter Cologne Act prohibits untreated sewage discharges throughout the state. The Regional Boards have the primary authority and responsibility in California for enforcing these acts, but they do not have the resources to operate a program to inspect or enforce their authority with respect to acts of dumping from boats.

California Coastal Commission/Department of Boating and Waterways

The Boating Clean and Green Campaign (Campaign) is a statewide boater educational and technical assistance program. The Campaign has been conducted by the California Coastal Commission (CCC) since 1997, and as of March 2006 the Campaign has been led by the California Department of Boating and Waterways (DBW), with assistance and support provided by the CCC.

Since the Campaign's inception, the California Integrated Waste Management Board, the National Oceanic and Atmospheric Administration and the USEPA have provided funding. The Campaign assisted Contra Costa County to develop and implement its boating program called "Keep the Delta Clean. You Play in it, You Drink it too!". The Campaign has four major components as follows.

- Networking. As part of its efforts to promote clean and safe boating, the Campaign facilitates the California Clean Boating Network (CCBN). The CCBN consists of a collaboration of government, environmental, business, boating, and academic organizations working to increase and improve clean boating education efforts in California. The CCBN and Campaign have websites providing links and resources, including a marina Geographic Information System (GIS) database with locations of marinas with pump stations.
- Research. For the last several years, the Campaign has developed research to better orient its educational messages, developed outreach materials, and identified and promoted environmental services for boaters statewide.
- Technical Assistance. Identifying and promoting environmental services for boaters (sewage and bilge pumpouts, oil absorbent pad distribution and collection, used oil and household hazardous waste collection centers), assisting marinas and local governments in identifying the need and installing pollution prevention services for boaters, and participating at conferences and trade shows.
- Education and Outreach. The Campaign is focused on a multi-faceted outreach strategy to target boat shows and events, marine supply stores, and word-of-mouth to reach boaters. This also includes "The Changing Tides" newsletter and the Clean Marina Toolkit.

Clean Marinas California Program

This is an independent organization for education and outreach to marinas and yacht clubs, administered by the Marina Recreation Association. This program was created in San Diego County in response to potential regulatory action by the Regional Board. It became a statewide program in 2007, and there are currently 120 marinas certified through the program. This is an all-voluntary program that encourages the use of best management practices (BMPs) to prevent and reduce pollution.

The program provides a Program Manual with BMPs related to a variety of issues, including boat sewage discharge, waste management, hazardous materials, and storm runoff. Marina owners are provided a checklist to assist as they educate, train and encourage boaters and employees to protect the environment and water quality through the routine use of these BMPs. A review of each facility is performed by an independent team to determine that day-to-day activities and operations are enhancing the environment and water quality. Those meeting the Program standard and implementing a pledge to continue the use of these BMPs receive a Clean Marina designation. The Folsom Lake Marina has not been certified.

United States Environmental Protection Agency

The 2008 Vessel General Permit (VGP) regulates discharges incidental to the normal operation of vessels operating in a capacity as a means of transportation, specifically commercial vessels greater than 79 feet in length. Recreational vessels as defined in section 502(25) of the Clean Water Act are not subject to this permit. The VGP includes general effluent limits applicable to all discharges; general effluent limits applicable to 26 specific discharge streams; narrative water-quality based effluent limits; inspection, monitoring, recordkeeping, and reporting requirements; and additional requirements applicable to certain vessel types. This permit was renewed in 2013 with no significant changes. The USEPA is now developing a Small Vessel General Permit for commercial vessels less than 79 feet in length. This is expected to be developed in late 2013 and effective in 2014.

Since most (if not all) vessels in American River watershed are recreational vessels, these permits do not apply.

Water Quality Issues and Data Review

The constituents of concern related to recreational activities are microbials. This includes coliforms and protozoa. A review of these data in **Section 3** does not indicate that there is clear or persistent trend in the watershed of increased risk during periods of high recreational use. The only water treatment plant that experienced seasonal increases in *E. coli* during the summer was the Strawberry WTP, which were all still considered low. It is uncertain what the cause of this increase is, but body-contact recreation could contribute to the increase.

Source Water Protection Efforts

"Keep Our Waters Clean" continues to increase awareness among local recreationalists about drinking water sources and the use of pumpouts and restrooms. This program is run by the City of Sacramento Department of Utilities on behalf of a group of water agencies and other local organizations along the Sacramento and American Rivers. The program was started in 2000 along the Sacramento River and was extended to the Folsom Lake and the Lower American River. Agency sponsors during the study period include Carmichael Water District, the cities of Sacramento, Folsom, and Roseville, East Bay Municipal Utility District (EBMUD), the Sacramento County Water Agency (SCWA), and San Juan Water District, among others.

The program utilizes several means of sharing information with recreationalists including maps of pumpout and restroom locations, and brochures. The program also creates partnerships with other organizations including other counties and jurisdictions, State and County Parks, educational outlets, boating and rafting businesses, and local marinas to help distribute information. Program updates include a website http://www.kowc.org/, a GIS map which shows boat launch locations, public restrooms, marinas, pumpout stations, used oil filter drop off locations, and pet waste stations; and an on-line radio ad.

In 2009, a survey of 40 recreationalists was conducted, and it was determined that 90 percent are using public restrooms and 80 percent are picking up pet waste.

RIVER CORRIDOR ACTIVITIES

Background

There are three river corridor activities which do not fit into other potential contaminating source activities: goose management at Lake Natoma, pet waste management, and illegal camping/homelessness along the Lower American River.

In the 2003 Update it was recognized that a significant population of waterfowl has become resident at Lake Natoma due to improvements completed along the south shore, known as Nimbus Flat. Feeding of this waterfowl population at Nimbus Flat has become a popular recreational past-time for many people in the area and has resulted in increased resident waterfowl population. The report also noted that there was a significant amount of pet waste, particularly dog waste, accumulating in the American River Parkway and possibly being transported to the Lower American River during storm events.

There is a continuous, though shifting, population of homeless people and illegal encampments in the lowest three miles of the Lower American River. The illegal camps become littered with debris, garbage, and human sewage and are a source of contamination in the watershed.

Seasonal Patterns

The waterfowl population at Lake Natoma consists of both resident (year-round) and migratory (spring and fall) populations of geese. The Canadian Geese that are migratory are a protected species.

The American River Parkway is used year-round by local residents for walking dogs and exercising. During this process, many dogs make waste, and historically it has frequently been left behind by the owners.

The illegal camping along the Lower American River is typically located within the flood plain. For this reason, the principal concern is that contaminants associated with the sites, including human waste, may be washed off during storm events and transported to the American River.

Related Constituents

Both the waterfowl population, pet population, and the illegal camps are potential sources of fecal waste. The human waste associated with illegal camps may have a disproportionately high load of disease-causing organisms since, as noted in the Sacramento County and Cities Board on Homelessness' Five Year Plan, there is "substantial documentation of high incidence of diseases among the homeless population."

Presence in the Watershed

The waterfowl population of concern is located at Lake Natoma, and is principally concentrated at Nimbus Flat. There has been no official study on the waterfowl population at the lake. DPR staff indicates that there is a resident goose population ranging from 50 to 200 birds and an additional migratory population that is present in the spring and fall. The DPR estimates there are approximately 300 resident geese at Lake Natoma, which is exacerbated by people feeding them.

Dog walking and exercising occurs throughout the American River Parkway. Some of the heaviest use areas are those near neighborhood enclaves, generally between Sunrise Avenue and Paradise Beach.

Illegal camps are created largely in the American River Parkway, mostly downstream of the Business 80 bridge crossing, close to social services in downtown Sacramento. There are County and City ordinances which ban illegal camping in the American River Parkway, and this is enforced by the City of Sacramento Park Services and Sacramento County Park Rangers. All static camps on County property are dismantled and occupants are forced to move. There is other land within the floodplain which is either owned by the City of Sacramento or privately where homeless populations illegally camp. Most of the camps are located near the river. The City of Sacramento Park Services also enforces illegal camping bans on City or privately owned lands within the City limits located within the American River floodplain, but which are not officially Parkway designated lands.

Regulation and Management

Management of the river corridor activities consists of local efforts only; there is limited state regulatory assistance with respect to pollution control. The existing local efforts exist on both the north and south sides of the Lower American River.

California Department of Parks and Recreation

Currently, there is an ordinance by DPR to prohibit feeding of the wildlife at Lake Natoma; however there is limited enforcement by Park Rangers due to limitations on resources. There is signage at Nimbus Flat to dissuade recreators from feeding the geese, but this is only in English and is not widely displayed. Since the Canadian Goose is a protected species under the Migratory Bird Treaty Act, DPR is not allowed to cull the birds, collect their eggs, or harass them into relocating without a “Take Permit” from the United States Fish and Wildlife Service.

County of Sacramento Department of Regional Parks, Recreation and Open Space

Sacramento County Parks Department manages two of the river corridor activities: pet waste and illegal camping. There have been no changes to either the 2002 River Corridor

Management Plan or the 2006 American River Parkway Plan which guide the ongoing activities in the parkway. The County Parks Department has implemented the Pups on the Parkway program since it was created in 2003, which provides 12 pet waste stations along the American River Parkway. The American River Parkway Foundation has served as the program administrator and coordinator for purchasing stations and Mutt Mitts®, which are installed and maintained by the County Parks Department. The American River Parkway Foundation has distributed 160,000 Mutt Mitts during the study period. County Park Ranger staff have included water quality stewardship messages (including dog waste pickup) on County message boards installed along the Parkway. Stations with Mutt Mitts® can be found at the following locations along the American River Parkway:

- Paradise Beach
- Mira Del Rio Drive
- Rod Beaudry Drive
- Sunrise Bridge Crossing
- Gold River
- Kadema Drive
- Estates Drive
- Jacob Lane
- Arden Way
- Sailor Bar
- Sarah Court
- San Lorenzo Drive

In the American River Parkway (specifically the property owned by Sacramento County), park rangers clean up the illegal camps and also direct County Sheriff work crews in cleanup efforts. "Grabber sticks" are used to pick up toilet paper where possible, but human waste and decomposing paper are left on the ground due to health and aesthetic concerns with close handling of the waste. As of October 2013, there were six full-time positions in the Parks Department to manage illegal camping in the Parkway and the program was considered well-resourced. During the study period the City of Sacramento completed the "Two Rivers Trail" on the south side of the Lower American River between Tiscornia Park and the 12th Street Bridge. There are increased recreational users in this area which is discouraging illicit use of the area.

The numbers of homeless people has also stabilized to around 200 to 400 living in the furthest downstream three-mile reach of the American River, and this population is predominantly a service-resistant population. There is a "no-alcohol" area from the Capital City Freeway Bridge crossing to Discovery Park. Rangers confiscate alcohol as well as cite and jail people for illegal camping in this area. The County ban on alcohol in non-motorized vessels between Hazel Avenue and Discovery Park on summer holiday weekends (Memorial Day, 4th July, and Labor Day) remains in effect.

The American River Parkway Annual Report was published annually by Sacramento County through 2009 and provided some general law enforcement statistics. The statistics were

extracted from a database that includes all of Sacramento County park ranger activities, including the American River Parkway. **Table 4-8** below provides a summary of citations and arrests, including those for illegal camping, for 2008 and 2009.

Table 4-8
American River Parkway Law Enforcement Statistics

Action	2008	2009
Citations and Arrests	645	738
Illegal Camping	34	35

Beginning in February 2013, Sacramento County implemented a new data tracking system which allows for tracking more details related to illegal camping. A review of this database from February through October 2013 showed that there were 615 occupied camps that were cited, 561 unoccupied camps that were provided notice to vacate, and an additional 106 camps that were identified for further action. This has resulted in 1,269 camp sites cleaned by County Parks' maintenance staff, with 255 of those sites cleaned by a 25-person work crew.

Community Link

Community Link (formerly Community Services Planning Council) developed the "10 Year Plan to End Chronic Homelessness". Sacramento City and County adopted the Plan in September of 2006. The Plan describes innovative new strategies to address chronic homelessness.

Community Link is an "umbrella" organization that develops, nurtures, and sustains programs in the Sacramento region by convening groups to address issues and providing technical assistance and leadership development. Community Link assisted in the development of the plan and currently provides staffing services for the Policy Board and Interagency Council.

The essential components of the Plan to solving the problems of homelessness are:

1. Housing First
2. Outreach and Central Intake
3. Prevention
4. Leadership
5. Evaluation and Reporting to the Community

Community Link conducts annual homeless counts in Sacramento as part of their planning process. The counts are not broken down, but rather total within Sacramento County. The total homeless counts were as follows: 2008 – 2,678, 2009 – 2,800, and 2011 – 2,358. The data from 2008, 2009, and 2011 did identify the number of homeless who were considered "unsheltered", and evaluation of this data may indicate the trend of the number of people who would be living in the American River Parkway. In 2008 there were 1,266, in 2009 there were

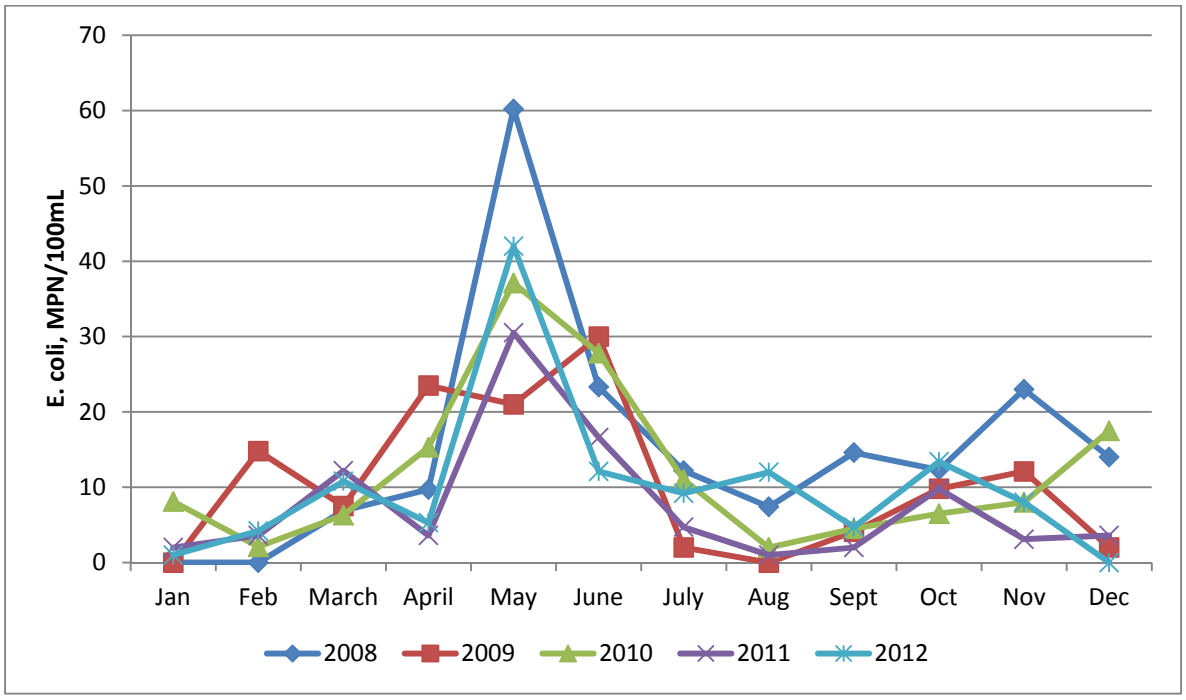
1,194, and in 2011 there were 955. This shows a consistent decreasing trend, with an overall reduction of approximately 25 percent increase.

Community Link administered the Homelessness Prevention and Rapid Re-Housing Fund from the American Recovery and Rehabilitation Act. This included nearly $5 million in short- and long-term grants from the Federal government to prevent homelessness. A pilot program from 2009 through 2011 resulted in 750 households being re-housed after becoming homeless and prevention of homelessness in 1,376 households.

Water Quality Issues and Data Review

GSWC's Coloma WTP collects *E. coli* data on a weekly basis from the raw water. The raw water is diverted from the Folsom South Canal, which originates from the south side of Lake Natoma near Nimbus Flat. Monthly medians were calculated for each month during the study period, and it was determined that the data at the Coloma WTP did not follow the same trend as the majority of the water treatment plants, which have increasing levels of coliform during the winter months associated with storm events. **Figure 4-5** presents the monthly median *E. coli* values for the Coloma WTP. It can be seen that the peak levels of each year occur generally in May or June with a lesser peak in October and November. These peaks do not correlate with any documented spills or discharges and do not correlate to recreational activities in the watershed. It is possible that the levels may be impacted by waterfowl population waste at Lake Natoma.

Figure 4-5. Golden State Water Company Coloma WTP *E. coli* Average Monthly Medians, 2008 - 2012



Pet waste and illegal camping have the potential to contribute coliform, pathogens, and solids to the source water. This would typically occur during storm events when runoff picks up waste and debris. Turbidity and coliform levels on the Lower American River do show peak events during the wet season, but how much these activities contribute is uncertain.

Source Water Protection Efforts

When the "Pups on the Parkway" campaign was initiated in 2004 to install dog waste bag dispenser stations at selected locations along the parkway and promote dog waste pickup, several participating water utilities became sponsors, including Golden State Water Company (GSWC), CWD, the City of Sacramento, EBMUD, and SCWA. These participating water utilities provide funding to the American River Parkway Foundation for purchase of dog waste stations and Mutt Mitts®. County Parks staff report that approximately 32,000 Mutt Mitts® are used per year, and they believe the stations have provided a significant reduction in presence of dog waste in the Parkway.

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 DPH, if DPH is apprised of a hazardous material spill with risk to drinking water through the Cal EMA State Warning Center. The American River Water Utilities 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.

Spills of raw or partially treated wastewater can occur from collection systems and from wastewater treatment plants. A sanitary sewer overflow (SSO) is any overflow, spill, release, discharge, or diversion of untreated or partially treated wastewater from a sanitary sewer collection system. Major causes of SSOs include grease, root and debris blockages; sewer line flood damage; manhole structure failures; vandalism; pump station mechanical failures; power outages; excessive storm or groundwater inflow/infiltration; improper construction; lack of proper operation and maintenance; insufficient capacity; and contractor-caused damage. Spills of raw or partially treated wastewater occur due to equipment malfunctions or operator errors at wastewater treatment plants. Spills also occur during storm events when stormwater infiltrates a wastewater collection system and when the capacity of the wastewater treatment plant is exceeded.

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 or power outages affecting wastewater treatment plant operations, but they can also occur during other seasons. Wastewater treatment plants and collection system pipelines are present in the watershed, see discussion of **Wastewater** below for more details.

Related Constituents

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

Presence in the Watershed

A review of the USEPA Toxic Release Inventory (TRI) was conducted. No releases occurred in the watershed counties during the study period.

There is a tremendous number of roadways in the watershed, many of which cross either the rivers, creeks, or canals associated with the American River water supply. The main truck transportation routes through the watershed are Interstate 80, Highway 50, Highway 49, and portions of the Capital City Freeway and Interstate 5, 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 or canal system.

Union Pacific Rail Road owns and operates the railroad tracks that parallel Interstate 80 along the northern boundary of the watershed, as well as cross the Lower American River near Sacramento. The railroad is allowed to transport hazardous materials over the railway lines as long as they follow the Federal Department of Transportation guidelines for the transportation of hazardous materials. Spills could occur at any time.

Kinder Morgan owns a petroleum product pipeline that also closely parallels Interstate 80 and the railroad tracks through the watershed. The pipeline size is six to eight inches in diameter and transports various petroleum products.

During the study period there were 182 spills reported to the California Emergency Management Agency (Cal EMA) State Warning Center for discharge to the American River or a tributary. Only 13 of these were determined to be of any significance, and those were all related to sewage discharges and will be discussed in more detail in the **Wastewater** subsection later. A complete list of all the reported spill events in the watershed during the study period is provided in **Appendix D**.

Regulation and Management

Union Pacific Railroad 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 near Colfax and Blue Canyon.

The California State Fire Marshal inspects pipelines that cross the rivers at least once every two to three years. 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.

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 EMA 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 EMA 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 EMA 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 State Cal EMA.

There are four CUPAs governing discharges that enter the watershed: El Dorado County Environmental Management, Placer County Environmental Health, City of Roseville Fire Department, and Sacramento County Environmental Management Department. 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 EMA State Warning Center

There is a 24-hour telephone number for the Cal EMA State Warning Center. The Cal EMA 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 EMA 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 EMA State Warning Center is looking to record the following 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 4-6 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 EMA State Warning Center. It should be noted that in the event of a hazardous materials incident, the Cal EMA State Warning Center can also assist responding agencies in contacting other response agencies during business hours and after-hours.

Figure 4-6. Cal EMA State Warning Center Notification Determination

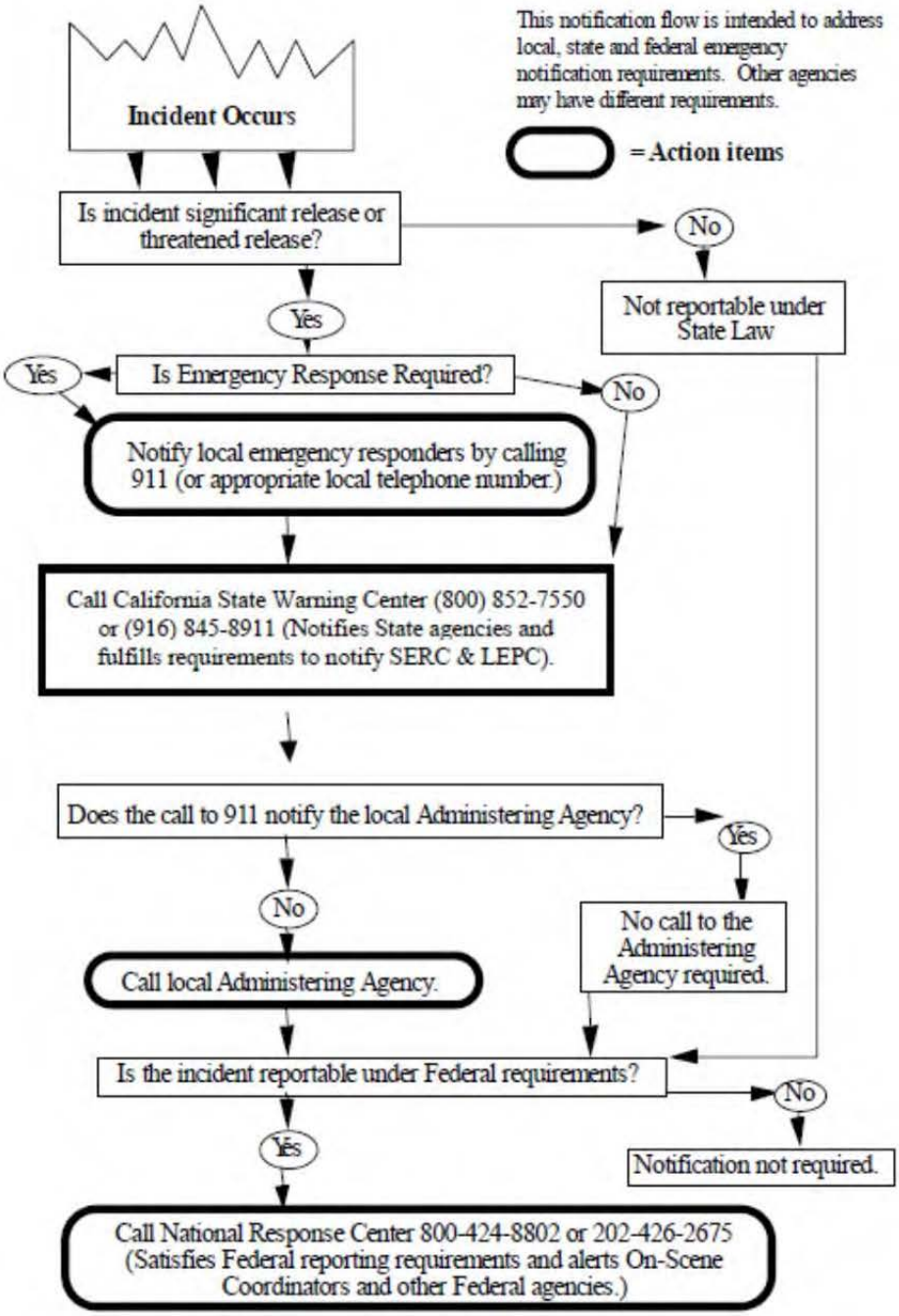


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Figure 4-7. Cal EMA State Warning Center Notification Flow Decision Tree

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/Regional Board

Notification Requirements for Cal EMA Notification to the State Board/Regional Board: Immediate verbal notification is required by the Cal EMA 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 EMA 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 DPH in advising water users of potential adverse impacts of a spill.

California Department of Public Health

The DPH Division of Drinking Water and Environmental Management (DDWEM) 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 DPH Duty Officer is notified of the impact to the source. Generally, Cal EMA 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 DPH Duty Officer would then notify the DDWEM Duty Officer of the spill. The DDWEM Duty Officer then notifies the DPH District Engineer for the impacted source. The District Engineers have call down lists to assist with notifying DPH 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 EMA Notification to DPH: 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)

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 EMA cases. The current cases can be accessed at:

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

The archived cases, including those from 1993 through the present, can be accessed at:

http://www.calema.ca.gov/HazardousMaterials/Pages/Historical-HazMat-Spill-Notifications.aspx

Water Quality Issues and Data Review

A review of the available water quality data, as presented in **Sections 3** and **5** showed that samples collected did not coincide with the watershed spills in the RIMS website. Also, none of the water treatment plants had detects of organic constituents. A separate discussion is presented in the **Wastewater** subsection later for the wastewater related spill events.

Source Water Protection Efforts

Subsequent to the 1998 Update, the American River Water Utilities established a voluntary spill notification program. This is an active program and consists of direct notification and inter-notification agreements, a notification chart, and a protocol for maintaining and implementing the program. The on-going maintenance includes updating contacts and notification charts, and implementing test events. The spill notification program for the American River watershed was expanded into a second program specific to the Lower American River watershed. The current notification charts for both programs are provided in **Appendix D**.

Direct notification agreements have been made with the four CUPAs serving the watershed, two wastewater treatment plants, four wastewater collection systems, seven other emergency response organizations, and two additional maintenance organizations. As part of the

agreements with Placer County Office of Emergency Services, Sacramento City Fire and Police Departments, Sacramento Regional Fire Dispatch, and California Department of Transportation (CalTrans), maps were developed to assist those agencies in determining if a spill was located in the areas of concern for the participating water utilities. These maps are provided in **Appendix D**. Also provided is a summary of the fire department contacts and various fire alarms.

The City of Sacramento and CWD have created a River Travel Time tool to assist in roughly estimating travel times for spills on the Lower American River. The tool materials can also be used to estimate concentrations and provide resources for response. In addition, the City of Sacramento has developed numerous documents and tools for its water treatment plant operators to assist in locating spills, waterways, and wastewater treatment plants.

URBAN RUNOFF

Background

There is little urban land use in the upper watershed, above Folsom Lake, while the majority of the watershed below Folsom Lake is highly urbanized. A portion of the greater Sacramento metropolitan area, including Folsom, Rancho Cordova, Fair Oaks, Carmichael, and Sacramento City and County, discharges urban runoff to the American River and its tributaries year-round. Upstream urban areas, including Auburn, Placerville, and El Dorado Hills, also discharge urban runoff to the American River and its tributaries. Future urbanization of additional land within the American River watershed will change the relative contribution of urban runoff volume compared to other land use runoff volume. Constituent loadings may also change, but these changes will be dependent on the constituent and the type of land use replaced by urbanization.

Seasonal Pattern

Urban runoff occurs on a year-round basis and includes wet and dry weather discharges. Wet weather runoff resulting from seasonal storms is of relatively short duration and can have highly variable pollutant concentrations. Because of the higher degree of imperviousness and the efficiency of the drainage systems, urban areas generally generate higher per acre volumes of runoff and peak flows than undeveloped or agricultural lands. Dry weather runoff results from activities such as lawn irrigation and washing activities such as 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). Human activity and urban land use can be the predominant source of some constituents in the lower portion of the American River watershed.

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 is a source of other constituents such as pesticides, metals, and organic compounds. Limited data on *Giardia* and *Cryptosporidium* levels in Sacramento urban runoff showed few protozoa detections in dry weather runoff and generally low level detections in wet weather runoff with the exception of high protozoa levels in urban runoff from an early season storm, first-flush event.

Presence in the Watershed

In the American River watershed there are two National Pollutant Discharge Elimination System (NPDES) Stormwater Phase I municipal separate storm sewer system (MS4) permits; the Sacramento County MS4 Permit, known as the Sacramento Stormwater Quality Partnership (SSQP), and the Statewide California Department of Transportation (Caltrans). The County of Sacramento and the cities of Citrus Heights, Folsom, Elk Grove, Galt, Rancho Cordova, and Sacramento are co-permittees of the SSQP, which is a collaborative water quality protection effort. During the study period there were four NPDES Stormwater Phase II MS4 permits, the cities of Auburn and Placerville, Western Placer County (including unincorporated Auburn and North Auburn), and Western El Dorado County (including El Dorado Hills).

In addition, a review of NPDES Industrial Stormwater permittees was conducted for the Sacramento River Watershed Sanitary Survey 2010 Update. That list was queried to identify facilities located in the American River watershed. Seventy-five were identified and a list is provided in **Appendix D**. The majority of these facilities are small, with only three of them greater than 50 acres located in the lower watershed.

Sacramento Stormwater Quality Partnership

Much of the greater Sacramento metropolitan area (including portions of the cities of Sacramento, Folsom, and Rancho Cordova, as well as the urban unincorporated area of Sacramento County) discharges urban runoff to the American River system. There are over 40 direct discharge points to the Lower American River, below Folsom Dam. A few of the drainage basins with direct discharge are relatively small, self-contained basins. Many, however, include multiple sub-basins and/or a network of urban creeks.

Sacramento area urban runoff management began in 1989 as a cooperative effort amongst Sacramento County, the City of Sacramento, and the smaller cities within the County to address stormwater pollution through a county-wide NPDES Phase I stormwater permit. The permit is renewed every five years, and the current permit is NPDES No. CAS082597, Order No. R5-2008-0142. As part of the permit, the permittees must develop a Stormwater Quality Improvement Plan (SQIP) that describes the stormwater pollution prevention activities to be undertaken over a five year period. The permittees last revised their SQIP in 2009. There are some joint activities, including: a commercial and industrial business compliance program, target pollutant reduction strategies, a water quality monitoring program, special studies, regional public outreach and education, regional development standards, and program effectiveness

evaluation. The City and County SQIPs also include individual actions directed at construction sites, new development, industrial discharge management, illicit discharges and connections, public outreach and education, municipal activities, and watershed stewardship.

The BMPs of particular interest to source water quality are:

- BMPs that seek to address pollutants at the sources, such as eliminating spills and dumping through storm drain marking, public outreach, and an illicit discharge program.
- BMPs that provide education; stormwater compliant pressure washer program through the Business Environmental Resource Center, recreational behavior through the Keep Our Waters Clean campaign, and general behavior through regional media campaigns, Creek Week, and Our Water Our World.
- BMPs that address fecal waste include an illicit connection program, pet waste public education and programs to maintain dog waste dispenser stations in parks developed in coordination with parks and recreation departments and districts, inspection of kennel facilities, street sweeping, and sump cleaning. This includes funding of the "Pups on the Parkway" and "Scoop the Poop" pet waste cleanup programs.
- BMPs that address TOC include detention basins, bioretention (e.g. stormwater planters), and grassy swales; street sweeping; sump cleaning; erosion control at construction sites; public education for landscape management (River Friendly Landscaping and Rain Garden rebate programs); and containerization of green waste in many parts of the greater Sacramento urban area. The City of Sacramento implemented a voluntary containerization program beginning in August 2007 with 90 percent of customers participating by the end of the 2010/2011 Fiscal Year. After City of Sacramento residents approved Measure T in November 2012, allowing the City to implement a city-wide containerized yard waste collection program combined with seasonal loose-in-the-street yard waste, the City Council approved a plan to mandate containerization for all residential customers. This new program was implemented in July 2013 and includes mandated containerized yard waste collection with loose-in-the-street pickup during the fall leaf season (November 1 through January 30) each year.
- Other BMPs to reduce constituents in urban runoff through watershed-based public education and outreach including participation in the Sacramento River Watershed Program, sponsorship of public service announcements related to pet waste, car washing, and pesticides, and funding school education programs, including the awarding-winning "Splash."
- Implementation of new development, as well as redevelopment, source controls, treatment controls, hydromodification management measures, and Low Impact Development (LID) BMPs. The goal of the source control measures is to prevent pollutants from contacting site runoff, while the treatment controls treat and remove pollutants from site runoff. LID measures are designed to help reduce the site runoff volume and supplement the hydromodification management measures, which are designed to attenuate the increased site runoff and discharge it to the receiving water body at a controlled rate.

Through the target pollutant reduction program the permittees developed and implemented reduction strategies for several constituents including; sediment, fecal waste, pesticides, metals, and mercury. Mercury is not of primary interest for drinking water. The following information broadly summarizes the constituents of interest for drinking water. Sediment control is a key strategy for controlling sediment bound pollutants, including metals, and sediment is addressed through new development standards, construction BMPs, street sweeping, and basin/drain cleaning. A Sediment Strategy was finalized in 2012. In 2004 a Fecal Waste Reduction Strategy was completed which continues to be implemented. Efforts have included implementation of BMPs that help to eliminate or reduce fecal matter in the storm drain system, including investigation and elimination of sanitary sewer cross connections, control of sanitary sewer overflows, street sweeping, and cleaning of the storm drainage system infrastructure; prohibition of discharges of pet waste into the storm drain; inspection of kennels for appropriate waste handling procedures; outreach to increase appropriate disposal of pet waste; and workgroup meetings to review current status of coliform/pathogen control efforts in the state. A comprehensive Pesticides Plan, approved in 2006, is being implemented, which includes education and outreach related to integrated pest management and initiatives to better protect urban water bodies through more effective regulation of pesticides at the state and national level.

The SSQP conducted river monitoring during the study period under the Coordinated Monitoring Program (CMP) and creek and urban discharge monitoring under the NPDES permit required joint monitoring program. River monitoring included three sites on the Lower American River (Nimbus Dam, Business 80 Overpass, and Discovery Park) and was discussed previously in **Section 3**. Creek monitoring included sampling at two urban creeks in the watershed (Willow Creek and Chicken Ranch Slough). Two urban runoff sites were monitored in the watershed (Strong Ranch Slough and Sump 111). The creek and urban runoff data is discussed further in the Water Quality Issues and Data Review subsection.

The SSQP compared runoff concentrations from the existing developed areas (Strong Ranch Slough, Sump 104, and Sump 111) and a recently developed area (North Natomas Basin 4) and found significantly lower concentrations of pollutants of concern in the discharges from the newly developed area water quality basin. The new developed area was developed using BMPs required by the permit to address urban runoff quality.

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. 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 will revise its program in 2013 to accommodate the requirements of the new Permit, and will modify the measureable goals and reporting process accordingly.

Caltrans has a 2003 Storm Water Management Plan (SWMP), updated July 2012, which it implements statewide. The key components of the permit 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).

Phase II MS4s

There are four current Phase II MS4 systems in the watershed; City of Auburn, Western Placer County, City of Placerville, and Western El Dorado County. Each of these has previously developed and implemented a SWMP to manage the stormwater program.

Each permittee prepares a SWMP which 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.

These entities implement these programs using existing programs and ordinances (such as the grading ordinance) to the extent possible, but have expanded the programs as necessary to cover all aspects of the plans. Each program element has specific control measures the County has identified for implementation, and those are largely efforts that were already on-going through various departments. The schedule for completion of the various BMPs is built into the program management. No monitoring was required to be conducted in the watershed by any of the Phase II permittees during the study period.

Selected Industrial Stormwater Permittees

A list of all facilities greater than 50 acres was developed for the Sacramento River Watershed Sanitary Survey 2010 Update (SRWSS 2010 Update). This table was reviewed to identify the three facilities located in the American River watershed, as shown in **Table 4-9**. It should be noted that the California Department of Corrections at Folsom will no longer be considered an Industrial Stormwater permittee; they have been identified as a non-Traditional permittee under the new Phase II MS4 permit and will convert to that program in the future.

Table 4-9
Key Industrial Stormwater Permittees

Facility Name	Facility Location	Facility City, State, Zip Code	Facility Size	Facility Size Unit
CA Dept of Corrections Folsom	100 Prison Road # 300	Represa, CA 95671	1,200	Acres
Granite Construction Company Bradshaw Facility	4291 Bradshaw Road	Sacramento, CA 95827	289	Acres
Sacramento City Landfill	20 28th Street	Sacramento, CA 95816	113	Acres

Construction Permittees

Dischargers whose construction projects disturb one or more acres of soil or whose construction projects disturb less than one acre, but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage from the State Board under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit (Order 2009-0009-DWQ).

The State Board's California Integrated Water Quality System (CIWQS) database was queried to identify the number of currently active construction permittees in the watershed. It was determined that there were 34 in El Dorado County, 10 in Placer County, and 81 in Sacramento County (including all of Folsom, Rancho Cordova, and parts of Sacramento, Carmichael and Fair Oaks). The permitted entities ranged from private residences to large corporations. It also included facilities like contractor's yards and municipal-type entities (such as Pacific Gas and Electric and Union Pacific Railroad).

Regulation and Management

Municipal Stormwater Program

In 1972, The Federal Water Pollution Control Act (also referred to as the Clean Water Act [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.

Stormwater permits are required for discharges from a municipal separate storm sewer system. 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 that are in an area with a population greater than 100,000.

MS4 permits do not establish numeric effluent limitations for stormwater. Therefore, these permits allow permittees to implement BMPs to comply with the requirements of their respective permits.

Both the Phase I and Phase II stormwater regulations require municipalities to reduce urban runoff pollution to the maximum extent practicable (MEP) through implementation of control measures called BMPs. Management programs must include public education, pollution prevention and good housekeeping for municipal operations, implementation of new

development BMPs, erosion and sediment control at construction sites, and control of illicit discharges. Phase I programs must also include control programs for industrial sites. Both the Phase I and II regulation 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.

In 2004, smaller urban areas came under a Statewide General Permit for Phase II stormwater permits. Phase II permittees implement urban stormwater management programs similar to, but on a smaller scale than, the Phase I permittees. The Phase II programs focus on implementation of BMPs, including implementation of treatment BMPs in new development. A monitoring program is not required for most permittees. Areas that are 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 American River watershed.

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 Order 2013-00010DWQ, adopted on February 5, 2013 and effective July 1, 2013 (outside of the study period). The new Phase II MS4 Permit will be effective during the next study period. It generally has similar requirements to the existing permit, with a few key differences:

- SWMP will no longer be required, dischargers will use guidance documents developed by the Regional Board,
- Requirements focus on water quality issues post-construction,
- Encourages the use of low impact development,
- Targets high priority waterbodies,
- Dischargers will use the Stormwater Multiple Application and Report Tracking System (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 Total Maximum Daily Load (TMDL) or a Clean Water Act Section 303(d) impairment listing with urban runoff listed as a source, and areas of special biological significance.

The permit identified two new traditional permittees in the watershed: Cameron Park and Diamond Springs census designated places (which will join in the Western El Dorado County permit). It also identified a new non-traditional permittee, the Folsom State Prison/California State Prison/California Medical Facility (which is a conversion from a previous industrial stormwater permittee).

Industrial General Program

The regulations require that stormwater associated with industrial activity (stormwater) 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 a statewide Industrial General Permit on November 19, 1991 that applied to all stormwater discharges requiring a permit except construction activity. The basis of this program is implementation of BMPs to prevent discharge of pollution. The monitoring requirements of this General Permit were amended September 17, 1992 and again in 1997. The current permit is Order No. 97-03-DWQ.

The General Permit generally requires facility operators to:

1. Eliminate unauthorized non-stormwater discharges;
2. Develop and implement a stormwater pollution prevention plan (SWPPP); and
3. 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.

A review of the enforcement orders for the Regional Board Sacramento and Redding offices was conducted as part of the SRWSS 2010 Update. This resulted in identification of violations related to industrial stormwater permits. Generally, the violations were related to late submittals for annual reports. A contact to Regional Board staff located in Sacramento indicated that there is generally good compliance with permittees in this program. There are limited staff resources, but annual reports are reviewed and some inspections are conducted. The Regional Board staff has developed some “Benchmark” levels for the permitted constituents that they use as comparison for data submitted in the annual reports. If discharge quality exceeds the benchmark levels, the Regional Board notifies the discharger to update the SWPPP and identify a plan of action to reduce the constituent levels. Permittees are considered in good standing if their levels are either below the benchmark levels or are consistently reducing from year to year.

The permit is currently being renewed, with public comment in 2013 and a final order expected in 2014. Key changes may include requirements of minimum BMPs, exclusion of no exposure facilities, electronic reporting via the SMARTS database, increased training requirements, numeric action levels, exceedence response actions, consideration of 303(d) listed waterbodies, storm standards for BMP design, and monitoring clarifications.

Construction General Program

The General Permit for Discharges of Storm Water Associated with Construction Activity is the Construction General Permit (Order 2009-0009-DWQ), which 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 activity 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 (NALs) and Numeric Effluent Limitations (NELs) for pH and turbidity. The NELs for pH and turbidity at Risk Level 3 / Linear Underground/Overhead Project (LUP) 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.

Total Maximum Daily Loads (TMDLs)

Section 303(d) of the Clean Water Act requires states to develop a list of impaired water bodies and a priority ranking for addressing impairments. This list is updated every two years. Impairments are addressed by developing TMDLs for that water body. Any constituent could be selected for a TMDL, if water quality segments are impaired. There is a TMDL for diazinon and chlorpyrifos in six Sacramento area urban creeks, including Strong Ranch Slough and Chicken Ranch Slough, which are tributary to the Lower American River. These TMDLs have been set based on aquatic life considerations. These are well below levels of concern for human health. The TMDL is implemented through a Basin Plan amendment to include site-specific numerical objectives, water quality management strategies to reduce runoff, monitoring, and a plan to reduce levels in the water bodies. TMDLs are also implemented through existing regulatory programs, such as the Stormwater Program.

Water Quality Issues and Data Review

Urban runoff contains many types of contaminants. The extensive monitoring of Sacramento urban runoff has shown that levels of a few metals and a few pesticides in urban runoff are of concern from an aquatic toxicity viewpoint; but metals, VOCs, and SOCs in urban runoff are generally below drinking water levels (see **Section 3** for additional discussion). Therefore, metals, VOCs and SOCs in urban runoff are generally of lower interest from a drinking water perspective. However, the levels of coliform are definitely of concern as an indicator for fecal contamination, and a constituent potentially of interest is total iron.

Sacramento Stormwater Quality Partnership

The SSQP has a monitoring program that includes receiving water monitoring where rivers, creeks, and urban runoff discharge are sampled during three wet and one dry events. Constituents include general parameters, nutrients, organic carbon, metals, bacteria, pesticides, semi-volatile organic compounds, and methyl tert-butyl ether (MTBE). In addition to the Annual Monitoring Reports, the SSQP compiled data from these monitoring efforts between October 2008 and June 2012 as part of a data assessment for the permittees' Report of Waste Discharge (ROWD).

The urban creek sites tributary to the American River (Willow Creek and Chicken Ranch Slough) had few detected concentrations above applicable water quality objectives of interest to drinking water. The urban runoff monitoring stations that discharge to the American River are Sump 111 and Strong Ranch Slough and are monitored in two of every three years. Detections above water quality objectives are not violations of an MS4 permit. These exceedences require follow-up by the permittees to determine if urban runoff is contributing to the exceedence and if so, to identify control measures to address the exceedences unless measures are already in place.

In 2007/2008, the urban tributary monitoring indicated several constituents of interest to drinking water were detected above their water quality objectives. It should be noted that the organics detected in Chicken Ranch Slough were well below human health levels of interest. A Fact Sheet was prepared by the City of Sacramento for chlorpyrifos and diazinon and it is attached in **Appendix D**. The organics included:

- Willow Creek at Blue Ravine
  - Fecal coliform, various samples, 40 – 13,000 MPN/100 mL
  - *E. coli*, various samples, 40 – 13,000 MPN/100 mL
  - Total Iron, various samples, average 3,170 µg/L

- Chicken Ranch Slough
  - 4,4'-DDE, one sample, 0.0044 µg/L
  - Chlordane, one sample, 0.0011 µg/L
  - Diazinon, one sample, 0.0741 µg/L

In 2008/2009, the urban tributary monitoring indicated two constituents of interest to drinking water were detected above their water quality objectives and included:

- Willow Creek at Blue Ravine
    - Fecal coliform, two samples, average 3,000 MPN/100 mL
    - *E. coli*, two samples, average 2,350 MPN/100 mL

In 2009/2010, the urban tributary monitoring indicated three constituents of interest to drinking water were detected above their water quality objectives and included:

- Willow Creek at Blue Ravine
    - Fecal coliform, two samples, average 3,933 MPN/100 mL
    - *E. coli*, two samples, average 2,933 MPN/100 mL
    - Total Iron, one sample, 4,010 µg/L

In 2010/2011, the urban tributary monitoring indicated three constituents of interest to drinking water were detected above their water quality objectives and included:

- Willow Creek at Blue Ravine
    - Fecal coliform, various samples, average 9,625 MPN/100 mL
    - *E. coli*, various samples, average 2,825 MPN/100 mL
    - Total Iron, various samples, average 1,012 µg/L

In 2011/2012, the urban tributary monitoring indicated three constituents of interest to drinking water were detected above their water quality objectives and included:

- Willow Creek at Blue Ravine
    - Fecal coliform, one sample, 23,000 MPN/100 mL
    - *E. coli*, one sample, 13,000 MPN/100 mL
    - Total Iron, various samples, average 1,345 µg/L

TOC and DOC samples were collected at Willow Creek and were summarized in the ROWD. The TOC ranged from 2.0 to 16 mg/L, with a median value of 4.0 mg/L. The DOC ranged from 2.2 to 17.0 mg/L, with a median value of 4.0 mg/L. The urban runoff tributary and discharge monitoring also resulted in low level detects of a few organics regulated in drinking water, benzo (a) pyrene and 2,4-D, but both were well below drinking water levels of interest.

The urban runoff sites (Sump 111 and Strong Ranch Slough) with detects above water quality objective levels occurred in 2007/2008 and 2008/2009. These are not permit violations.

- Sump 111
    - *E. coli*, various samples, 5,000 – 30,000 MPN/100 mL
    - Diazinon, one sample, 0.1082 µg/L
    - Total Iron, various samples, average 1,839 µg/L

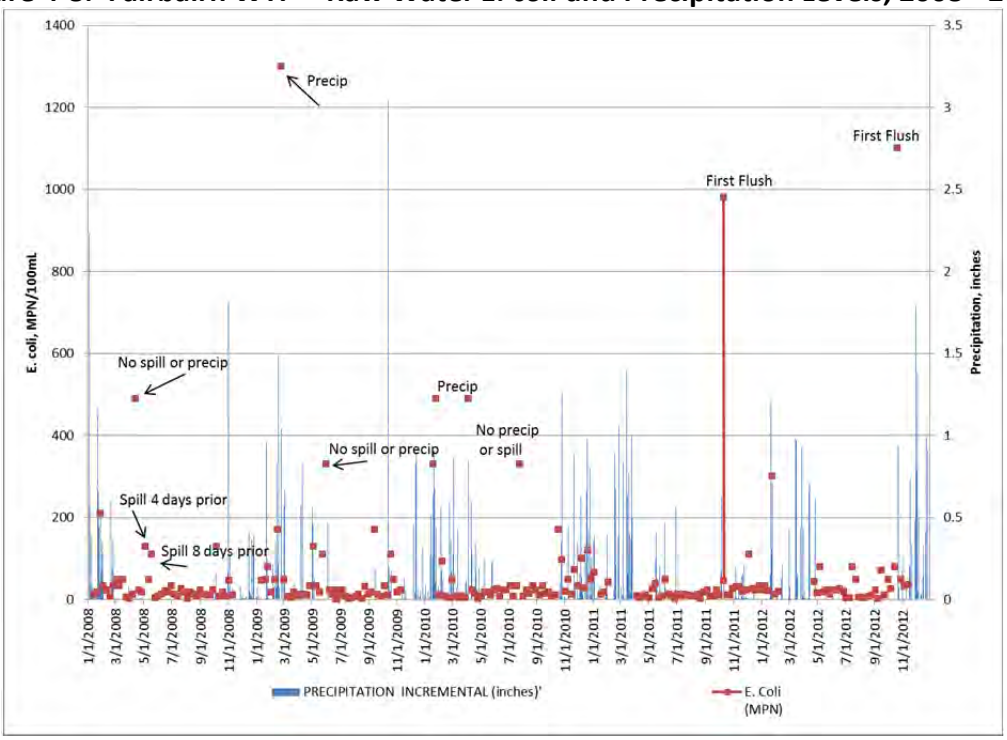
- Strong Ranch Slough
  - *E. coli*, various samples, 300 – 170,000 MPN/100 mL
  - Total Iron, various samples, average 1,404 µg/L
  - Diazinon, one sample, 0.0477 µg/L
  - Chlorpyrifos, one sample, 0.043 µg/L

TOC and DOC wet weather samples were collected at Sump 111 and Strong Ranch Slough and were summarized in the ROWD. At Sump 111, TOC ranged from 4.0 to 73 mg/L, with a median value of 14.4 mg/L. The DOC ranged from 4.5 to 72 mg/L, with a median value of 14.1 mg/L. At Strong Ranch Slough, TOC ranged from 5.2 to 53 mg/L, with a median value of 14.2 mg/L. The DOC ranged from 3.8 to 50 mg/L, with a median value of 12.5 mg/L.

Water Treatment Plant Data

A review of the water quality data for the water treatment plants shows no detection of any of the organic constituents. Aluminum and iron are sometimes detected in the raw water and reported, but these are currently removed through treatment effectively and no maximum contaminant level (MCL) violations have occurred. TOC is monitored monthly at all the required water treatment plants. Fairbairn WTP had an average source water TOC level less than 1.5 mg/L between 2008 and 2012. *E. coli* is present at variable levels in all source waters. **Figure 4-8** provides a graph of *E. coli* levels at Fairbairn WTP. There is variability throughout the year, but the highest annual levels consistently occur during the wet season, when general watershed runoff and the volume of urban runoff are highest.

Figure 4-8. Fairbairn WTP – Raw Water *E. coli* and Precipitation Levels, 2008 - 2012



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[1], 85 to 99 percent of heterotrophic bacteria[2], and 92[2] percent of *Giardia* cysts. Wastewater discharges occur throughout the watershed.

Seasonal Patterns

Municipal wastewater treatment plants discharge throughout the year. Sewage management in much of the upper watershed consists of individual onsite septic systems. All of the collection systems in the watershed are separated sewer systems. During high flow events, typically during the wet season, discharge of treated, partially treated, and untreated sewage can occur. This can happen from permitted treatment plants or from backups in the collection systems caused by blockages or breaks. Septic systems are less susceptible to seasonal impacts as failures are typically related to improper design/installation, use, or maintenance and can occur throughout the year.

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, and SOCs. Many types of industrial effluent discharges are regulated and treated by the wastewater treatment plants and must meet effluent limits set, including pretreatment if necessary.

Presence in the Watershed

There are only two permitted wastewater treatment plant dischargers in the American River watershed; the City of Colfax Wastewater Treatment Plant (WWTP) and the City of Placerville Hangtown Creek Water Reclamation Facility (WRF). These are shown on the Watershed Map; see **Figure 2-1**. There are numerous wastewater collection systems with some pipelines located within the watershed, including the cities of Colfax, Auburn, Placerville, Folsom, and Sacramento, EID, Folsom State Prison, and the Sacramento Area Sewer District.

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[1] National Research Council, 1998. Issues in Potable Reuse: The Viability of Augmenting Drinking Water Supplies with Reclaimed Water. National Academy Press.

[2] 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.

The Watershed Sanitary Survey 1998 Update determined that the only area where there were septic systems of concern was the town of Strawberry in El Dorado County, along the South Fork American River.

City of Colfax Wastewater Treatment Plant

The City of Colfax owns and operates a wastewater treatment plant that discharges to an unnamed tributary of Smuthers Ravine, which discharges to Bunch Canyon, and then to the North Fork American River.

The City of Colfax submitted a Report of Waste Discharge in December 2005, and the Order was renewed on October 25, 2007, R5-2007-0130. The new tertiary wastewater treatment plant provides wastewater that is oxidized, coagulated, filtered, and adequately disinfected. The City of Colfax constructed a new biological nutrient removal treatment plant, including tertiary filters and ultraviolet (UV) light disinfection, to comply with the order, with an average daily capacity of 0.275 million gallons per day (mgd) and a peak design capacity of 0.5 mgd. There are interim permit limits for copper, ammonia, and 4,4'-DDE which expired in December 2008. Copper is the only remaining treatment difficulty.

A subsequent enforcement order from the Regional Board, R5-2007-0131, was issued to the City of Colfax to require them to further investigate the potential for reduction of infiltration and inflow in the collection system, seepage from the storage facility, and the ability to meet the nitrate standard. The Regional Board used the findings from the City of Colfax's investigation to determine if more action should be taken by the City of Colfax or if it was appropriate to revise the effluent limitations on the NPDES permit. Subsequently, the City of Colfax was required to implement a Capital Improvement Program to address the infiltration and inflow issues.

The City of Colfax was issued three Administrative Civil Liabilities (ACL) orders during the study period for various water quality discharge violations from 2001 through 2012. The ACLs were settled with the fines being applied to City projects related to the upgraded wastewater treatment plant and the infiltration and inflow issues.

In 2010 the City of Colfax was issued a Cease and Desist Order (CDO) to address the seepage from the storage reservoir at the Colfax WWTP. The storage reservoir is unlined, and seepage to the receiving water occurs. The City has developed a reservoir lining project to stop the seepage, which was delayed due to inclement weather. Once the reservoir is lined, it is projected that discharges will cease.

During the study period there were two spill events that occurred from the Colfax WWTP; both were leaks of partially treated wastewater from the storage reservoir. The events occurred on October 14, 2009 (approximately 11,200 gallons) and March 7, 2011 (approximately 4,000 gallons). In addition to the two spills at the Colfax WWTP, there were seven spills from the

City's collection system that resulted in discharge; these are discussed later in the Collection Systems subsection.

City of Placerville – Hangtown Creek Water Reclamation Facility

The City of Placerville owns and operates the Hangtown Creek Water Reclamation Facility (WRF) that discharges to Hangtown Creek, which is tributary to Weber Creek, which then flows to the South Fork American River.

The City of Placerville submitted a Report of Waste Discharge in September 2005 and the permit was renewed on April 25, 2008, R-2008-053, to discharge up to 2.3 mgd average dry weather flow, and 5.7 mgd wet weather flow, from the water reclamation facility. The City of Placerville completed construction of several treatment system improvements and began operation on March 1, 2009. The new treatment system includes upgraded primary, secondary, and tertiary treatment processes; effluent cooling; and anaerobic digesters for processing waste activated sludge.

In the current permit, the City of Placerville has an expanded list of effluent limitations based on the water quality monitoring that was done on the effluent between 2002 and 2006. This includes typical constituents in wastewater NDPES permits, such as biological oxygen demand (BOD), turbidity, pH, total suspended solids, coliform, nitrate and cyanide, but it also includes an interesting list of other constituents. The ones of interest from a drinking water quality perspective include Methyl *tert*-butyl ether **(**MTBE), atrazine, total trihalomethanes, and chlorinated hydrocarbon pesticides. Some of these are found in the effluent at levels at or below drinking water standards (atrazine, trihalomethanes), while others have been found at significantly higher levels (MTBE, chlorinated hydrocarbon pesticides).

There are numerous interim permit limits for a variety of constituents, each with a variable expiration date. The City of Placerville was issued two CDOs (2008 and 2010) to address pollution prevention plans for constituents with interim permit limits. In addition, ACLs were issued in 2008, 2009, and 2011 to address various water quality discharge violations from 2002 through 2010. The ACLs were settled with the fines being applied to City projects related to the upgraded wastewater treatment plant and pollution prevention issues.

During the study period there were no reported spill events that occurred from the Placerville WRF. There were 20 spills from the City's collection system that resulted in discharge, these are discussed later in the Collection Systems subsection.

Septic Systems

An effective septic tank and leach field system removes bacteria and other microbiological constituents within three to six feet of soil. Failing septic systems, however, can introduce microbiological constituents into the subsurface or surface environment where they can be transported to receiving streams. Septic systems are located throughout the upper watershed.

El Dorado County manages septic system installations through the Liquid Waste Management Program under Environmental Health in the Environmental Management Department. County specifications for new septic systems require 50 feet of separation between septic tanks and streams, springs, lakes, or reservoirs. The leach lines are required to be set back 50 feet from seasonal streams and 100 feet from any flowing stream. Various tests (percolation test, soil textural analysis, saturation zone) are required as part of the installation and permitting process, and at least two inspections are conducted before the installed system is approved and permitted. The number of septic systems is not readily identifiable within a given area as this information is cataloged with the individual parcel information. El Dorado County still does not run a regular maintenance inspection program due to resource constraints.

There are septic systems within El Dorado County along the Main Canal in Pollock Pines between Forebay Reservoir and Reservoir One WTP. The septic systems in this area must be sited to meet the 100 foot setback from the Main Canal, or must be concrete lined. County staff does not believe that there is any evidence of failures in this area and does not consider it an area of concern.

The community of Strawberry is of particular interest due to its proximity to the EID Strawberry Water Treatment Plant. There are outhouses and septic systems in this community which are aged and have been constructed close to the river, primarily due to the steeper slopes along the river in this portion of the watershed. Many of these systems are for recreational residences which are on leased land from the USFS.

As the USFS re-issues the 20 year land leases for many of the recreational residences in the vicinity of the South Fork American River, they require all homeowners to sign a Water Quality Agreement which states that if there is a sign of failure, then the lessee will be required to fix, repair, or replace the on-site waste system. ENF staff note that there are probably 10 to 15 outhouses along the South Fork American River in this vicinity, a greater number of redwood pits, and many septic systems. When re-issuing recreational residence permits, the ENF staff can require removal of outhouses and redwood pits, and replacement with an upgraded septic system.

The State Board adopted the Onsite Wastewater Treatment System (OWTS) Policy (Resolution 2012-0032) in June 2012, and it became effective in May 2013. Counties are now required to develop a Local Agency Management Plan to show how the Policy requirements will be implemented. The OWTS Policy is a new level of management for septic systems in California. It uses a tiered system to address septic systems based on risk management. The tiers are based on the potential receiving waters, ranging from zero (low risk) to five (high risk). The tiers are designed to be protective of impaired waterbodies. If a septic system is located within 600 feet of a waterbody with a designated TMDL related to coliform then the system will be required to be upgraded. The higher the tier, the higher the priority and level of improvement required.

Collection Systems

El Dorado Irrigation District

EID owns and operates a wastewater collection system that serves various regions throughout El Dorado County including the El Dorado Hills, Deer Creek, and Motherlode service areas. During the study period, there were 19 discharges from these collection systems, typically caused either by breaks, blockages, or pump failures. **Table 4-10** provides a summary of these events.

Table 4-10
Collection System Spills for El Dorado Irrigation District (gallons)

System	Date	Location	Total Volume Spill	Volume Recovered	Volume Reach Surface Water
Camino Heights CS	11/8/2009	Camino	1650	0	1650
Deer Creek CS	6/25/2008	El Dorado	50	40	10
Deer Creek CS	9/21/2008	Diamond Springs	2700	5	2695
Deer Creek CS	2/18/2009	Shingle Springs	200	0	200
Deer Creek CS	3/19/2009	Placerville	480	100	380
Deer Creek CS	2/25/2011	El Dorado	7500	4500	3000
Deer Creek CS	11/30/2012	Placerville	2800	0	2800
El Dorado Hills CS	2/3/2008	El Dorado Hills	1500	0	1500
El Dorado Hills CS	12/8/2008	El Dorado Hills	1100	200	900
El Dorado Hills CS	1/11/2009	El Dorado Hills	900	60	840
El Dorado Hills CS	1/17/2009	El Dorado Hills	3300	2070	1230
El Dorado Hills CS	4/18/2009	El Dorado Hills	180	0	180
El Dorado Hills CS	8/26/2009	El Dorado Hills	2000	200	0
El Dorado Hills CS	11/20/2009	El Dorado Hills	25	0	25
El Dorado Hills CS	4/8/2010	El Dorado Hills	650	150	500
El Dorado Hills CS	8/30/2010	El Dorado Hills	285	50	235
El Dorado Hills CS	10/24/2010	El Dorado Hills	2500	0	2500
El Dorado Hills CS	5/6/2012	El Dorado Hills	225	0	225
El Dorado Hills CS	12/2/2012	El Dorado Hills	138	0	138

Sacramento Area Sewer District

Sacramento Area Sewer District (SASD) owns and operates a wastewater collection system that serves the urbanized areas of unincorporated Sacramento County as well as some additional areas within the cities of Rancho Cordova and Sacramento, covering an area of more than 250 square miles. The collection system conveys an average of 165 million gallons of wastewater per day through more than 3,000 miles of pipe with approximately 100 miles of interceptor pipelines to the Sacramento Regional Wastewater Treatment Plant. A portion of this collection system is located along the Lower American River, and crosses the river as well.

The SASD collection system is regulated by State Board Order No. 2006-0003; see discussion below under the Sanitary Sewer Overflow Program. SASD is responsible for compliance with the Waste Discharge Requirements (WDRs) and is required to operate and maintain its sewage collection system to prevent sanitary sewer overflows and spills. The most significant spills are shown in **Table 4-11**.

Table 4-11
Collection System Spills for SASD (gallons)

Date	Total Volume Spill	Volume Recovered	Volume Reached Surface Water
3/19/2009	1005	1005	0
5/7/2009	139	99	40
5/14/2009	448	0	448
7/9/2009	182	0	182
1/6/2010	8750	8750	0
2/25/2010	370	15	355
11/10/2010	5550	5550	0
12/10/2010	406	406	0
12/31/2010	51034	2000	49034
2/18/2011	608	0	608
2/18/2011	980	980	0
2/24/2011	1845	1845	0
3/9/2011	300	300	0
4/7/2011	15855	0	15855
4/7/2011	9837	0	9837
1/20/2012	2500	2500	0
1/20/2012	226	226	0
4/2/2012	8897	8897	0
8/27/2012	63	20	43

Other Collection Systems

There were ten other wastewater collection systems that had spills during the study period. That included; the cities of Colfax, Auburn, Placerville, Folsom, and Sacramento, Placer County Sewer Maintenance Districts (SMD) #1 and #3, California State Prison (CSP) Sacramento, Folsom State Prison (FSP), and Sacramento Regional County Sanitation District (SRCSD). **Table 4-12** provides a summary of their discharges.

Table 4-12
Spills for Other Collection Systems (gallons)

System	Number of Spills	Minimum Volume	Maximum Volume	Total Volume Spilled	Total Volume Reached Surface Water
City of Colfax	7	50	11,200	25,675	20,100
City of Auburn	3	168	3,968	4,406	4,106
City of Placerville	20	15	2,100	9,713	7,638
Placer County SMD #1	2	160	200	360	183
Placer County SMD #3	1	750	-	750	710
City of Folsom	3	40	6,392	8,592	6,462
CSP Sacramento	9	25	2,500	6,700	565
FSP	9	50	1,500	5,050	4,200
City of Sacramento	2	400	1,557	1,957	100
SRCSD	1	31,500	-	31,500	31,480

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 in place to prevent and clean up spills.

Sanitary Sewer Overflow Program

To provide a consistent, statewide regulatory approach to address 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 Monitoring and Reporting Program (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 CalEMA 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.

Wastewater Treatment Plant Spills

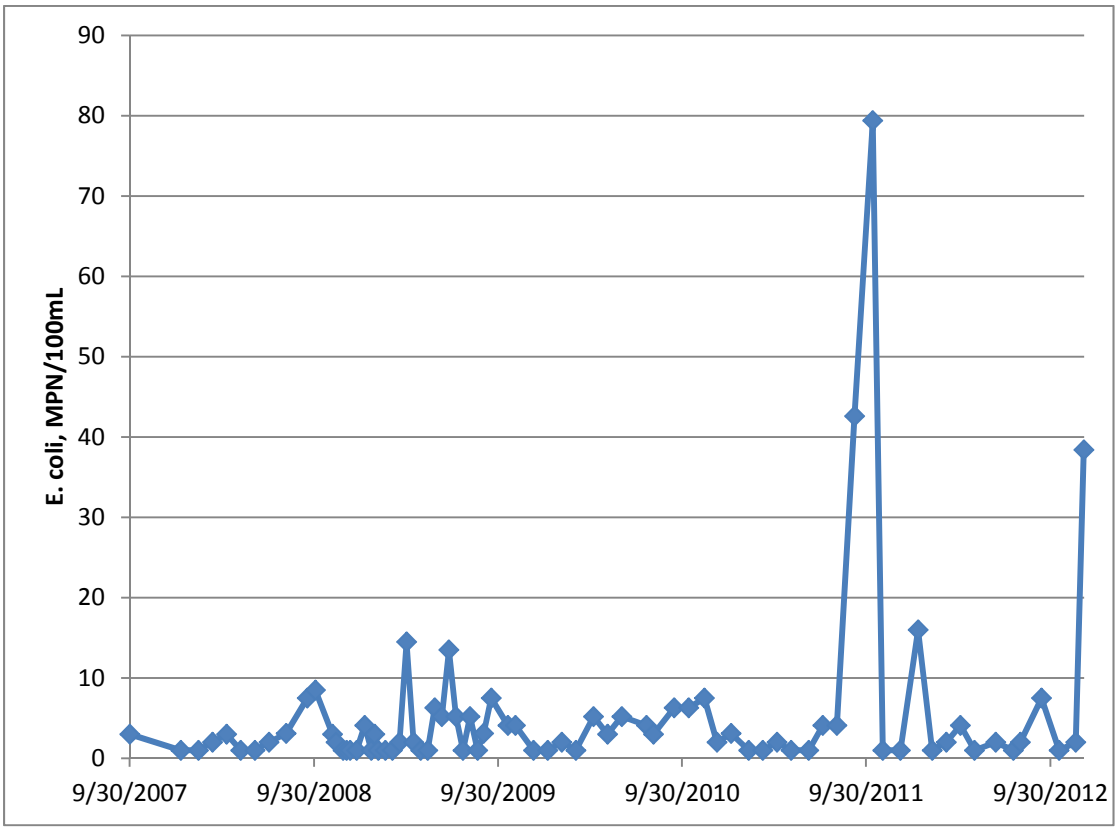
In August 2008 the Regional Board issued Spill Reporting Procedures for wastewater treatment plant spills. This was issued to ensure consistency in notification procedures with the State Board Order for Sanitary Sewer Systems. This requires facilities to notify the OES, the local

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.

Water Quality Issues and Data Review

Data for *E. coli* at the Strawberry WTP is shown in **Figure 4-9**. This chart clearly shows that peak levels occur during summer months. The specific cause is not certain and insufficient data exists to evaluate it, but is possible that it is related to the substandard design of older sanitation systems for some of the residences adjacent to the South Fork American River.

Figure 4-9. Strawberry WTP – Raw Water *E. coli* Levels, 2008 - 2012



There was limited ability to compare source water coliform monitoring with spill reports since the timing was not typically coincident. There were three events which may have been detected in the raw water quality data. On June 18, 2009 the City of Colfax had a discharge of 3,000 gallons. Raw water *E. coli* at SJWD intake on June 29 was 17 MPN/100 mL (above the previous ND result). On February 26, 2010 the Folsom State Prison discharged 1,500 gallons of wastewater. Raw water *E. coli* at Fairbairn WTP was 49 MPN/100 mL on March 1, which was higher than the sample the week before (February 22 at 4 MPN/100 mL) and the week after (March 8 at 6.8 MPN/100 mL) and there was no precipitation on March 1. On November 30, 2012 EID discharged 2,800 gallons of wastewater. Raw water *E. coli* at SJWD intake on

December 4 was 33 MPN/100 mL, which was higher than the sample from two weeks prior (November 19 at non-detect). There was a large storm event between the wastewater discharge and the SJWD sample collection on December 7.

Source Water Protection Efforts

The American River Watershed Technical Committee (ARWTC) is comprised of the participating water utilities and functions as an ad-hoc group to work together in implementing some of the recommendations from the watershed sanitary surveys and share information. The ARWTC has been very active in development, maintenance, and implementation of a spill notification program in the American River watershed. This includes direct contact with, and obtaining voluntary notification from, wastewater agencies in the event of a potentially significant discharge (greater than 1,000 gallons) to the American River. This has been very effective at providing advance notification. This was discussed previously in the **Source Water Spills** subsection.

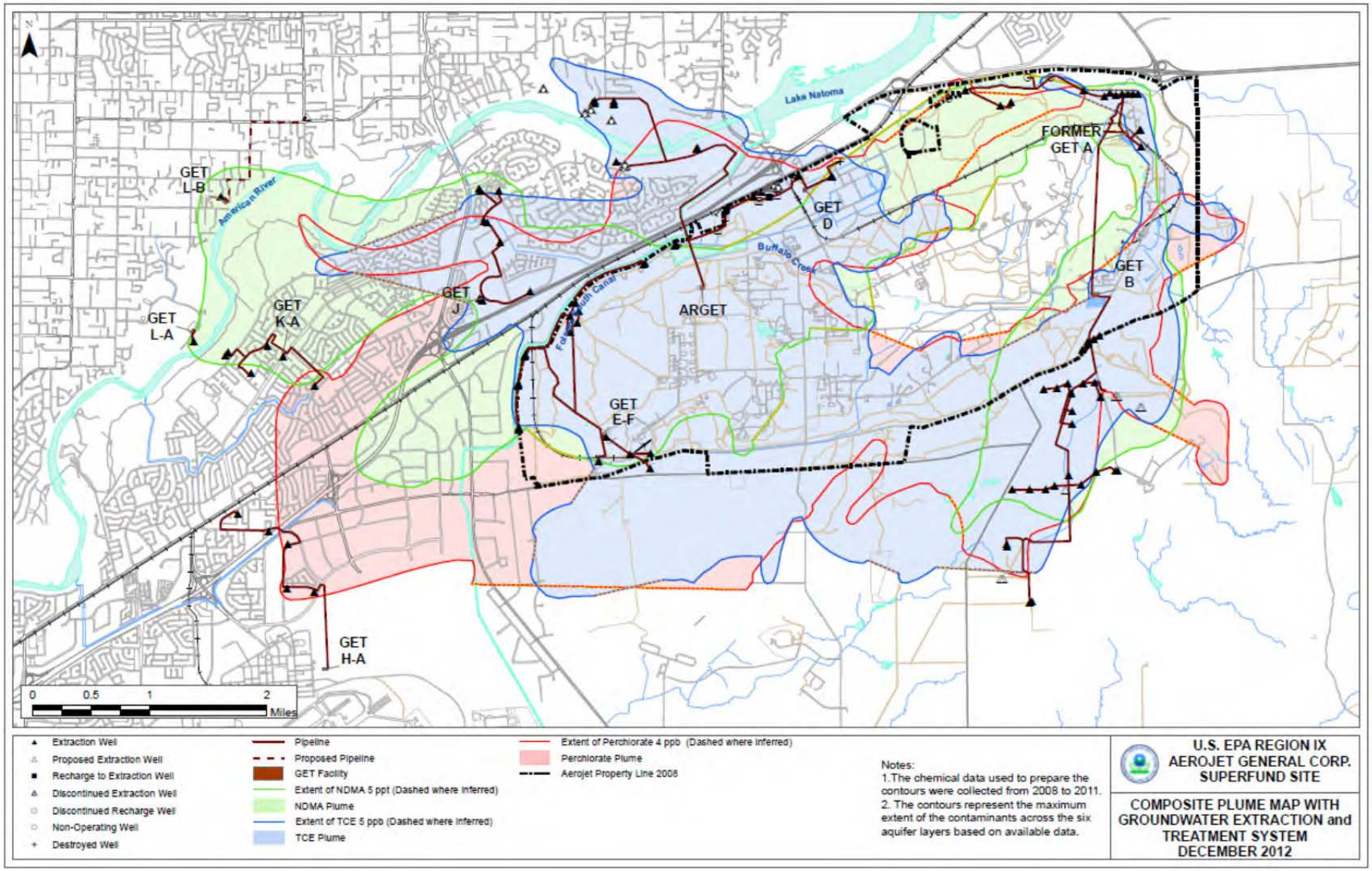
AEROJET INDUSTRIAL FACILITY

Background

The Aerojet site covers 5,900 acres near Rancho Cordova, 15 miles east of Sacramento, California. The northeastern edge of the site is about one half mile south of the American River. Aerojet has developed, manufactured, and tested liquid and solid rocket motors at this site since the early 1950s. In addition, the facility has manufactured chemicals such as rocket propellants, agricultural chemicals, and pharmaceuticals. Cleanup efforts at the site are jointly administered by the USEPA, the Regional Board, and the California Department of Toxic Substances Control (for soil contamination sites).

Environmental investigations at the site began in 1979. Groundwater contamination has been defined in a number of discrete plumes. Aerojet periodically prepares contaminant plume maps for trichloroethylene (TCE), n-Nitrosodimethylamine (NDMA), and perchlorate. There are six groundwater depth layers of the plumes, and maps are prepared for each layer. The major contaminants found both onsite and offsite are solvents such as TCE and chloroform, and rocket fuel by-products such as NDMA and perchlorate. **Figure 4-10** provides a site map of the plumes and treatment facilities. It should be noted that although the solvents are generally volatile and therefore less persistent in the environment, NDMA and perchlorate are not volatile and are very water soluble and persistent in the environment.

Figure 4-10. Aerojet Site Plan and Contaminant Plume Map



In 1989, Aerojet, USEPA, the Regional Board and DTSC signed a Partial Consent Decree (PCD) to complete a comprehensive Remedial Investigation and Feasibility Study (RI/FS) (The RI is a report detailing the nature and extent of contamination and the FS describes alternatives to address the contamination), maintain the current Groundwater Extraction and Treatment (GET) systems, and take any necessary removal actions. In July of 1998, the PCD was modified to include monitoring public water supplies (local groundwater and the American River sources) for the chemical perchlorate, replacing water supplies impacted by high levels of perchlorate, annual updates to the monitoring plan for public water supplies, and reducing the discharge limit for NDMA at currently operating groundwater extraction and treatment facilities.

In 2001, USEPA, DTSC and Regional Board sought public comment to modify their PCD with Aerojet again. This modification included dividing the site into different areas called operable units (OUs) to help speed up the cleanup. The PCD modification was completed in 2002. The cleanup approach for the Aerojet site under the modified PCD is to first control groundwater contamination moving across the facility boundary with two OUs (Western Groundwater and Perimeter Groundwater OUs) and then remediate soil and groundwater contamination at source areas (Boundary, Island, Eastern, Central, and Cavitt Ranch OUs).

An RI/FS must be completed for each Operating Unit. The RI and the FS are conducted concurrently. The RI serves as the mechanism for collecting data to characterize site conditions, determining the nature of the waste, assessing risk to human health and the environment, and conducting treatability testing to evaluate the potential performance and cost of the treatment technologies that are being considered. The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. Aerojet must conduct a separate RI/FS for each OU.

Risk assessment is defined by the USEPA as “qualitative and quantitative evaluation of the risk posed to human health and/or the environment by the actual or potential presence and/or use of specific pollutants.” Aerojet is conducting each OU risk assessment using the assumption that there is 100 percent use for all receptors. Receptors are ecological entities that are exposed to a stressor. This assumption is most conservative and does not assume that risk can be mitigated by surrounding lands or off-site receptors (those receptors located off of the Aerojet property).

The OUs/remedies have been prioritized to capture and treat contaminated groundwater in the early phases to try and minimize the migration of contamination off the site. It should be noted that the groundwater remedies are considered interim since they are dependent on the control of the source areas in other OUs that are in earlier stages of planning and remedy.

- OU1 is the Sitewide OU and it will be assessed once all the individual OU remedies have been installed. The first Five-Year Review will be conducted in 2016, and thereafter on five-year cycles. Once all the OU remedies are approved (possibly by 2021, but more likely by 2026), an entire sitewide analysis will be conducted. This will include an overall risk assessment and is expected to be available for public review.

- Western Groundwater OU (OU3) includes all groundwater west of Aerojet's main facility. It extends just south of International Drive, west to Mather Field Road, north just beyond the American River, and east to include much of the Gold River development. Principal contaminants include TCE, perchlorate, and NDMA. The final RI/FS was published in October 2000, with a Proposed Plan published for comment in December 2000. The final ROD was recorded in July 2001. The Construction Completion was approved by USEPA in July 2011, so the first Five-Year Review will be due by July 2016. Any other OUs with completed RODs and Workplans will also be included in that review, probably including the Perimeter Groundwater and Boundary OUs. USEPA is requiring annual Effectiveness Evaluation Reports for monitoring data from the inner hydraulic barrier and the outer hydraulic barrier to allow for reassessment of the current remedy for this OU. The first outer barrier Effectiveness Evaluation Report was submitted in January 2012 and the first inner barrier report was submitted in July 2012. These reports are from Aerojet to the USEPA and are designed to assess the current effectiveness of the remedy to determine if modifications should be made to optimize the remedy (i.e. selection of operating wells).

- Perimeter Groundwater OU (OU5) includes all remaining groundwater leaving the Aerojet facility to the north or south not included in the Western Groundwater OU. It includes OU2 (American River). Principle contaminants include TCE and other VOCs, perchlorate, and NDMA. The final RI/FS was submitted in 2008 and accepted in August 2010, with a Proposed Plan published for comment in September 2009. The City conducted a detailed review of the Proposed Plan and submitted comments to the USEPA. The final ROD was recorded in February 2011. The Unilateral Administrative Orders (UAOs) were issued with the ROD and included a Statement of Work for the RD/RA. Aerojet is working on the Remedial Design, and construction is expected to be completed by 2013. USEPA is requesting an effectiveness evaluation in the Remedial Design since much of the remedy has already been implemented (wells and GETs). This evaluation will also begin to integrate the remedies for OU3 and OU5, since the groundwater component is physically interconnected. This OU is expected to be assessed as part of the Western Groundwater OU Five-Year Review in 2016.

- Boundary OU (OU6) includes areas adjacent to or within the 2002 Carve-Out Lands. OU6 areas are scattered and include the Magazine Area, Chemical Plant 2, portions of Chemical Plant 1, and the Administration Area. Investigation work to define source areas began in 2005. The RI/FS was finalized in September 2012. A Proposed Plan was published for public review and comment period in May 2013, and a ROD is expected in early 2014.

- Island OU (OU7) is located in the central part of the Aerojet site and includes the most significant groundwater contamination source areas at the facility. Data for the RI has been collected and evaluated. The Draft RI/FS is to be submitted six months after the Final Proposed Plan for Boundary OU, so the Draft RI/FS for Island OU is expected in the Fall 2014.

- Eastern OU (OU8) is a soil and groundwater OU which includes most of the liquid and solid rocket testing areas on the eastern side of the facility. Sampling for the data collection has just completed, and now Aerojet is starting the RI/FS process. The Draft RI/FS is to be submitted six months after the Final Proposed Plan for Island OU.

- Central OU (OU9) contains most of Chemical Plant 1 and associated rocket manufacturing and is generally in the central portion of the facility. The Sampling Plan is currently in review. Once data is collected, the RI/FS analysis can begin. The Draft RI/FS is to be submitted six months after the Final Proposed Plan for Eastern OU.

- Cavitt Ranch OU (OU4/Area 41 OU) is a 550 acre site situated 1.5 miles east of Aerojet's main facility and south of White Rock Road. This site was used for drying and burning old solid rocket fuel. Soil and groundwater are contaminated primarily with TCE and perchlorate but also contain other VOCs, dioxin/furans, and some elevated metals. This was determined to be the lowest priority OU and the remedy is planned for later. Currently, the Sampling and Analysis Plan is expected in November 2014 which will outline the plan for data collection to support the RI/FS.

The risk assessments address human health (both cancer and non-cancer), ecology, and water quality (both on/off site – residual remaining and discharge). Aerojet has plans to redevelop as much of the property as is permitted by USEPA. There is a study being conducted to assess the potential reuse of these carve out lands (not covered under the Superfund Cleanup) as well as in the Perimeter Groundwater OU and some Source OUs.

In 2003, analyses revealed that a portion of the groundwater just north of the American River in Carmichael was contaminated with NDMA. Soon after, TCE and perchlorate were detected. Aerojet prepared a modification to the Western Groundwater OU design in 2004 to begin extraction and treatment of the plume.

There are two major receiving waters that pass through the Aerojet facility; Alder Creek and Buffalo Creek, both of which are tributary to the American River. Alder Creek currently receives few discharges, only storm runoff and cooling water. Buffalo Creek receives storm runoff, a small amount of industrial process water, and GET discharge. Buffalo Creek has been modified, realigned, and impounded in three areas: from upstream to downstream. These are F-Area Lake (located on the east end of the Aerojet property), East and West retention ponds, and West Lake. West Lake consists of two distinct cells.

No new GET facilities are planned for Western Groundwater or Perimeter Groundwater OUs at this time, but more flow will be supplied to existing facilities to go up to design limits and incorporate more waters associated with modifications to the proposed remedies. Source Area OUs may result in additional flows directed to the GET facilities or creation of new GET facilities. Aerojet does not plan to fully implement the remedy for the Source Area OUs prior to Record of Decision/Administrative Order from USEPA.

Seasonal Patterns

There are two types of discharges from the Aerojet property: treated groundwater and stormwater. The GETs are operational year-round and result in constant discharges throughout the year. The stormwater system includes both wet and dry weather flows. Typically, there is limited discharge during the summer months, with most runoff occurring during the wet season.

Related Constituents

Table 4-13 provides a list of the principal contaminants and their associated sources, human health thresholds, and treatment options. It should be noted that many of these constituents of interest are volatile compounds. This means that after treatment and discharge to surface water, there is opportunity for these constituents to be further reduced in the environment via volatilization. There are three compounds, NDMA, perchlorate and 1,4-dioxane, which are not volatile. All three are considered as very water soluble and do not biodegrade in the natural environment. These constituents are persistent in the environment and would likely not be reduced, but would be diluted, in the American River. When the USEPA adopts the new Carcinogenic VOC Rule (as discussed in **Appendix C**) there could be additional constituents of interest identified for drinking water.

Presence in the Watershed

Western Groundwater OU

The Western Groundwater OU ROD was completed in 2001 and specified the selected cleanup plan, or remedy, for this portion of the site. The ROD directed Aerojet to contain contaminated groundwater on the western side of Aerojet and restore the aquifer between the on- and off-property containment systems. There are fifteen contaminants of concern (COCs) in Western Groundwater OU groundwater, but the primary contaminants are TCE, perchlorate, and NDMA.

A summary of the GETs supporting the Western Groundwater OU is provided in **Table 4-14**. On-property perchlorate is removed from the contaminated groundwater at the combined GET E/F using a biological system developed by Aerojet. Off-property, the lower concentration perchlorate is removed by commercially-available ion exchange. This occurs at Chettenham Wellhead and GETs J, K-A, LA, and LB. Both on- and off-property NDMA and high concentration VOCs are removed by ultraviolet light treatment. VOC treatment consists of on-property air stripping and off-property use of granular activated carbon.

The remedy includes both extraction wells and sentinel wells. The extraction wells are being monitored to make sure they are containing the groundwater plume, and the sentinel plumes are located further downstream to ensure that the plume is not migrating ahead of the extraction wells.

Table 4-13
Principal Groundwater Contaminants at the Aerojet Superfund Site

Contaminant	Source	MCL, µg/L	PHG, µg/L	Treatment
Perchlorate - Inorganic anion	Component of solid rocket propellant	6	6	Biological reduction and ion exchange reduce perchlorate to <4 µg/L
N-nitrosodimethylamine – Semi volatile organic compound	Combustion product of liquid rocket fuel	0.01 [1]	0.003	UV light/peroxide oxidation removes NDMA to < 0.002 µg/L
1,4-dioxane	Stabilizer in solvents	1 [1]	-	UV light/peroxide oxidation removes 1,4-dioxane to < 3 µg/L
Trichloroethylene (TCE)	Solvent	5	1.7	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
Tetrachloroethylene (PCE)	Solvent	5	0.06	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
1,1-dichloroethene (1,1-DCE)	Solvent	6	10	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
cis-1,2 – dichloroethene (1,2-DCE)	Solvent	6	100	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
trans-1,2 – dichloroethene (1,2-DCE)	Solvent	10	60	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
1,1-dichloroethane (1,1-DCA)	Solvent	5	3	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
1,2-dichloroethane (1,2-DCA)	Solvent	0.5	0.4	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
Carbon tetrachloride (CCl4)	Solvent, refrigerant, propellant	0.5	0.1	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
Chloroform	Solvent	80 [2]	-	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
Vinyl chloride	VOC degradation product	0.5	0.05	Air stripping and/or GAC removes VOCs to < 0.5 µg/L

MCL – Maximum Contaminant Level: Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.
PHG – Public Health Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health.
[1] DPH Notification Level – the 1,4-dioxane level was revised down in November 2010
[2] The MCL is 80 µg/L for the sum of total trihalomethanes (as disinfection by-products) chloroform, dibromochloromethane, bromodichloromethane, and bromoform.

Table 4-14
Summary of Operating Units and GET Facilities at the Aerojet Superfund Site

Operating Unit	Area/ Zone	Name of Facility	Target Contaminants	Treatment Processes[1]	Design Capacity/Permit Flow	Discharge Location
Western Groundwater – OU3	Area 1	GET E/F	Perchlorate, NDMA, VOCs	Bioreactor/sand filtration (biological reduction), H_2O_2/UV, Air stripping	8.64 mgd/ 8.64 mgd	Buffalo Creek/ American River
	Area 1	GET H-A	No Information Required Since Does Not Discharge to American River or Tributary			Morrison Creek
	Area 1	Chettenham Wellhead	Perchlorate	Ion Exchange - source water decreased and treatment system removed late 2010	0.86 mgd/ 1.08 mgd	American River
	Area 2	GET J	Perchlorate, NDMA, VOCs	Bag Filters, H_2O_2/UV, Ion Exchange, GAC	7.17 mgd/ 5.98 mgd	Buffalo Creek/ American River
	Area 3	GET K	Perchlorate, NDMA, VOCs	Basket Strainers, Ion Exchange, H_2O_2/UV, GAC (Future Option)	5.76 mgd/ 4.03 mgd	American River
	Area 4	GET LB (Bajamont)	NDMA, Perchlorate, VOCs	Bag Filter, H_2O_2 (Future Option)/UV, GAC	0.86 mgd/ 1.44 mgd	American River
	Area 4	GET LA (Ancil Hoffman)	NDMA, Perchlorate, VOCs	Bag Filter, H_2O_2 (Future Option)/UV, GAC(Future Option)	2.02 mgd/ 2.88 mgd	American River/ Irrigation
Perimeter Groundwater – OU5	Area 4	Sailor Bar Park	VOCs	GAC	0.36 mgd/ 0.36 mgd	Sailor Bar Park Pond
	Zone 4	GET A	No Information Required Since Do Not Currently Discharge to American River or Tributary			Rebel Hill Ditch (onsite percolation)
	Zone 3	GET B				Rebel Hill Ditch (onsite percolation)
	Zone 1	GET D				Direct Injection – Groundwater
	Zone 1	ARGET[2]	VOCs, 1,4-Dioxane	HiPOx (H2O2/Ozone), Air stripping	5.2 mgd/ 4.96 mgd	Buffalo Creek/ American River
Golden State Water Company		AC-6	Perchlorate	Ion Exchange	2.16 / 1.08 mgd	American River
		AC-18	No Information Required Since Does Not Discharge to American River or Tributary			Morrison Creek
		AC-23	Perchlorate	Ion Exchange	2.88 mgd/ 3.17 mgd	American River
All Areas	All	Low Threat Discharges	Varies	Treatment if practical	No Limit	Any

[1] All media filtration beds have pre-filters.
[2] Currently, perchlorate is not considered a target pollutant at the ARGET facility, even though it can be detected in the current source water. If source waters change and it was identified as a target pollutant, then an effluent limitation would be put in place and treatment would be required.

Aerojet must implement the remedy, including obtaining all necessary permits. They must obtain a NPDES permit from the Regional Board to discharge the treated water from GET facilities to surface waters. The current permit for the GET discharges was reissued in December 2011 and is discussed later in the Regulation and Management subsection.

GET E/F

This facility is located on the Aerojet property. It was constructed in 1998 and has been upgraded since that time. The current design capacity is 6,000 gallons per minute (gpm), but this may be increased to 6,200 gpm to accommodate additional extraction wells. For perchlorate removal, there are four fluidized bed reactors (FBRs). This is a biological process and has proven to be a more sensitive process than the ion exchange process. The biological process requires ethanol to be dosed as a food source for the bacteria; then the bacteria utilize perchlorate for respiration. The perchlorate is degraded into chlorine and oxygen.

Since biological reduction is a pioneering process for perchlorate removal, there are no standard operating procedures for this general process, but Aerojet has developed an Operating Manual for their facility.

Between October 2008 and June 2012 there were six official violations of the permit related to GET E/F. The events were reported in the Draft Revised Waste Discharge Requirements (WDRs) for the GET discharges, published in October 2013. The downstream water utilities were only notified of two of these events (March 30, 2010 and August 8, 2011 – see below). Three of the events were related to low level detects of cis-1,2-dichloroethylene at the GET E/F effluent on April 7, 2010, December 7, 2011, and September 5, 2012 (0.97, 0.68 and 1.2 µg/L, respectively, slightly above the effluent limit of 0.7 µg/L but below the MCL of 6 µg/L). A fourth event was a detection of perchlorate in GET E/F effluent on June 17, 2010 at 6.8 µg/L, above the MCL of 6 µg/L. The final events were detections of acetaldehyde in the GET E/F effluent on August 8, 2011 and April 11, 2012 at 22 and 13 µg/L, respectively, above the permit limit of 5 µg/L.

During the same period there were seven events of interest (including two of the permit violations) at GET E/F that were variations from permit requirements during the study period. Provided below is a summary of each event.

Event 1: October 14, 2009

There was a detection of 1,2-dichloroethane in the GET E/F discharge to Buffalo Creek of 0.53 µg/L in the October 14 sample; slightly above the discharge limit of 0.5 µg/L as a maximum daily (0.38 µg/L average monthly). This was also above the drinking water MCL of 0.5 µg/L and above the public health goal of 0.4 µg/L. The river sampling result was non-detect downstream of this discharge. Non-routine maintenance was underway during the sample period and likely contributed to the detection.

Event 2: March 30, 2010 (Permit Violation)

There was a detection of cis-1,2-dichloroethylene (1,2-DCE) in the GET E/F discharge to Buffalo Creek in a March 10 sample of 0.68 µg/L; below the daily maximum limit (0.75 µg/L) but above the average monthly limit (0.5 µg/L) per the NPDES permit for the GET discharges. A follow up sample collected by Aerojet staff on March 30 resulted in a detect of 1.7 µg/L. A final sample on April 7 was also above the limit, at 0.97 µg/L. All results were lower than the drinking water MCL of 6 µg/L and Public Health Goal (PHG) of 100 µg/L. The river sampling result was non-detect downstream of this discharge. Aerojet staff attributed the cis-1,2-DCE detections to UV maintenance.

Event 3: June 5, 2011

There was a detection of perchlorate in the GET E/F discharge to Buffalo Creek in a June 5 discharge sample of between 800 and 900 µg/L; well above the permit effluent limit of 6 µg/L as a monthly average and 4 µg/L as a maximum daily. This was above the drinking water MCL of 6 µg/L and the current PHG of 6 µg/L. This was caused by a power outage and subsequent equipment shutdown on June 1.

Event 4: August 8, 2011 (Permit Violation)

There was a detection of acetaldehyde at 22 µg/L in the effluent from GET E/F. This is above the permit limit of 5 µg/L. However, it was not detected in the sample collected just prior to the GET E/F outfall into Buffalo Creek or in the GET E/F receiving water location. Regional Board staff determined that the detection was not valid and used the outfall data in lieu of the effluent data for compliance.

Event 5: November 3, 2011

There was an extensive power outage at Aerojet (three hours) on November 3 which resulted in failure of one of the GET E/F biological fluidized bed reactors and a high detect of perchlorate from an internal performance monitoring sample. This reactor bed was taken off-line and then corrected. After a slow return to service, the bed was again increased in flow almost up to full capacity of 1200 gpm. The performance sample collected on November 21st was returned on November 22nd at 80 µg/L out of that reactor. Aerojet investigated the cause of the failure and had numerous potential causes. Aerojet initiated a 6-month manufacturer evaluation of the facility in January 2012, which resulted in installation of new bed cleaning system.

Event 6: April 22, 2012

There was a detection of perchlorate in the GET E/F discharge to Buffalo Creek of 300 to 350 µg/L on April 22. This was well in exceedence of the permit effluent limit for discharge to Buffalo Creek of 4 µg/L monthly average and 6 µg/L maximum daily and above the drinking water MCL of 6 µg/L and the PHG of 6 µg/L. This issue was caused by failure of tubing to an

ethanol dosing pump. Aerojet determined that if they monitor the pump speed they can identify when the tubing is wearing and in need of replacement. A new alarm is in place which tracks the pump speed; when it is at 80 percent or greater, then the tubing is replaced.

Event 7: May 8, 2012

There was a detection of acetaldehyde in the effluent of the GET E/F facility of 13 µg/L on May 8. This is above the permit limit of 5 µg/L. Again, it was not detected in the sample collected just prior to the GET E/F outfall into Buffalo Creek or in the GET E/F receiving water location. Regional Board staff determined that the detection was not valid and used the outfall data in lieu of the effluent data for compliance. Operational modifications being implemented as part of a Pilot Study are suspected to be the cause of the detect.

Chettenham Wellhead

This facility was brought into operation in January 2006 and is located south of the Highway 50 in Rancho Cordova. It provides perchlorate removal. There have been no permit violations.

GET J

This facility was brought into operation in January 2005 and is located between the American River and Highway 50 near Hazel Avenue. It provides iron, perchlorate, NDMA, and VOC removal. There were no permit violations during the study period.

GET K

This facility was brought into operation in December 2004. This facility is located on the south side of the American River in Rancho Cordova. It provides NDMA removal. There were no permit violations during the study period.

GET LA

This facility is located on the north side of the American River. It provides NDMA removal. This facility is located in Carmichael near Ancil Hoffman Park. There were no permit violations during the study period.

GET LB

This facility is located on the north side of the American River and was brought into operation in 2007. It provides NDMA and VOC removal. This facility is located adjacent to Carmichael Water District's Bajamont Water Treatment Plant. There were no permit violations during the study period.

Perimeter Groundwater OU

The Perimeter Groundwater OU covers the north, east, and south boundaries of the site. The investigation was completed in 2006, and a proposed plan was presented for public comment in 2009. This OU has five treatment facilities, but only one currently results in a discharge to the American River, the American River GET (ARGET).

ARGET

The 3,500 gpm ARGET treatment plant consists of air stripping (removes VOCs to less than 0.5 µg/L) and UV light/peroxide oxidation (removes 1, 4-dioxane to less than 3 µg/L) and is located on the Aerojet property. Treatment covers all the currently monitored and known contaminants, except perchlorate. The perchlorate level in the combined extraction wells is estimated to be near 7 µg/L, which is above the DPH MCL of 6 µg/L. The Regional Board determined that treatment for perchlorate at the ARGET is not necessary at this time since they expect a nearly 30-fold dilution in the American River (estimated at minimum river flow of 250 cubic feet per second and maximum discharge rate of 3,500 gpm).

ARGET is allowed an interim perchlorate effluent limit of 11 µg/L (instead of 6 µg/L) to account for dilution. When Aerojet adds the source waters from GET D, then the facility will need to meet an effluent limit of 4 µg/L. GET D is planned to be blended with ARGET supply wells and then treated at the facility and then discharged to American River. This is expected to occur by 2014. GET D source waters have perchlorate, which would trigger treatment at this facility.

Regulation and Management

Under two NPDES permits, Aerojet discharges storm runoff, cooling tower water runoff, treated groundwater, and periodically treated industrial process water to American River tributaries.

GET System Waste Discharge Requirements

Aerojet was issued an NPDES permit, Order No. R5-2011-0165, for discharge of treated water from the GET facilities in December 2011. This replaces Order No. R5-2007-0165. In this permit, facilities are permitted to discharge over 33.6 million gallons per day (mgd) of treated groundwater to the American River or its tributaries, an increase of over 8 mgd since the 2007 NPDES permit.

The current permit includes effluent discharge from 10 GET facilities to the American River; American River Groundwater Extraction and Treatment (ARGET), GET E/F, GET J, GET K-A, GET L-A, GET L-B, Sailor Bar Pond, Chettenham Well, AC-6 Well, and AC-23 Well. Between 2008 and 2012 there have been four modifications to this NPDES permit, summarized below.

- The Regional Board amended Order No. R5-2007-0165 in February 2009 with Order No. R5-2009-0016. This order revised the GET E/F effluent limit for TCE up to 1.5 µg/L (daily

maximum value), due to treatment difficulties with achieving the historic effluent limit of 0.5 µg/L. This is still below the primary MCL of 5 µg/L. This limit can also be increased by the Regional Board Executive Officer to 3 µg/L when Aerojet General is making operational changes to correct effluent exceedences from GET E/F.

- The Regional Board issued a new permit for Aerojet in March 2010, Order No. R5-2010-0039, which updated several aspects of the permit. This includes incorporation of Order No. R5-2009-0016, relocation of several outfalls (GET L-A and GET K-A), closure of several interim GET facilities (GET K and GET H), addition of three new GET facilities, and numerous other minor revisions to the permit and monitoring plan.
- The Regional Board amended Order No. R5-2010-0039 in April 2011 with Order No. R5-2011-0024. It revised the classification of the discharge from major to minor to reduce Aerojet staff time for USEPA reporting requirements.
- The Regional Board issued a new permit for Aerojet in December 2011, Order No. R5-2011-0088, which updated several aspects of the permit. The modifications included removal of the perchlorate treatment system on the Chettenham well, addition of three wellhead treatment systems for Golden State Water Company (GSWC) wells, and extension of the ARGET interim perchlorate limit to December 1, 2013. In addition, the permit clarifies the low-threat discharge classification (any system-wide discharge meeting the low-threat requirements) and its discharge effluent limitations.

The GSWC wells are not operated as proposed in the current permit. Well 6 is no longer needed as part of the remedy, so it is only operated to meet the needs of GSWC. Wells 18 and 23 remain part of the remedy, but are only operated on demand; therefore, there is expected to be minimal discharge from these wells outside of startup and shutdown. When discharging under point 12 (low-threat discharge) the limit for perchlorate is 12 µg/L, but if the discharge level is greater than 8 µg/L for two consecutive months then Aerojet must submit a plan to ensure compliance with the effluent limit.

As part of this permit, discharge points are identified for each GET facility. The location of each GET facility and their associated discharge locations were provided in the NPDES permit as Attachment B-1; this is shown in **Figure 4-11**. In the permit, each discharge point is described and final effluent limitations are set for each GET effluent discharge. The effluent limitations are based on the source water contamination issues. **Table 4-15** provides a list of the general effluent limitations of concern for drinking water purposes.

Figure 4-11. Aerojet GET and Discharge Locations

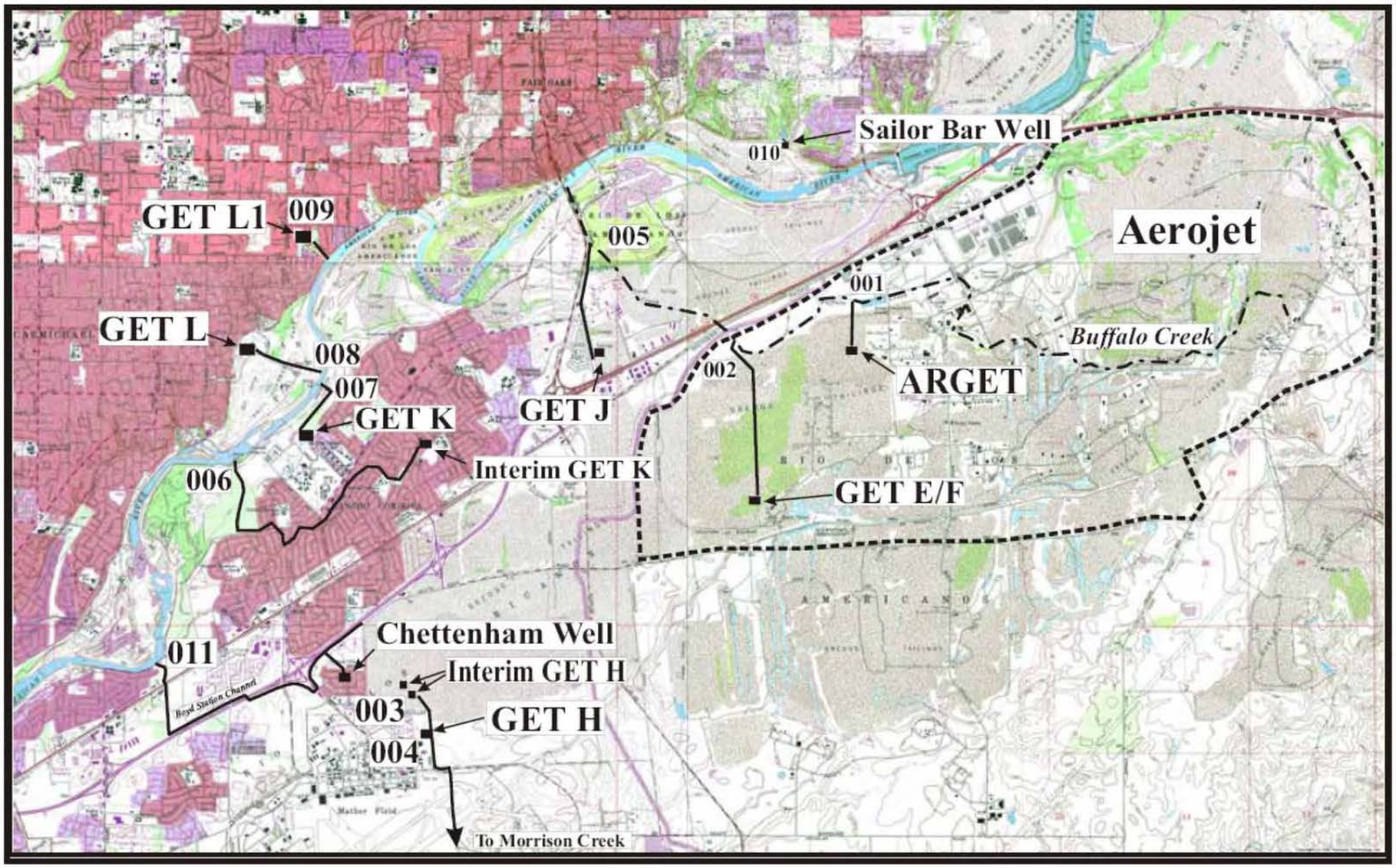


Table 4-15
General GET Effluent Discharge Limitations

Constituent	Units	Average Monthly	Maximum Daily
VOCs [1]	µg/L	0.5	0.7 [2]
1,2-Dichloroethane (1,2-DCA)	µg/L	0.38	0.5
1,4-Dioxane [3]	µg/L	3	6
NDMA	µg/L	0.002/0.007 [4]	0.010 [5]
Perchlorate [6]	µg/L	4	6 [7]
Total Copper [8]	µg/L	11	17
Acetaldehyde [9]	µg/L	5	5
Formaldehyde [10]	µg/L	50	50
Chloroform [11]	µg/L	3.0	5.0
Tetrachloroethene (PCE) [12]	µg/L	5.0	5.0
pH [13]	Units	6.5	8.5

[1]All VOCs listed in EPA Methods 8010/8020 or 8260. Each shall meet limit.
[2] Except for GET E/F which has a TCE maximum daily limit of 1.5 µg/L, with an upper limit of 3 µg/L, and Low Threat Discharges have maximum daily limit of 5 µg/L only.
[3]Applies only to ARGET, GETs E/F, J, and Low Threat Discharges (which have a maximum daily limit of 10 µg/L)
[4]NDMA limit is higher for GETs J, K-A, L-A, and L-B and does not apply to Sailor Bar Park, Chettenham Well, AC-6, AC-23
[5]Low Threat Discharges only have a maximum daily value at 0.020 µg/L
[6]Interim limit for ARGET exists as 8 µg/L for both average monthly and maximum daily until 12/1/13
[7] Low Threat Discharges only have a maximum daily value at 12 µg/L
[8] Applies only to ARGET and GET E/F
[9]Applies only to GET E/F
[10]Applies only to GET E/F
[11]Applies only to GET J
[12]Applies only to AC-6
[13]Listed values represent instantaneous minimum and maximum

Under the NPDES permit for discharge of treated groundwater, Aerojet is required to monitor the influent and effluent for each GET facility, for a total of 12 influent sample points and 13 effluent sample points (including the low-threat discharge). The influent sites are required to be monitored monthly for the applicable constituents of concern in the contaminated groundwater which varies between facilities. Semi VOCs are required to be monitored quarterly at several of the GET facilities. The effluent sites are required to be monitored monthly for a larger suite of constituents to ensure compliance with all effluent limitations.

In addition, the Regional Board has identified 12 receiving water sites on the American River, or Alder Creek, that are also monitored monthly. These sites are monitored for VOCs, NDMA, perchlorate, total copper, temperature, dissolved oxygen, turbidity, specific conductivity, pH, total dissolved solids, and hardness.

The treated groundwater discharges generally meet the NPDES permit effluent limits, which the Regional Board set at or below the drinking water MCLs or notification levels set by the DPH. Aerojet General has an interim effluent limit for perchlorate on their treated groundwater

NPDES permit for the ARGET facility which is above the drinking water MCL for perchlorate. The interim effluent limit was set at 8 µg/L in the ARGET discharge and relies on dilution from the American River to reduce perchlorate levels to below the MCL in the receiving water. ARGET does not currently provide treatment for perchlorate, but treatment will be required by December 2013, or if GET D (another treatment facility on the site which currently discharges to groundwater) waters are diverted to ARGET, whichever comes first.

The Aerojet NPDES permit for discharge of treated groundwater includes several requirements of interest:

- Higher frequency (weekly) receiving water monitoring under low flow (1,500 cubic feet per second) conditions in the American River.
- Cessation of discharges and re-opening of the permit if perchlorate is detected in the American River at levels greater than the 6 µg/L primary MCL.
- Notification to downstream water utilities, including the City of Sacramento, CWD, and Freeport Regional Water Authority within 24-hours after Aerojet has received information that its discharge exceeds effluent limitations, or if operational monitoring of the treatment facilities indicates that there is a potential for effluent limitations to be exceeded.
- The permit also has a special provision which now requires an operations and maintenance manual for any new GET.
- Prepare a safeguard to an electric power failure to assure that all requirements of the permit can be met in the event of the loss of power. This can include alternate sources of power, standby generators, retention capacity, operating procedures, or other means.

Also of note is the comprehensive Supervisory Control and Data Acquisition (SCADA) system that Aerojet has installed for the GET facilities. This includes alarms and set points. The operations staff visit all GET facilities daily during the work week. There is no requirement in the Regional Board permit for there to be backup supply for power. However, when power is out to a GET, the system is controlled to turn off. When the facility is brought back on-line there is a startup mode which requires recirculation to ensure operations are working correctly. During off-hours, alarms from the GET facilities are sent to the Aerojet security office and then forwarded to the operations group as required.

The Regional Board published a Proposed NPDES permit for the GET system in August 2013, which is expected to be adopted in December 2013. There are numerous modifications included in the revised permit. Many of these changes reflect modifications required by USEPA for the Perimeter and Western Groundwater OU Remedies. Key proposed changes include:

- An increase in the total permitted discharge to the Lower American River of an additional 10 mgd (roughly 30 percent increase), from increased flows at GET E/F and ARGET and new discharges from GET AB (a new combined facility) and White Rock GET.

- Modifications to the treatment process for GET E/F to account for additional low-level perchlorate flows with installation of a parallel ion exchange unit.
- Revise the effluent permit limit for cis-1,2-dichloroethylene at GET E/F up to 1.5 µg/L, still below the primary MCL of 6 µg/L.
- GET D to be closed and flows sent to ARGET.
- GETs A and B will be combined into GET AB and will no longer be discharged onsite through groundwater recharge, but will be discharged to Buffalo Creek, tributary to the Lower American River.
- A new White Rock GET will be discharged to Buffalo Creek, tributary to the Lower American River.
- ARGET interim limit for perchlorate will sunset and long-term limit will apply. ARGET will be modified to include ion exchange units as a pre-treatment for the new GET D flows.
- Requirement for an Effluent and Receiving Water Characterization Study.

GETs AB, D, and White Rock will be new discharges to the American River. The primary constituents of concern for those discharges are VOCs, perchlorate, and NDMA. GET AB will have a capacity of approximately 3,000 gpm and is expected to begin discharging to the American River by March 2014. GET B will be pre-treated with ion exchange for perchlorate removal, then blended with GET A for UV and air stripping to remove the NDMA and VOCs. GET D will be pretreated for perchlorate with ion exchange and then treated at ARGET. White Rock GET was previously covered under a separate Waste Discharge Requirement (WDR) order for land disposal (R5-2011-0025). This treats groundwater from the White Rock Road North Dump as well as the leading edge of the Aerojet plume. It has the same constituents of interest (VOCs, perchlorate, and NDMA) and is treated with air stripping and ion exchange.

Stormwater and Industrial Process Water Waste Discharge Requirements

This NPDES permit, Order No. R5-2008-0118, covers general site runoff, which includes large amounts of stormwater (about 35.6 mgd) and a small amount of operational/process water (normally less than 0.2 mgd) that discharge via Alder and Buffalo creeks and local drainages to the American River. The current permit was adopted on July 31, 2008. To date, there have been no violations of the existing permit.

Stormwater in the Buffalo Creek system is collected on-site and stored in the one of five impoundments on the site. Water is kept in the impoundments for evaporation and percolation, but it is discharged to one of the receiving waters on the property if additional storage capacity is needed. Between 2008 and 2011 there was only one discharge event from the impoundments to Buffalo Creek. There have been no violations of the permit during the study period, with all perchlorate samples resulting in non-detects (less than 4 µg/L).

Discharge of process water, generated by on-going rocket testing operations, is typically sent to the sanitary sewer system. If the process water does not meet sewer effluent limits, then it is treated by neutralization and chemical oxidation or it may also be hauled to an appropriate

licensed disposal facility. F-Area Lake is an impoundment on the east end of Buffalo Creek. This generally receives stormwater runoff and does receive some sump discharge from the Rocket Engine Test Stand Area (this is a deactivated test site). Also, there is blowdown from boilers and coolers as well as low-threat discharges that are directed to the ground surface for infiltration or into swales. Unless storm flows are occurring, this water does not reach surface water.

Under the current permit, Aerojet is required to monitor four discharge locations around the property for a variety of constituents, including perchlorate, during discharge events. Aerojet must also monitor five receiving water locations on Buffalo and Alder creeks during those discharge events. Perchlorate has been detected in Buffalo Creek upstream of the impoundments, at levels from 4 to 8 µg/L, during first flush scour events. Therefore, the permit includes an effluent limitation for a maximum daily value of 6 µg/L of perchlorate, set at the current primary MCL for perchlorate. This is the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). The daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day. The source of perchlorate is uncertain, but could include surface scouring to both creeks and possible upwelling of shallow groundwater contamination to Alder Creek via seeps. By limiting the discharge effluent to the MCL, there should be a lower likelihood of detectable perchlorate in the American River from this source due to dilution.

The permit also requires Aerojet to update its SWPPP for the site. The stormwater NPDES permit reports are not submitted electronically to the Regional Board so the discharge reports can only be reviewed if visiting their office.

The Regional Board published a Proposed NPDES permit for the stormwater discharge in August 2013, which is expected to be adopted in December 2013. There are numerous modifications included in the revised permit. Key proposed changes include:

- Buffalo Creek will no longer be diverted into the impoundments during the summer months, because it will have larger flows due to the revision to the GET A and B discharge points (which will now be combined with discharge to Buffalo Creek).
- Removal of numerous discharge points that are no longer used by Aerojet.

Water Quality Issues and Data Review

The required monitoring by Aerojet has resulted in numerous exceedences of the permit effluent limits during the study period; these were discussed previously. However, it should be noted that the companion samples for the receiving waters did not result in detects above the receiving water limits. In addition, there has been no detection of perchlorate, NDMA, or 1,4-dioxane in the Lower American River by the participating water utilities, as noted in **Section 3**. The Coordinated Monitoring Program has detected low-levels of some organics in the receiving water, but these levels are low and infrequently detected.

Source Water Protection Efforts

The City of Sacramento and CWD have been active in tracking the permitting and discharge events at Aerojet. These efforts include providing comments to USEPA on the proposed plan to address groundwater contamination in the Boundary OU of the Aerojet site, reviewing and commenting on proposed changes to the NDPES permits for the GET facility discharges, providing input to the Regional Board on concerns related to drinking water impacts on the Lower American River, tracking the Aerojet Superfund Site Community Advisory Group, and follow up with Aerojet when spill events occur.

In addition, the City of Sacramento has conducted a parallel Aerojet tracking effort to obtain an understanding of the proposed changes at the site, which has included site tours and communications with Aerojet staff to better understand the GET treatment facilities and their operations and maintenance.

SPECIAL TOPICS

Six special topics where identified by the participating water utilities for investigation and summary. Provided below are discussions on future population growth in the watershed, upper watershed management program (specifically the Cosumnes, American, Bear and Yuba Integrated Regional Water Master Plan), the Regional Board's Drinking Water Policy, Climate Change, Selected Invasive Species, and Reservoir Operations. These topics are summarized only for informational purposes.

Population Growth

Growth trends were examined in order to identify the potential long-term impacts of growth on the related potential contaminant sources being investigated: forest activities, recreation, river corridor activities, urban runoff, and wastewater. The estimated total population of the counties in the American River watershed was nearly two million in 2010**.** The majority of growth continues to occur in the middle watershed, from El Dorado Hills and Roseville east to the communities of Colfax and Placerville, in proximity to the drinking water intakes. Much of the growth has occurred as extensions of existing urban areas.

Table 4-16 provides the recent change in population of the three counties in the watershed. It can be seen that there has been a 5.5 percent increase in population of the watershed counties, with the largest growth rate in Placer County. It is possible that much of this growth occurred in western Placer County and is outside of the American River watershed.

Table 4-16
Population Change in Watershed Counties

County	2005	2010	Change
El Dorado	172,987	180,921	4.6%
Placer	307,987	350,275	13.7%
Sacramento	1,368,333	1,420,434	3.8%
TOTAL	**1,849,307**	**1,951,630**	**5.5%**

[1] Based on data from the California Department of Finance

Table 4-17 provides information on population projections by the Department of Finance through 2060. The population of the counties within the watershed is projected to increase approximately 57 percent, to over three million, during the next 50 years. These projections have been revised down from the projections in 2005, which showed a 100 percent increase through 2050.

Table 4-17
Population Projections for the Watershed Through 2060

County	2010	2020	2040	2060	Net Change
El Dorado	180,921	203,095	263,579	297,972	65%
Placer	350,275	391,682	501,293	579,729	66%
Sacramento	1,420,434	1,543,522	1,913,756	2,191,508	54%
TOTAL	**1,951,630**	**2,138,299**	**2,678,628**	**3,069,209**	**57%**

[1] Based on data from the California Department of Finance

This increasing human population in the watershed will likely mean an increasing urbanization of the watershed as well as the potential for new industrial discharges. The change in land use may be significant in terms of the potential contaminating activities and resultant impact on source water quality. It is uncertain as to what extent this shift will result in quantifiable changes in source water quality. Most of the potential contaminating activities in the watershed are regulated now so that should minimize their impact. As development occurs in the middle and upper watershed it will be important for upstream communities to implement measures to protect water quality, such as those identified in the Phase II MS4 permits like source controls, encouraging low impact development, and potentially implementing hydromodification management.

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

The Integrated Regional Water Master Plan (IRWMP) was first adopted in December 2006, with an Update IRWMP beginning development in 2012. The goal is to have an updated plan complete in 2014. The 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) rivers region. This effort includes participants from water suppliers (including PCWA and EID), power utilities, and watershed conservation groups; the purpose is to give:

- Provision of long-term water supplies,
- Protection and improvement of water quality, and
- Enhancement of environmental and habitat resources.

The IRWMP presents information on current water resource issues in the region, provides solutions to address those issues, and prioritizes projects across the four watersheds. It is a coordinated effort among water agencies, federal, state, and county agencies, citizens groups, power utilities, and other stakeholders. The goals and objectives presented in the Plan have remained the same: water supply, water quality, environment and habitat, land use, and recreation water resource management areas. Implementation of the goals and objectives is the core of the Plan and is achieved through a series of specific actions or projects. The goals are as follows:

- Goal 1: Achieve sustainable surface and groundwater supply.
- Goal 2: Provide multiple benefits from management of water resources, diversions, and infrastructure.
- Goal 3: Reduce impacts from catastrophic fire.
- Goal 4: Protect infrastructure, equipment, and property from flooding.
- Goal 5: Protect and improve watershed resources through land use practices.
- Goal 6: Manage sediment for water resources, infrastructure and habitat value.
- Goal 7: Reduce mercury contamination in waterways.
- Goal 8: Reduce contamination of surface and groundwater resources.
- Goal 9: Protect and improve fisheries and aquatic biota through water resources management.

The Plan also identifies objectives, which describe how goals are to be attained. The Plan identifies 26 objectives, of which there are ten that are highlighted here as significant to drinking water quality in the American River watershed. These include:

- Objective 2: Implement measures to manage and reduce erosion and sedimentation.
- Objective 3: Meet and/or attain Regional Board standards.
- Objective 4: Work collaboratively to restore state designated impaired water bodies (303(d)).
- Objective 7: Manage recreation to minimize impacts to watershed resources.
- Objective 9: Implement measures to manage and reduce contamination of waterways.
- Objective 12: Investigate effects of drought and climate change and need for water management strategies.
- Objective 16: Maintain and promote recreational and environmental values associated with water infrastructure.
- Objective 17: Evaluate and modify water infrastructure to improve efficiency.
- Objective 18: Minimize impervious surface cover and improve infiltration.

- Objective 19: Promote community and regional storm water management plans.

In addition, CABY has identified actions associated with a variety of topics related to the IRWMP. Water quality is one of those topics with the following actions identified:

- Promote a standardized regional water quality assessment, monitoring, and reporting program that includes groundwater.
- Develop guidelines to reduce sediment in waterways.
- Develop guidelines to reduce contaminant inputs to waterways.
- Reduce non-point source impacts to watershed health.
- Reduce water treatment costs by implementing land and water management strategies to avoid water contamination.
- Evaluate and address the impacts of septic systems on water reuse and groundwater recharge.
- Collaborate with state to identify sources and remedies for 303(d) listed water bodies.

Proposition 50 and 84 funds were awarded for completion of the 2012 Update, as well as projects described in the IRWMP. There are four projects related to water quality that received funding: Watershed Education Summit by El Dorado County Resource Conservation District (RCD) in August 2008, Watershed Coordinators for El Dorado County and Georgetown Divide RCDs as well as EID for the South Fork American River, EID's "South Fork American River Water Quality and Recreation Study" completed in April 2008, and the CABY Water Trust completed in May 2008.

A Climate Change assessment was completed as part of the CABY 2012 Update, which is discussed further in the **Climate Change** subsection later. The Updated IRWMP has tentatively identified its objectives, a few of which are of potential interest to drinking water quality.

- Wastewater spill prevention discussion by 2015
- Headwaters protection projects
- Aquatic invasive species prevention programs
- Climate change adaptive management strategies

Central Valley Regional Water Quality Control Board's Drinking Water Policy

The Regional Board has adopted the Basin Plan Amendment (BPA) to Establish a Drinking Water Policy for Surface Waters of the Delta and Its Upstream Tributaries (Drinking Water Policy for the Delta). This policy was developed as required by the CALFED Record of Decision (ROD) for the Programmatic EIS/EIR. Many constituents that threaten drinking water supplies are addressed in the Basin Plans, so this policy focused on high priority constituents that were not addressed: salt (including bromide), nutrients, organic carbon, and pathogens such as *Cryptosporidium* and *Giardia*. In 2010, the Regional Board directed staff to focus the policy on organic carbon, *Cryptosporidium,* and *Giardia* as the other constituents were being addressed in other programs.

The BPA addresses organic carbon by modifying the Basin Plan to clarify the existing water quality objective for chemical constituents with a footnote stating that the existing objective applies to drinking water chemical constituents, such as organic carbon. During the course of work, source control evaluations were conducted based on 2011 permit conditions for publically owned treatment works, urban runoff, and irrigated agriculture and these indicated that concentrations of organic carbon at public water system intakes are not projected to increase through the 2030 planning horizon.

The BPA addresses pathogens by establishing a new narrative water quality objective for *Cryptosporidium* and *Giardia* to protect the public water system component of the MUN beneficial use. This narrative water quality objective for *Cryptosporidium* and *Giardia* is only applied within the Sacramento-San Joaquin Delta and its tributaries below the first major dams. Compliance with this objective will be assessed at existing and new public water system intakes.

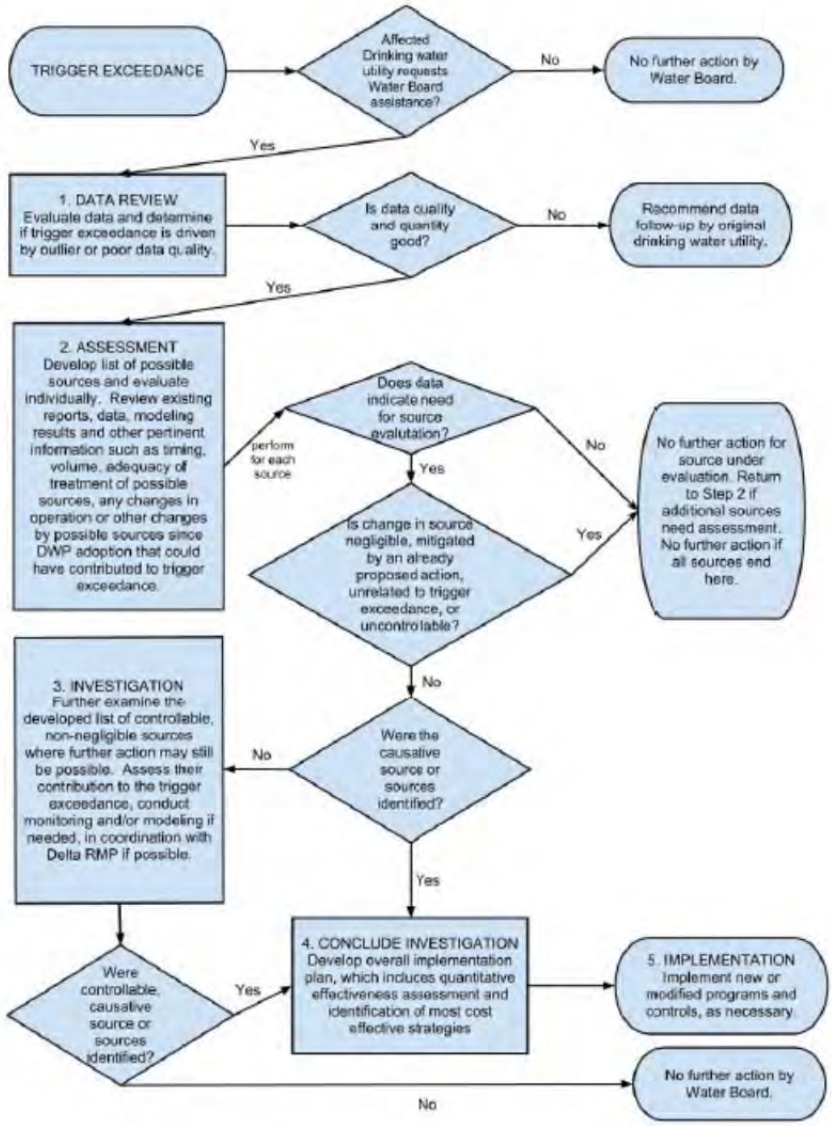
The BPA requires an Implementation Program for the proposed narrative water quality objective for *Cryptosporidium* and *Giardia* that describes the actions that the Regional Board will take to maintain existing water quality if trigger values for *Cryptosporidium* are exceeded. **Table 4-18** shows the 2013 Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) bin classifications and the 80 percent trigger levels.

Table 4-18
***Cryptosporidium* Ambient Trigger Exceedence**

Bin	Maximum Running Annual Average (oocysts/L)	80 Percent Trigger (oocysts/L)
1	< 0.075	0.06
2	0.075 to < 1.0	0.80
3	1.0 to < 3.0	2.40

If *Cryptosporidium* monitoring data from an existing public water system intake indicate that the maximum running annual average (MRAA) has reached 80 percent of the next highest bin, as existed in 2013, the affected public water system may request that the Regional Board initiate the investigation shown in **Figure 4-12**. If the affected public water system requests assistance, the Regional Board should coordinate with DPH, the affected public water system and potential sources to assess the data and evaluate the need to conduct source evaluations and implement control options.

Figure 4-12. Actions Prompted by Trigger Exceedence



Also, the BPA includes support of a one-time special study to characterize ambient levels of *Cryptosporidium* to better understand the relationship between source loading and ambient concentrations, and to better understand the movement of *Cryptosporidium* through the system. This study can be conducted as either part of the Delta Regional Monitoring Program or a group of interested stakeholders. The study is expected to last two years and be coordinated with the second round of monitoring under the LT2ESWTR.

The study will result in a report and may consist of the following elements:

- Literature review to identify available source information.
- Continued monitoring at existing public water systems intakes.

- Monitoring at several ambient locations that will be identified as sites that integrate the pathogen sources where historic pathogen data are unavailable.
- Monitoring at several representative discharge locations, if representative pathogen concentrations are not available or if coordinated data are necessary.
- Hydrodynamic and particle tracking models to simulate the transport of pathogens from potential sources to public water system intakes.
- If needed, focused studies to identify the viability and fate and transport of *Cryptosporidium*.

Clarifications were made in the BPA related to the antidegradation analysis conducted for new or revised dischargers. Antidegradation analyses for these constituents must be conducted for any change in permitted discharge with the potential to degrade water quality and drinking water constituents of concern. When addressing *Cryptosporidium* and *Giardia* in an antidegradation analysis, the monitoring results of the nearest impacted public water system intake shall be considered. In cases where a trigger at the nearest public water system intake has not been exceeded, the analysis should be simplified and may be curtailed. If a trigger has been exceeded, information from the resulting investigation should be considered in the antidegradation analysis.

The BPA allows the Regional Board to consider the need to reevaluate the Drinking Water Policy for the Delta if there are significant changes to the characteristics of the project area, drinking water treatment standards based on source water quality, or knowledge regarding drinking water constituents of concern. The Drinking Water Policy will be reviewed by the Regional Water Board in 2023 to determine if the provisions should be revised.

Climate Change

Climate is defined as expected average conditions, plus the characteristic range of variability of those conditions. Therefore, climate change is the expected difference in the likelihood of types of weather events. The climate system includes the atmosphere, oceans, ice, land, vegetation, and freshwaters. A change in any part of the system can cause global and regional changes to climate. The sun is the energy source that drives the climate system. Greenhouse gases (GHGs) include water vapor, carbon dioxide, methane, nitrous oxides, and human-made chemicals such as chlorofluorocarbons. As these GHGs are emitted into the atmosphere, they trap infrared radiation in the atmosphere and cause increases in air, land, and water temperatures, also known as global warming.

The United Nations Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by two organizations, the World Meteorological Organization and the United Nations Environment Program. The purpose of the IPCC was to evaluate the risk of climate change caused by human activity. Four assessment reports have been completed by the IPCC since its inception. In its Fourth Assessment Report, Climate Change 2007, the IPCC confirms dramatic changes to our world's water resources and identifies GHG emissions as the predominant contributor to global warming and resulting regional climate change.

Since the climate system includes freshwaters, changes to air and land temperatures will have an impact on the timing, amount, type and location of precipitation and runoff in the American River watershed. In fact, the California Department of Water Resources (DWR) has documented a slight increase in temperature (one degree Fahrenheit) and an increase in annual precipitation (one inch) in the Sacramento River watershed over the 20th century. DWR research from 1901 to 2000 shows that the Sacramento River system runoff volume has remained stable on an annual basis, but there has been a nine percent reduction in runoff from April through July. This is likely the result of increased winter rainfall and less snowpack storage. DWR also estimate that for each one degree Celsius increase in Earth's temperature, the Sierra snowpack will retreat 500 feet. This will mean an increase in wet season runoff and less available storage under current operations.

As follow up to the 2008 Update to the American River Watershed Sanitary Survey, the Lower American River Joint Source Water Protection Program has continued to track developments on climate change impacts and management related to the American River watershed. As the last update was completed in June 2012 (provided in **Attachment D**), this climate change discussion summarizes that update and focuses on regional action being taken, or regional studies completed, since June 2012.

Summary of June 2012 Climate Change Update

Some of the key items highlighted in the June 2012 Update were:

1) The DWR 2013 Water Plan is being updated and will have an improved discussion of climate change, with greater detail and regionally specific climate change information and adaptation and mitigation strategies.
2) DWR is also conducting a System Reoperation Study where feasibility studies will identify potential options for reoperation of the state's flood protection and water supply systems that will optimize the use of existing facilities and groundwater storage capacity. At the time of the June 2012 Update, it was unknown which reservoirs would be selected for study.
3) USEPA has developed tools and other resources for water and wastewater utilities to become climate ready. For example, the Climate Resilience Evaluation and Assessment Tool (CREAT) is software that allows utilities to evaluate potential impacts of climate change. USEPA also developed a Climate Ready Water Utilities Toolbox which is a searchable library of resources to help with decision making related to climate change impacts/responses. Additionally, USEPA released an Adaptation Strategies Guide in January 2012 which is an interactive guide which assists drinking water and wastewater utilities in gaining a better understanding of what climate-related impacts they may face in their region, and what adaptation strategies can be used to prepare their system for those impacts. The guide also includes examples of utilities implementing adaptation options for their systems.

Cal-Adapt

Cal-Adapt is a website that has been developed by the University of California at Berkeley's Geospatial Innovation Facility (GIF) with funding and advisory oversight by the California Energy Commission's Public Interest Energy Research (PIER) Program, and advisory support from Google.org. The development of the website is a key recommendation of the 2009 California Climate Adaptation Strategy:

"The California Energy Commission will develop the Cal-Adapt Web site that will synthesize existing California climate change scenarios and climate impact research and to encourage its use in a way that is beneficial for local decision-makers." – Page 9, 2009 California Climate Adaptation Strategy

Cal-Adapt has been designed to provide access to the wealth of data and information that has been, and continues to be, produced by the State of California's scientific and research community. Cal-Adapt is a web-based climate adaptation planning tool. Cal-Adapt synthesizes volumes of existing downscaled climate change scenarios and climate impact research and presents it in an easily available, graphical layout that is intended to benefit local planning efforts. It allows the user to identify potential climate change risks in specific geographic areas throughout the state. The website allows users to input a specific location or click on an interactive map to explore what climate impacts are projected to occur in their area of interest. It provides information on air temperature projections, snow pack predictions, wildfire impact projections, and sea level rise. **Tables 4-19 through 4-21** were generated by inputting specific locations within the American River watershed into the Cal-Adapt website.

Table 4-19 compares historical (1961 to 1990) air temperature data to projected air temperatures in 2070 - 2090 assuming a low carbon emission scenario. A number of locations within the American River watershed were selected to model to obtain information on potential changes to air temperature, loss of snow pack (**Table 4-20**), and increase in burn area (**Table 4-21**). It should be noted that these are not forecasts – they are potential scenarios based on downscaled IPCC models to describe how climate may evolve in California.

Table 4-19
Historical Average (1961 - 1990) Air Temperatures and Low Carbon Emissions Scenario (2070 – 2090) Air Temperatures

Study Area	Historical Average, °F (1961 - 1990)	Low Emissions, °F (2070 - 2090)	Change, °F
Placer – French Meadows/Hell Hole	44.4	48.3	3.9
El Dorado – Union Valley Reservoir/Loon	49.6	53.3	3.7
Pollock Pines	52.2	55.8	3.6
Kyburz	41.6	45.6	4
Granite Bay (Folsom Lake)	60.9	64.9	4
Coloma	60.1	63.6	3.5
American River Parkway	61.6	65.2	3.6

Table 4-20
Historical Average (1961 - 1990) Snow Pack and Low Carbon Emissions Scenario (2070 – 2090) Snow Pack

Study Area	Historical Average, inches (1961 - 1990)	Low Emissions, inches (2070 - 2090)	Percent Change
Placer – French Meadows/Hell Hole	9.83	3.56	-63.80%
El Dorado – Union Valley Reservoir/Loon	1.13	0.12	-89.60%
Pollock Pines	0.18	0.02	-91%
Kyburz	8.1	3.63	-55.1%

Table 4-21
Fold-Increase in Burn Area Assuming a Low Carbon Emission Scenario

Study Area	2020	2050	2085
Placer – French Meadows/Hell Hole	1.11	1.11	0.96
El Dorado – Union Valley Reservoir/Loon	1.2	1.38	1.48
Pollock Pines	1.2	1.41	1.48
Kyburz	1.2	1.32	1.36

DWR Water Plan and Follow-Up

The DWR Water Plan website was reviewed and there was no draft posted for the 2013 Water Plan at the time of preparation of this report, although the public review draft was expected to be released in spring 2013 and the final draft published at the end of 2013. The website states that Update 2013 will have an improved discussion of climate change, with greater detail and regionally specific climate change information and adaptation and mitigation strategies.

DWR System Reoperation Study

Senate Bill X2 1 (Water Quality, Flood Control, Water Storage, and Wildlife Preservation) directed DWR to conduct feasibility studies to identify potential options for reoperation of the state's flood protection and water supply systems that will optimize the use of existing facilities and groundwater storage capacity. The studies will incorporate appropriate climate change scenarios.

A website for the System Reoperation program (http://www.water.ca.gov/system_reop/) went live in May 2011. However, the website does not currently contain information such as project updates, completed documents, and stakeholder meetings.

A presentation on the System Reoperation Study was given at the Water Plan Plenary Meeting on October 27, 2011. The presentation covered the background and status of the study. There are four phases for the study:

- Phase 1 – Plan of Study
- Phase 2 – Strategies Formulation and Refinement
- Phase 3 – Reconnaissance-level Assessment
- Phase 4 – Feasibility-level Assessment

DWR staff has indicated that Phase 2 has been completed, and Phase 3 is underway. The outcome of Phase 2 was to identify four to five strategies for reconnaissance-level assessment in Phase 3. After contacting various facility owners and operators (i.e., private water districts), and state and federal agencies, the four scenarios to be modeled are:

1) Reoperation of Shasta Reservoir
2) Reoperation of Oroville Reservoir
3) Reoperation of Lake McClure in Mariposa County
4) Integration of the State Water Project and Central Valley Project Systems

The three main goals to be achieved during the assessment of each scenario are to improve water system reliability, improve flood protection, and provide for ecosystem protection and restoration. Currently, the operation of certain reservoirs is driven by flood control curves developed by the United States Army Corps of Engineers, which dictates how much reservoir volume must be made available for flood control, depending on the month of the year. The

reconnaissance-level assessment will use computer modeling to show what the impacts are if the flood control curve is lowered, such that water is released earlier in the year. DWR is also working on using advanced forecasting technology to better forecast floods, and to use this information as input into the computer model. DWR staff indicated that by early 2014 there would be some initial modeling results, and that those result would not include a study on Folsom Lake. The completion date for the DWR Reoperation Study is mid-2014. Since the study will not include modeling of Folsom Lake, this study is less relevant compared to the modeling being completed for the Bay Delta Conservation Plan (BDCP) and for the Folsom Dam Joint Federal Project.

Cosumnes, American, Bear, and Yuba (CABY) IRWMP

Cosumnes American Bear Yuba (CABY) is a collaborative planning effort that adopted an Integrated Regional Water Management Plan (IRWMP) in December 2006, in response to the passage of Proposition 50. CABY comprises more than 30 organizations, representing water supply, conservation, recreation, agriculture, and community interests, as well as federal and local government. CABY functions as a vehicle to bring funding into the region, as well as bringing diverse stakeholders together. Priorities are water quality (maintaining and restoring), water quantity (for both people and the environment, in CABY and statewide), and environmental quality (restoration and preservation). Placer County Water Agency and El Dorado Irrigation District are members of CABY.

CABY is currently in the process of updating their IRWMP, which is a planning document that identifies broadly-supported goals, objectives, strategies, actions, and projects within the CABY region to address long-term water supply needs, protection of water quality, and enhancement of environmental and habitat resources. The Draft IRWMP (March 2013) also contains a chapter on Climate Change, which was reviewed.

Some of the relevant activities that CABY members have completed to address climate change are:

- EID used the Water Evaluation and Planning (WEAP) model, developed by the Stockton Environment Institute for their 2010 Urban Water Management Plan.
- PCWA assessed climate change on watershed yield for Federal Energy Regulatory Agency (FERC) relicensing of the Middle Fork Project.
- EID worked with a large public stakeholder group to complete a Drought Preparedness Plan.

The Draft IRWMP identified six major vulnerabilities in the CABY region due to climate change: 1) water supply, 2) habitat and environment, 3) air quality, 4) water quality, 5) fire, and 6) recreation. The CABY Technical Advisory Committee (TAC) completed a high-level vulnerability assessment on these six topics and identified fire and fuels management as the area with the most vulnerability and the most potential to complete meaningful adaptation actions. A literature search was then conducted to find more information relevant to the CABY region. Some of the findings are listed below:

- All analyses completed for fire occurrence and severity into the future predict more fires and greater severity.
- Greater occurrence of fires feeds a negative feedback loop, putting greater amounts of carbon and particulates into the atmosphere.
- Increased air temperature dries out vegetation more quickly, lengthening the fire season.
- Drier springs are characteristic of more serious fire seasons.
- Drought years may increase the fuel loads because of a greater occurrence of insects and disease.

Some of the management strategies identified were decreasing the fuel load, improving and decommissioning forest roads, enhancing riparian corridors, and replanting the forest with fire-tolerant species.

United States Bureau of Reclamation

The United States Bureau of Reclamation (USBR) is conducting a Sacramento-San Joaquin River Basin Study. The study will assess potential climate change impacts to the Sacramento-San Joaquin River Basin water supply, and will evaluate changes to flood control, water quality, recreation, and wildlife. The study will also recommend adaptation strategies in response to climate change. The expected completion date for this study is 2015.

Potential for Selected Invasive Species Growth and Impact to Source Water Quality/Treatment

Background

Invasive Quagga and Zebra mussels can pose a significant threat to the costs of operation of water infrastructure, such as drinking water diversion and conveyance facilities, by reducing capacity and increasing maintenance costs. In order to minimize the impact for growth of the invasive mussels, many operators have to either physically remove the mussels or add treatment facilities at their raw water diversions to kill the mussels. Early detection of a mussel invasion is critical as adult mussels may spawn multiple times within a single year and have the potential to produce millions of offspring per spawning season. Many utilities are focusing on monitoring larval mussels versus adult mussels as they are still free floating, and management tactics can be deployed earlier. Free floating microscopic larval mussels called veligers, float for weeks before firmly attaching to substrates in the water from the surface down to depths of 180 feet (Zebra mussels) and 400 feet (Quagga mussels).

Presence in the Watershed

In January 2007, adult Quagga mussels appeared at Lake Mead in Nevada and since then have fully infested the lower Colorado River and the Metropolitan Water District of Southern California's transport and storage facilities in Southern California, as water is imported from the

Colorado River. Within California, the spread of invasive mussels currently appears to be limited to Southern California. The California Department of Fish and Game (CDFG) has not reported the presence of invasive mussels in Northern California waters, except the San Justo Reservoir near Hollister. The reservoir has remained under quarantine since Zebra mussels were detected there in January 2008.

Assembly Bill (AB) 2065 was signed into law in September 2008 and is designed to stop the spread of non-native dreissenid mussels (Zebra and Quagga mussels). The DFG Code requires that any person, federal, state, or local agency, district, or authority that owns or manages a reservoir where recreational, boating, or fishing activities are permitted, except a privately owned reservoir that is not open to the public, shall do both of the following:

(1) Assess the vulnerability of the reservoir for the introduction of non-native dreissenid mussel species.
(2) Develop and implement a program designed to prevent the introduction of non-native dreissenid mussel species. The program shall include, at a minimum, public education, monitoring, and management of boating, fishing, or recreational activities that are permitted.

The agencies which operate or own reservoirs in the watershed are shown in **Table 4-22.**

Table 4-22
Reservoirs within the American River Watershed

Agency	Reservoir/Lake
Placer County Water Agency (PCWA)	French Meadows
	Hell Hole
El Dorado Irrigation District (EID)	Jenkinson Lake
	Caples Lake
	Silver Lake
	Echo Lake
	Lake Aloha
Sacramento Municipal Utility District (SMUD)	Rubicon (no boating)
	Buck Island (no boating)
	Loon
	Gerle
	Robbs (no boating)
	Union Valley
	Ice House
	Junction
	Camino (no boating)
	Brush
	Slab Creek
United States Bureau of Reclamation (USBR)	Lake Folsom
	Lake Natoma

PCWA has been monitoring since 2011 for the presence of Zebra/Quagga mussels. Monitoring consists of annual visual inspections for attached mussels at: (1) French Meadows Boat Ramp, (2) Hell Hole Boat Ramp, (3) French Meadows Powerhouse Tailrace at Hell Hole Reservoir, (4) Ralston Powerhouse Tailrace at Ralston Afterbay, and (5) Oxbow Powerhouse Intake at Ralston Afterbay. PCWA also visually monitors the water conveyance system during annual maintenance of the treatment and distribution systems, raw water canals, water treatment intakes, and reservoir outlet intakes.

SMUD does not monitor for the presence of Zebra/Quagga mussels due to low vulnerability.

EID monitors for invasive mussels in Jenkinson Lake, Silver Lake, and Caples Lake. Five locations are monitored in Jenkinson Lake, and two locations at Caples and Silver Lake. Sampling devices are placed in dark, shaded areas as mussels do not like direct sunlight. A sampling device consists of a series of dark acrylic plates stacked and spaced two inches apart, attached by a thick nylon rope. Sampling devices are deployed in May and checked July and October. Plankton tows are also conducted, which use a fine-mesh net to sample the water column for veligers (larval mussels). A separate monitoring and control plan would be developed and implemented in coordination with DFG if mussels were identified as being present.

EBMUD monitored three locations along the Sacramento River and two locations on the Folsom South Canal in 2010. Similar monitoring will be conducted when EBMUD diverts water from the Folsom South Canal in the future.

In 2009, the USBR began a monitoring and detection program at Folsom Lake. The aim is to detect the earliest stages of mussel exposure or infestation so that response planning and budgeting for protective measures can be initiated. If microscopic mussel larvae are detected early, potentially several years may be available for response actions to be taken prior to full infestation. According to USBR staff, they conduct plankton tows biannually at Lake Folsom in November and July (Personal communication, Chelsea Stewart). They also set Quagga condos, which are plastic pans, to see if any mussels will attach and proliferate. They have not detected anything to date.

Vulnerability of Reservoirs in American River Watershed

PCWA, SMUD, EID, and USBR have developed their own assessment and management programs for non-native mussels which may consist of some or all of the following elements: vulnerability assessment, public education, and monitoring. Vulnerability assessments for the introduction of non-native dressenid mussels were conducted by evaluating both water quality and recreational use.

Recreational Use

In 2008, PCWA conducted a boater survey where each boater was asked for their county of origin. Based on 166 interviews, 33 percent were from Placer County, 29 percent from Sacramento County, and 16 percent from El Dorado County. A small percentage resided in counties bordering San Benito County, and only one participant resided in San Diego County. These data suggest a low probability that invasive mussels from known infested waterbodies are likely to be introduced into PCWA's reservoirs in the American River watershed.

In 2009, SMUD surveyed the boating public and each boater was asked to name the last three previous waterbodies in which they had launched their boat. The results of approximately 280 interviews revealed that the majority of boaters exhibit limited geographic range, having last put their boats within the broader Sacramento region.

Water Quality

A variety of laboratory and field studies have indicated a strong relationship between Zebra/Quagga mussel health and calcium concentrations in waterbodies. Calcium concentrations less than 15 mg/L have been demonstrated to be associated with decreased growth rates, loss of shell material, and poor larval production. All of these lead to low population growth (California Resources Agency 2008).

Calcium concentrations in SMUD-owned reservoirs ranged from 1 to 5 mg/L. Calcium concentrations in Middle Fork Project reservoirs ranged from 2.1 to 6.8 mg/L, with an average of 3.1 mg/L (PCWA, 2010). These data suggest that even if mussels were introduced, there is a low probability that they would reach population levels that would cause adverse ecological or operational impacts. According to EID staff, EID reservoirs are also likely to have low vulnerability to mussel infestation due to low calcium concentrations.

Due to low calcium concentrations in the source water, and a low likelihood that mussels would be transported from Southern California reservoirs to reservoirs located in the American River watershed, the reservoirs and waterways of the American River possess a low level vulnerability for invasive mussels to proliferate.

Public Education

PCWA posted large notices approved by DFG at all boats ramps associated with the Middle Fork American River project, and seven small reservoirs and lakes owned by PCWA. Small information cards are handed out to boaters who desire more information about Zebra/Quagga mussels, and are available at ranger stations in Forestville and Georgetown, and PCWA's offices. PCWA does not inspect boats at their facilities because of the low vulnerability of introduction of invasive mussels into PCWA waterbodies.

SMUD has posted large notices on Ice House Road, which is how the majority of recreationalists with trailered boats access SMUD reservoirs. Similar notices are posted near the boat launch areas of Union Valley Reservoir, Ice House Reservoir, and Loon Lake. Similar to PCWA, small information cards are distributed to boat owners who wish for more information. SMUD also does not conduct boat inspections.

During the high visitor season (April through October), EID conducts verbal screening for boats prior to launching at Jenkinson Lake. If the boat has been south of the Grapevine within the last 30 days, the boat will not be allowed to launch without proof of boat cleansing. During the winter months (November through March), verbal screenings are not performed after 4 pm due to staffing restraints. Boat inspections are not conducted at Caples Lake or Silver Lake. However, at those locations an active education program is in place which includes posters, handouts, and verbal communication when possible.

USBR has "Don't Move a Mussel" signs posted at Folsom Lake and flyers are distributed, but boat inspections are not conducted at Folsom Lake by either USBR or Folsom Lake State Recreation Area staff.

Prevention and Management Measures

As Quagga and Zebra mussels cannot live out of water for a long period of time, boaters should wash their boats and equipment and allow them to fully dry. "Adults can live out of water for five days in California heat, and up to 30 days in cooler, moist, or wet weather. (CNRA, 2010) Boats may also be professionally de-contaminated at a boat yard equipped with high pressure, hot water (at least 140 degrees F) equipment. Please refer to the Invasive Mussel Guidebook for Recreational Water Managers and Users, California Natural Resources Agency for additional information.

USBR is evaluating various ways to control invasive mussels once infested. They are evaluating:

- Anti-fouling and foul-release coatings,
- Self-cleaning filtration systems for ballast water applications,
- UV treatment at Hoover Dam to slow down mussel settlement in water supply lines and power plant cooling water systems, and
- Use of *Pseudomonas fluorescens* as an alternative to traditional molluscicides

The DFG Invasive Species Program will work with a federal, state, or local agency to implement a treatment and management plan once an infestation is confirmed, and they also train survey teams to inspect waterbodies.

The Metropolitan Water District of Southern California uses sodium hypochlorite to kill Quagga mussel larvae in the Colorado River Aqueduct. Adult Quagga mussels are controlled by mechanical methods such as scrapping and water jetting. Smaller amounts of chemicals are needed to control larvae, versus adult mussels.

Summary

Due to low calcium concentrations in the source water, and a low likelihood that mussels would be transported from Southern California reservoirs to reservoirs located in the American River watershed, the reservoirs and waterways of the American River possess a low vulnerability for invasive mussels to proliferate. Therefore, this issue is unlikely to become a significant concern for American River water users in the near future. Local agencies continue to implement educational programs to alert boaters about Zebra and Quagga mussels, and they also continue to monitor for either adult mussels or larvae, which will help to minimize the risk. In 2009 the participating water utilities hosted a special workshop on these species to share information.

Changing Reservoir Operations and Potential Impact to Source Water Quality/Treatment

Reservoir operations at Folsom Lake could change as a direct outcome of the Folsom Dam Joint Federal Project, or indirectly as a result of implementing the Delta Plan and the Bay Delta Conservation Plan (BDCP). These three projects were reviewed in order to determine what aspects of each project, if any, could impact or potentially impact American River source water quality.

At this point in time, it is not possible to define specific impacts to American River source water quality as the project and plans are either currently conducting modeling to determine water supply or water quality (primarily temperature) impacts, or the project itself is still under review.

The formal public review draft of the BDCP and the BDCP EIR/EIS will be available in late 2013. The draft BDCP available during preparation of this Report was preliminary, not yet through a review process, and subject to change. It appears that it may be possible that the BDCP could result in source water quality changes or impacts on the American River. The Administrative Draft for the BDCP EIR/EIS itself states "…the lead agencies have relied on computer models that represent best available science; however, any predictions of conditions 50 years from the present are inherently limited and reflect a large degree of speculation." (page 5-42).

Operational and Management Strategies

<u>Delta Plan</u>

Created by the legislature in 2009, the Delta Stewardship Council (DSC) is considered the successor entity to the California Bay-Delta Authority and the CALFED program. The DSC is composed of members who represent different parts of the State and offer diverse expertise in fields such as agriculture, science, the environment, and public service. Of the seven, four are appointed by the Governor, one each by the Senate and Assembly, and the seventh is the Chair of the Delta Protection Commission.

The DSC's mission is to achieve the state's co-equal goals of 1) enhancing the reliability of the water supply for California and 2) protecting, restoring, and enhancing the Delta ecosystem. These goals are to be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

The Final Delta Plan was completed in September 2012, and the Draft EIR for the Delta Plan was completed in November 2012. The Final Delta Plan was adopted by the DSC at its May 16, 2013 meeting and was approved by the State Office of Administrative Law as of August 12, 2013. The Delta Plan and its regulatory policies took effect on September 1, 2013. State and local agencies proposing actions or projects within the Delta will need to certify for the DSC that those efforts are consistent with the Delta Plan.

The Delta Plan is intended to lay out the initial roadmap on how to achieve the co-equal goals in the years to come. It contains five core policy chapters (Chapters 3 through 7) and a chapter on Funding Principles to Support the Coequal Goals (Chapter 8). It contains 14 regulatory policies, 71 priority recommendations (non-regulatory) to achieve goals, and performance measures.

The 14 regulatory policies are:

1. G P1 - Detailed Findings to Establish Consistency with the Delta Plan
2. WR P1 – Reduce Reliance on the Delta through Improved Regional Water Self-Reliance
3. WR P1 – Transparency in Water Contracting
4. ER P1 – Delta Flow Objectives
5. ER P2 – Restore Habitats at Appropriate Elevations
6. ER P3 – Protect Opportunities to Restore Habitat
7. ER P4 – Expand Floodplains and Riparian Habitats in Levee Projects
8. ER P5 – Avoid Introductions of and Habitat for Invasive Nonnative Species
9. DP P1 – Locate New Urban Development Wisely
10. DP P2 – Respect Local Land Use When Siting Water or Flood Facilities or Restoring Habitats
11. RR P1 – Prioritization of State Investments in Delta Levees and Risk Reduction
12. RR P2 – Require Flood Protection for Residential Development in Rural Areas
13. RR P3 – Protect Floodways
14. RR P4 – Floodplain Protection

Out of the 14 regulatory policies, two policies (WR P1 – Reduce Reliance on the Delta and Improve Self-Reliance and ER P1 – Delta Flow Objectives) have been identified in this work as policies that could potentially impact American River source water quality.

WR P1- Regulatory Policy: Reduce Reliance on the Delta and Improve Self-Reliance

The intent of this regulatory policy is to ensure that urban and agricultural water suppliers are taking appropriate action to contribute to the achievement of reduced reliance on the Delta, and to implement projects that are locally cost effective and technologically feasible for urban

and agricultural water suppliers to increase water use efficiency and conservation, and diversify local water supply portfolios. The Delta Plan states that water suppliers that have done all of the following are contributing to reduced reliance on the Delta:

- Completed a current Urban or Agricultural Management Plan which has been reviewed by the Department of Water Resources;
- Identified, and commenced all programs and projects that are locally cost-effective and technically feasible which reduce reliance on the Delta;
- Included the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance in the Urban or Agricultural Management Plan.

ER P1 – Regulatory Policy: Delta Flow Objectives

Development, implementation, and enforcement of new and updated flow objectives for the Delta and high priority tributaries are key to the achievement of the coequal goals. The American River is one of the priority tributaries of the Sacramento-San Joaquin Delta and could have its own flow objectives by June 2018 (see below). The State Board should update the Bay-Delta Water Quality Control Plan objectives as follows:

- By June 2, 2014 adopt and implement updated flow objectives for the Delta that are necessary to achieve the coequal goals.
- By June 2, 2018 adopt and, as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals.

According to the Administrative Draft of the Delta Plan, the State Board is considering updates to Delta outflow objectives, export/inflow objectives, Delta Cross Channel Gate closure objectives, Suisun Marsh objectives, reverse flow objectives, and floodplain habitat flow objectives. (Administrative Draft, pp. 8-14) Flow objectives could be implemented through several mechanisms including negotiation and settlement, FERC relicensing, or adjudicative proceeding. The Water Forum Successor Effort has been developing a Flow Management Standard (FMS) and the City of Sacramento and County of Sacramento jointly are preparing an EIR on the FMS. The FMS may be submitted to the State Board by the project proponents to establish the necessary pattern of fishery flows for the Lower American River.

Our cursory review of the Delta Plan has identified three non-regulatory recommendations that could potentially impact American River source water quality.

WR R13 – Complete Surface Water Storage Studies

This recommendation states that the DWR was to complete surface water storage investigations of proposed off-stream surface storage projects by December 31, 2012. This investigation should include an evaluation of potential additional benefits of integrating

operations of new storage with proposed Delta conveyance improvements, and recommend the critical projects that need to be implemented to expand the State's surface storage.

WR R14 – Identify Near-Term Opportunities for Storage, Use and Water Transfer Projects

The DWR, in coordination with the California Water Commission, USBR, State Board, DPH, DSC, and other agencies and stakeholders, should conduct a survey to identify projects throughout California that could be implemented within the next five to ten years to expand existing surface and groundwater storage facilities, create new storage, improve operation of existing Delta conveyance facilities, and enhance opportunities for conjunctive use programs and water transfers. The California Water Commission should hold hearings and provide recommendations to DWR on priority projects and funding.

WQ R10 – Evaluate Wastewater Recycling, Reuse, or Treatment

The Regional Board, consistent with existing water quality control plan policies and water rights law, should require responsible entities that discharge wastewater treatment plant effluent or urban runoff to Delta waters to evaluate whether all or a portion of the discharge can be recycled, otherwise used, or treated in order to reduce contaminant loads to the Delta by January 1, 2014.

PCWA, EID, the City of Sacramento, the County of Sacramento, and the Regional Water Authority submitted comment letters on the Delta Plan in January 2013. Some of the common concerns for these agencies are/were:

- Determining how to reduce their reliance on Delta water, when that is their local supply.
- Required investment in expensive projects like recycled water or groundwater.
- Potential for reduction of available water for upstream water users for diversion due to new Delta flow objectives developed by the State Board.
- Financial obligations to pay for Delta restoration.
- Reduction of available water supply in Folsom Lake due to the implementation of the BDCP.

<u>Bay Delta Conservation Plan</u>

The BDCP is being prepared through a collaboration of State and Federal agencies, water agencies, environmental organizations, and other interested parties with the goal of protecting and restoring the ecological health of the Delta and providing a more reliable water supply for the export contractors. The BDCP is being developed in compliance with the Federal Endangered Species Act and the California Natural Communities Conservation Planning program. The BDCP is intended to provide the basis for issuance of endangered species permits for the operation of the State and Federal water projects. The goal of the BDCP is to promote the recovery of endangered, threatened, and sensitive species and their habitats in the Delta in

a way that also improves the reliability of water supplies exported from the Delta. The plan proponents hope to implement the plan over the next 50 years after approval.

The BDCP Consultant Administrative Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) Chapters 1 – 35 were released on May 10, 2013. The Draft EIR/EIS will be released December 2013. The 20,000 page document describes the potential effects of the BDCP and alternatives on water supplies, air quality, agriculture, recreation, transportation, land use, and other aspects of the natural and human environments. At the time of preparation of this report, Federal, State, and local agencies were reviewing the document in preparation for an October 1 release of a public review draft EIR/EIS.

The Administrative Draft EIR/EIS analyzes 15 alternatives. Most involve new water intakes, canals, or tunnels of varying capacities to divert water from the Sacramento River in the north Delta and carry it to existing pumping plants in the south Delta near Tracy. The document analyzes new facilities ranging in size from 3,000 cubic feet per second (cfs) to 15,000 cfs. The document also evaluates improvements to existing levees in the Delta that are affected by the transport of water supplies, different sets of operational prescriptions for the State and Federal water projects in the Delta, including providing higher outflows to the ocean in the spring or fall, and alleviating reverse flows in the central Delta. The alternatives also vary in the amount of Delta acreage each would devote to habitat, from 8,000 additional acres in the no-action alternative to 145,000 total acres of habitat restoration and preservation.

Currently, Alternative 4 (Dual Conveyance with Pipeline Tunnel) has been tentatively identified as the preferred alternative by DWR. However, this alternative is subject to change as public and agency comments are received. Alternative 4 consists of three intakes capable of diverting up to 9,000 cfs and two 40-foot diameter tunnels to carry water 35 miles to the existing pumping plants in the south Delta.

A preliminary review of the document suggests that certain chapters are of particular interest, particularly Chapter 5 Water Supply, Chapter 8 Water Quality, and Chapter 29 Climate Change. The purpose of this brief review is to identify possible impacts to American River water uses and specifically, to Folsom Lake. Relevant findings from Chapter 29 were discussed previously in the Climate Change subsection.

The water supply analysis in Chapter 5 addresses changes to water supply to water users upstream of the Delta Region due to implementation of various BDCP alternatives for conveyance facilities and conservation measures. The water supply analysis was conducted using the CALSIM II model. The various alternatives were compared against Existing Conditions and No Action Alternative Late Long Term (LLT) which includes the effects of climate change and sea level rise in 2060. A full description of the modeling tools in contained in Appendix 5A of the Draft EIR/EIS for the BDCP. **Tables 4-23 and 4-24** summarize the modeling conducted and storage results at Folsom Lake for end of September. It should be noted that the modeling results presented in the following tables were not verified as part of this report, but they

provide information on the potential relative difference between alternatives as provided in the Administrative Draft BDCP.

Based on **Table 4-23**, the percent difference from the No Action Alternative to the various alternatives ranges from -4 to 11 percent, where a negative percentage means that the alternative results in less September carryover storage at Folsom Lake compared to No Action. The alternatives which provide the most end of September storage are Alternatives 1A-1C, 3, 4 H1, 4 H2, and 6A-6C. It appears that the modeling is showing no greater than a four percent decrease of September storage at Folsom Lake by 2060 with implementation of the various BDCP alternatives, compared to taking no action. However, the LLT modeling shows that Folsom Lake will be drawn down to "dead-pool" by the end of September in about 10 percent of years (see Figure 5-12, Administrative Draft for the BDCP EIR/EIS). The participating water utilities' definition of "dead-pool" at Folsom Lake is the elevation at which water cannot be withdrawn via the Temperature Control Device. This corresponds to an elevation of approximately 330 feet, which is what corresponds to roughly 100,000 acre-feet in Folsom Lake. Some of the participating water utilities are conducting a review of the modeling for the BDCP and they believe that this draw down appears to be caused by an assumption that the existing Delta water quality requirements will remain unchanged at the same time anticipated climate change occurs (rising sea level and shifting patterns of precipitation altering inflow to Folsom Lake).

Water purveyors which divert water out of Folsom Lake will be impacted if Folsom Lake is drawn down to "dead-pool", as the water will be too low to access and divert from the lake. Water quality of Folsom Lake may also be impacted at "dead-pool". It is likely that Lower American River water purveyors who receive water downstream from Folsom Lake will receive water that has a different quality than typical when Folsom Lake is at "dead-pool". Possible issues may be increased temperature and corresponding disinfection by-product production, increased potential for algal blooms, increased taste and odor compounds, increased total organic carbon, and/or increased presence of metals which may be released from the anoxic zone of the lake bottom.

Chapter 8 Water Quality evaluates the water quality impacts to reservoirs upstream of the Delta for a number of constituents including ammonia, boron, chloride, electrical conductivity, pathogens, and total organic carbon. Generally the document finds no changes to these constituents as a result of implementing the BDCP as levels upstream of the Delta were low initially, or they are not projected to change with changes in river flow. The chapter concludes by stating, "Changes in seasonal reservoir storage and river flows from altered system-wide operations under Alternatives 1A-9 would have negligible, if any, effects on water quality in the rivers and reservoirs upstream of the Delta." The BDCP does not provide a detailed review of water quality, and the American River water utilities are concerned about potential changes or impacts to source water quality related to the BDCP.

Table 4-23
End of September Storage at Folsom Lake for BDCP Alternatives, TAF

Existing Condition	No Action Alt (LLT)	Alt. 1A, 1B, 1C (LLT)	Alt. 2A, 2B, 2C (LLT)	Alt. 3 (LLT)	Alt. 4 H1 (LLT)	Alt. 4 H2 (LLT)	Alt. 4 H3 (LLT)	Alt. 4 H4 (LLT)	Alt. 5 (LLT)	Alt. 6A, 6B, 6C (LLT)	Alt. 7 (LLT)	Alt. 8 (LLT)	Alt. 9 (LLT)
525	379	400	371	397	394	422	371	380	363	399	369	373	390

Alternative 1A, 1B, 1C – Dual Conveyance with Intakes 1 through 5
Alternative 2A, 2B, 2C – Dual Conveyance with Intakes 1,2,3, 6, and 7
Alternative 3 – Dual Conveyance with Intakes 1 and 2
Alternative 4 – Dual Conveyance with Intakes 2,3, and 5
Alternative 5 – Dual Conveyance with Intake 1
Alternative 6A, 6B, 6C – Isolated Conveyance with Intakes 1 through 5
Alternative 7 – Enhanced Aquatic Conservation Alternative (Dual Conveyance with Intakes 2,3, and 5)
Alternative 8 – SWRCB Criteria for Flow and Cold Water Pool Storage (Dual Conveyance with Intakes 2,3, and 5)
Alternative 9 – Separate Corridors

Table 4-24
Percent Differences from No Action Alternative (LLT)

Alt. 1A, 1B, 1C (LLT)	Alt. 2A, 2B, 2C (LLT)	Alt. 3 (LLT)	Alt. 4 H1 (LLT)	Alt. 4 H2 (LLT)	Alt. 4 H3 (LLT)	Alt. 4 H4 (LLT)	Alt. 5 (LLT)	Alt. 6A, 6B, 6C (LLT)	Alt. 7 (LLT)	Alt. 8 (LLT)	Alt. 9 (LLT)
5	-2	5	4	11	-2	0	-4	5	-3	-2	3

H1- Low Delta Outflow Scenario
H2 – Enhanced Spring Delta Outflow Scenario
H3 – Fall X2 Scenario
H4 – High Delta Outflow Scenario

Folsom Dam Joint Federal Project

Operation of the Folsom Dam with respect to releases for flood control purposes will change once construction of the Folsom Dam Joint Federal Project (JFP) is completed. Since the JFP is being constructed for flood control purposes, this project has the potential to change the timing of releases to the Lower American River during the October through March time period. Releases that occur outside of this time period are governed by conservation, recreation, and downstream water supply, and are under the jurisdiction of the USBR.

The Folsom Dam JFP is currently under construction and consists of a new auxiliary spillway with a crest elevation 50 feet lower in elevation than the current gated spillways on the main dam. The JFP will improve the ability of Folsom Dam to manage large flood events by allowing more water to be safely released earlier in a storm event, resulting in more storage capacity remaining in the reservoir to hold back the peak inflow when it arrives. The JFP consists of a control structure containing six submerged tainter gates, a 3,000 foot long spillway chute and stilling basin that act as an energy dissipator, and a 1,000 foot long approach channel. The JFP will be completed in 2017.

Due to the construction of the new auxiliary spillway, the current Folsom Dam and Reservoir Control Manual must be updated. Therefore, reservoir operations will change at Folsom due to the JFP. The new Folsom Dam Water Control Manual (WCM) will develop, evaluate, and recommend changes to the flood management operation of Folsom Dam and Reservoir to meet dam safety and flood risk management objectives. A number of flood risk management operational rule alternatives will be analyzed as well as their effects on Folsom Dam and Folsom Reservoir's other authorized purposes. According to the United States Army Corps of Engineers (USACE), climate change will be taken into account in the development of the plan, yet exact details/mechanisms are not known at this point in time. The WCM Update must be completed by 2017 when the JFP is scheduled to be completed.

The Review Plan for the Folsom Dam WCM Update states that CALSIM II is the system model that will be used to evaluate the effects of flood operation rules on the beneficial uses of water supply provided by Folsom Dam and Reservoir.

In order to evaluate proposed changes to operations of Folsom Dam as a result of the WCM Update, the USACE will be the lead agency to prepare a joint EIS/EIR for the Folsom Dam WCM Update. The USBR will be a cooperating agency. Effects analyzed will include water supply for irrigation, municipal, and industrial uses; fish and wildlife resources; power generation; water quality; recreation; special status species; soils and levee safety; and cultural resources. The draft EIS/EIR will contain information on effects to water quality as a result of the JFP and the updated WCM. The draft EIS/EIR is scheduled to be available for public review and comment in 2015.

After discussion with USACE staff, it seems likely that with a lower spillway elevation, the water being released from October through March might be colder under the new operating scenario

once the JFP is completed. However, more information about the stratification of the reservoir would have to be known.

The SJWD has been actively involved in the development of the new WCM, and they are a member of an "in-basin purveyor's" stakeholder group to develop the new WCM. The SJWD has provided comments provided through facilitated stakeholder meetings. The SJWD has recommended that the WCM:

- Use real-time forecast technology to base storage and release from Folsom instead of rigid rules.
- Use American River runoff data to understand real-time water supply availability.
- Adhere to existing State Water Rights terms. (The release of American River water should not interfere with SJWD's ability to provide water to retail customers)

The SJWD has also recommended that USBR and USACE engage in the State Water Resources Control Board's Delta Flow standard setting, related to WCM efforts.

Climate Change

Bay Delta Conservation Plan

The BDCP also contains a dedicated chapter on Climate Change. Chapter 29 of the BDCP discusses climate change in general but also discusses impacts to local hydrology and water temperatures. The following subsections have been included as they contain information specific to Folsom Lake.

Climate Change Effects on Reservoir Inflows

The effect of climate change on reservoir inflows was modeled, and modeling results were presented in the Administrative Draft EIS/EIR for the BDCP. The CALSIM model was used to simulate how projected changes in runoff (reservoir inflows) for two future climate periods, 2025 and 2060 conditions, would change existing reservoir operations and Delta inflows. The projected, or simulated, changes generally reflect the expected shift from snowpack runoff (in April, May, June) to rainfall runoff (January, February, and March). This discussion is further described in the Administrative Draft EIS/EIR, Appendix 29B - Climate Change Effects on Hydrology in the Study Area used for CALSIM Modeling Analysis.

Modeling showed that the annual inflow to Folsom Reservoir for existing (historical) conditions was 1,332 thousand acre-feet (TAF), the projected average inflow for 2025 conditions with no action would be 1,336 TAF, and the projected average runoff for 2060 conditions with no action would be 1,302 TAF. Although the overall inflow volume changed only slightly from existing to 2060, the timing of the inflow shows a more significant change. Summarizing the monthly inflow in quarterly periods, the inflow fraction from October to December would increase by two percent from existing (2010) to 2060, from 18 to 20 percent of the annual inflow. The inflow fraction from January to March would increase by 6 percent, from 34 to 40 percent of

the annual inflow. The inflow fraction from April to June would decrease by 4 percent, from 33 to 29 percent of the annual inflow, and the inflow fraction from July to September would decrease by 3 percent, from 15 to 12 percent of the annual inflow. This predicts that inflows will be more directly related to the time when the precipitation occurs and therefore it could reduce the cold water pool in Folsom available during the late summer and early fall time period.

Climate Change Effects on Water Temperature

The changes in water temperature for future climate periods, 2025 and 2060, were based on increased monthly air temperatures. **Figure 4-13** shows the Nimbus Dam release temperatures in September and October, plotted against the September or October Folsom Reservoir Storage volume for the six BDCP alternatives. ELT stands for Early Long Term at year 2025, LLT stands for Late Long Term at year 2060, and EBC stands for Existing Biological Condition. The Nimbus Dam September release temperatures for the 2025 cases (green symbols) were similar to the baseline cases (brown symbols) at 65°F for Folsom storage greater than 500 TAF, and again similar at 70°F for Folsom storage less than 200 TAF, but about 2°F warmer for storage of 200 TAF to 400 TAF. The 2060 cases (purple symbols) were about 2 to 5°F warmer for storage of 200 TAF to 400 TAF. The Nimbus Dam October release temperatures for the 2025 cases (green symbols) were similar to the baseline cases (brown symbols) at 60°F for Folsom storage greater than 600 TAF, and again similar at 65°F for Folsom storage less than 300 TAF, but about 2 to 5°F warmer for storage of 300 TAF to 600 TAF. The Nimbus Dam release temperatures for the 2060 cases (purple symbols) were 5 to 10°F warmer for all Folsom storage volumes.

With a projected rise in water temperatures, an increase in the amount of disinfection by-products in the treated water would be expected for the water agencies utilizing water at Folsom Reservoir. As presented in **Chapter 3**, Impact of Temperature Control Device at Folsom Lake, the average temperature at SJWD's intake has increased 4.9°F from pre-Temperature Control Device (TCD), 1992-2003, to post-TCD, 2003 to 2012. This has resulted in an overall 37 percent increase in total trihalomethane (TTHM) running annual averages (RAA) (varies by quarter) and an overall 20.6 percent increase in haloacetic acid (HAA5) RAA.

In summary, the simulated effects of climate change on the Folsom Dam and Nimbus Dam release temperatures were quite large (5-10°F) in September and October. However, Appendix 29B - Climate Change Effects on Hydrology in the Study Area used for CALSIM Modeling Analysis states that the simulated effects of climate warming should be confirmed with more detailed temperature modeling of Folsom Reservoir that includes potential changes in temperature panel operations.

The BDCP modeled temperature changes for a number of substantially larger system reservoirs such as Trinity, Shasta, Oroville, New Melones, and Folsom Reservoir. It is important to note that the Folsom water temperatures were simulated to increase more than any other reservoir, because of the very limited cold water storage and very low carryover storage in most years.

Figure 4-13. Folsom Reservoir Storage and Nimbus Dam Temperature in September and October for the six BDCP Cases for WY 1922-2003

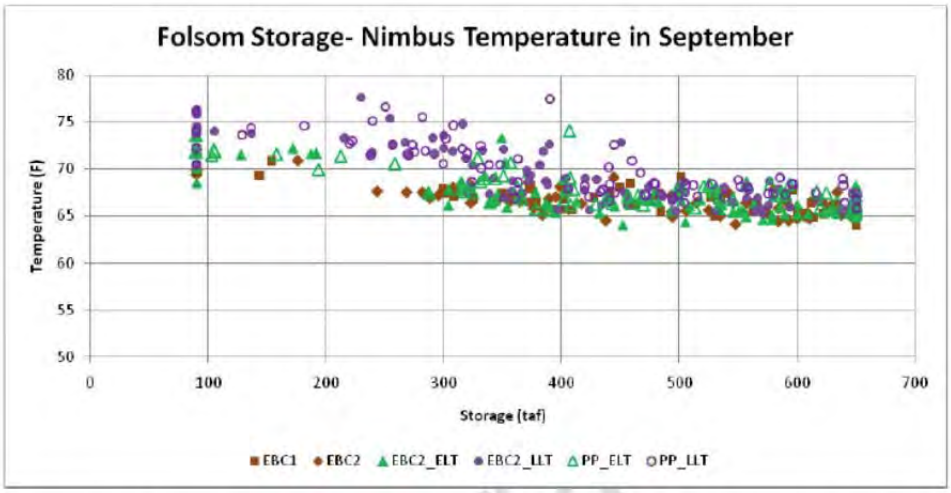


Figure 29C-17a. Folsom Reservoir Storage (taf) and Nimbus Dam Temperature (F) in September for the Six BDCP Cases for WY 1922-2003

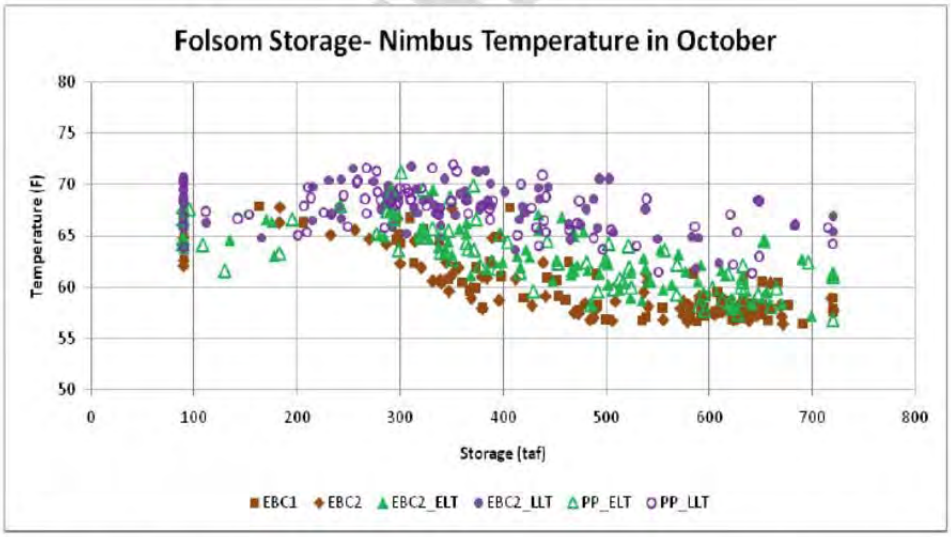


Figure 29C-17b. Folsom Reservoir Storage (taf) and Nimbus Dam Temperature (F) in October for the Six BDCP Cases for WY 1922-2003

Note: Folsom Reservoir is operated to meet water temperature objectives at the Watt Avenue Bridge, about 13 miles downstream from Nimbus Dam (68°F from June 1 to September 30).

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The purpose of this section is to evaluate the existing water treatment plants using American River water for their compliance with existing drinking water regulations. **Appendix B** contains a summary of the data provided by each of the participating water utilities, including data sources, water treatment plant summaries, and supporting water quality data (both raw and treated water). **Appendix C** provides the Regulatory Framework used as the basis for evaluation and provides details on the selected existing drinking water regulations highlighted below**.**

There are eight existing intakes and 12 existing water treatment plants within the watershed that are included in this study. Each of these is discussed herein within the context of selected current and future regulatory compliance and potential treatment issues beginning with the most upstream diversion point and then moving downstream for each participating water utility.

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

Highlights of Selected Existing Drinking Water Regulations

NIPDWR 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). Sets minimum 3/4-log reduction requirement for *Giardia* and viruses, respectively. Set turbidity requirements, which have since been tightened by the Interim Enhanced Surface Water Treatment Rule.

Interim Enhanced SWTR (IESWTR), Long Term 1 ESWTR and Filter Backwash Rule. IESWTR applies to systems serving at least 10,000 population and LT1ESWTR applies to smaller systems. Set minimum 2-log reduction requirement for *Cryptosporidium*. Require continuous monitoring of individual filter effluents (IFE) and combined filter effluent (CFE). Tightened treated water turbidity requirements: CFE < 0.3 NTU in 95 percent of monthly measurements, and not to exceed 1 nephelometric turbidity unit (NTU). Require recycling of all return flows to the headworks, upstream of chemical feed.

Stage 1 Disinfectants/Disinfection By-Product (D/DBP) Rule. Sets 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 (TTHM) and haloacetic acids (HAA5) at 80 and 60 micrograms per liter (µg/L), respectively, in the distribution system as system-wide running annual average (RAA).

Long Term 2 Enhanced SWTR (LT2ESWTR). 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 running annual average *Cryptosporidium* value is > 0.075 oocysts/L, 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 system plans to make a significant change to disinfection. A second round of source water monitoring is required, six years after initial bin classification.

Stage 2 D/DBP Rule. Requires compliance with distribution system MCLs for TTHM and HAA5 to be based on locational running annual average (LRAA). Under Stage 2, compliance is based on LRAA of 80 and 60 µg/L. Initial Distribution System Evaluations (IDSE) must be completed to identify long term routine monitoring locations. Compliance schedules will depend on system size and source type. For combined distributions systems, all systems will be on schedule of earliest system. Operational evaluations are required if projected DBP levels exceed the MCLs.

PLACER COUNTY WATER AGENCY (PCWA)

System Description

Foothill 1 Water Treatment Plant (40 mgd)

The American River raw water intake location for the Foothill 1 Water Treatment Plant (WTP) is located near Ophir Tunnel in Auburn, which diverts off the North Fork of the American River. Foothill 1 WTP is a ballasted clarification water treatment plant. The plant design flow is 40 million gallons per day (mgd), with average flows at about 30 mgd in summer and 10 mgd in winter. Typically, the Foothill WTP treats water from the American River for three to four weeks a year.

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 within the coagulation mixing chambers of Actiflo®. 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, is chlorinated, and then enters into contact basins. The clarified water is then filtered through eight dual media gravity filters, with a ninth filter as a standby. The filter loading rate is 9.6 gallons per minute per square foot (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 sodium hypochlorite, and stored in a 10 million gallon (mg) storage basin to meet disinfection contact time (CT) requirements. The average chlorine residual leaving the plant is 0.5 to 1.0 milligrams per liter (mg/L).

Foothill 2 Water Treatment Plant (15 mgd in standard mode, 18.26 in direct filtration mode)

The American River raw water intake location for the Foothill 2 WTP is the same as for Foothill 1 WTP described above. Foothill 2 WTP is a conventional water treatment plant. The plant design flow is 15.0 mgd, with average flows at 7 mgd in the winter and 15 mgd in the summer. This flow can be increased to 18 mgd during summer demands.

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 taste and odor. Chemicals are mixed by a mechanical mixer which 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 five gpm/sf in standard mode and six gpm/sf in direct filtration mode. 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 sodium hypochlorite, and stored in a 10 mg storage basin to meet CT requirements. The average chlorine residual leaving the plant is 0.5 to 1.0 mg/L.

Highlight of Changes Since 2008 Update

PCWA received approval from the California Department of Public Health (DPH) to operate Foothill 2 at 18 mgd, classified as direct filtration at that rate. PCWA upsized the raw water piping to Foothill 2 from 24-inch diameter to 36-inch diameter. The WTP changed from chlorine gas to sodium hypochlorite feed, to eliminate safety concerns and associated costs, and added pre-caustic feed. Finally, there was an addition of a multi-purpose chemical feed system to allow the chemical feed process to be streamlined and optimized.

Significant Potential Contaminating Activities

The Foothill WTP is located furthest upstream in the watershed on the North Fork of the American River. It diverts water at the American River Pump Station. From the upper watershed, recreational use is heavy and the potential for forest fires could increase the impact of erosion potential. Also of interest are the potential spills associated with wastewater treatment and collection systems, railroads, highways, petroleum pipelines, and bridge crossings.

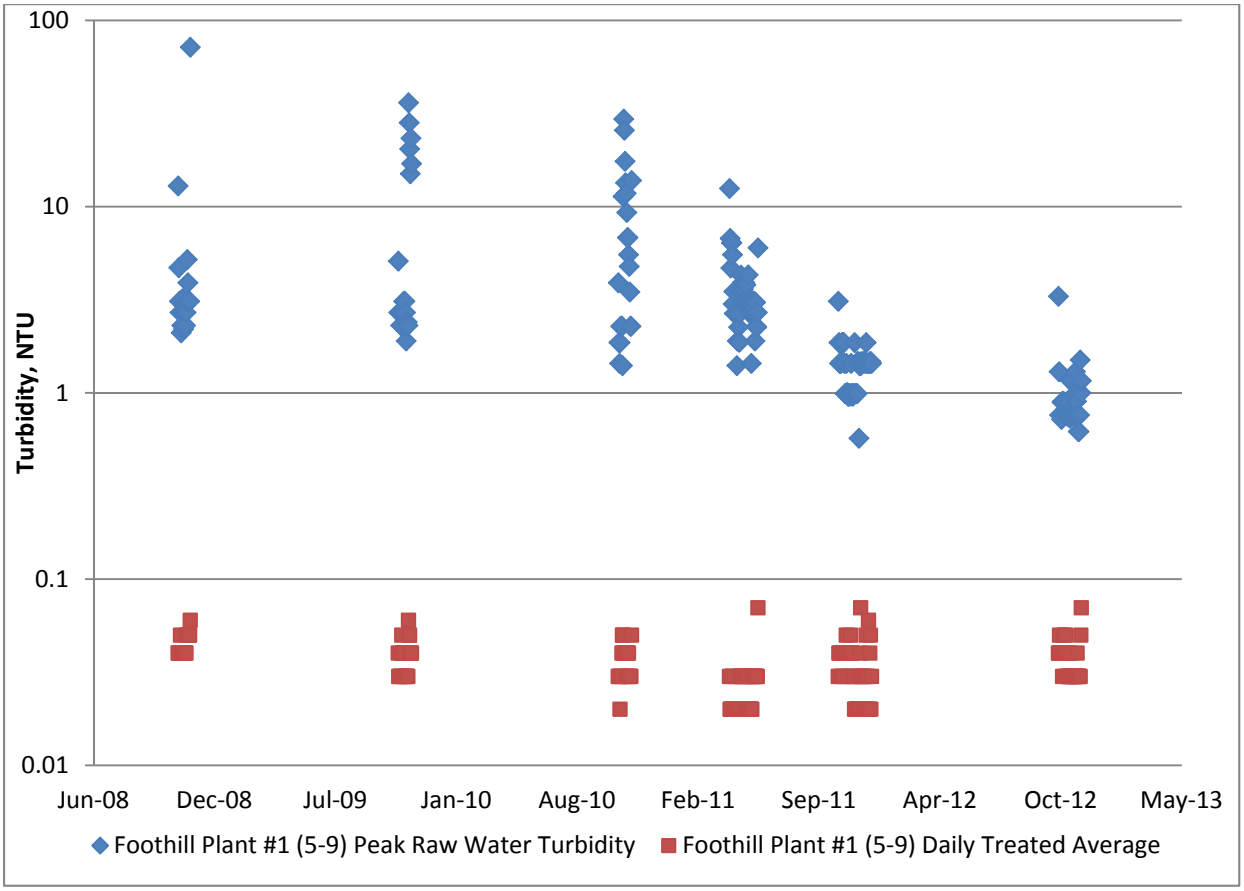
Treated Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study. As the Foothill WTP uses American River water only a few weeks a year, the analysis focused on the applicable time periods.

Turbidity

The average of peak daily raw water turbidity at the Foothill WTP for the period of study was 4.3 NTU, and on average the treatment process decreased this to 0.04 NTU, which equates to an average solids removal of 99 percent. **Figure 5-1** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are peak daily grab samples, and the treated water turbidities are daily average samples, where the daily average is an average of all 4-hour (hr) samples taken in a 24 hour period. Foothill WTP meets all current treated water turbidity standards.

Figure 5-1. Foothill WTP, Raw and Treated Water Turbidities During Periods of American River Use, 2008 – 2012



Microbiological Constituent Review

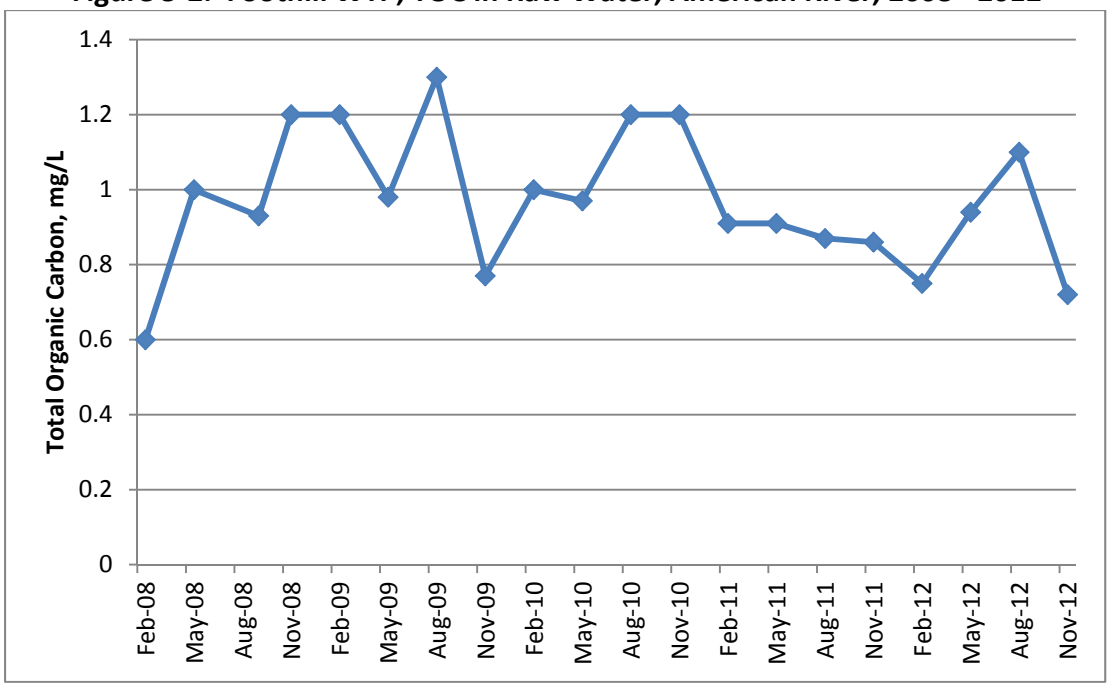
There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products and Precursors

PCWA monitors raw American River for alkalinity and total organic carbon (TOC) levels on a monthly basis. The average raw TOC level at the American River Pump Station was 0.97 mg/L. As shown in **Figure 5-2,** TOC levels in the raw water were below 2.0 mg/L all of the time during the reporting period; the highest recorded level was 1.3 mg/L in August 2009. As the source water running annual averages for years 2008 through 2012 were less than 2.0 mg/L, no TOC removal was required. There are no seasonal trends in the raw TOC data.

Over the reporting period, PCWA sampled eight sites in the Foothill distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2011. PCWA converted to the eight Stage 2 D/DBP monitoring sites in February 2012.

Figure 5-2. Foothill WTP, TOC in Raw Water, American River, 2008 - 2012



As the Foothill WTP treats American River water during a limited time period in any given year, there were only three quarters of TTHM and HAA5 data that were relevant to treated American River water. These three quarters were the second and fourth quarter of 2011 and the fourth quarter of 2012. Due to the limited data, RAAs and LRAAs cannot be calculated to evaluate Stage 1 and Stage 2 D/DBP compliance. Individual DBP results will be discussed.

For the second quarter of 2011, individual TTHM ranged from 28 to 43 µg/L, and individual HAA5 ranged from 32 to 43 µg/L. For the fourth quarter of 2011, individual TTHM ranged from 36 to 43 µg/L, and individual HAA5 ranged from 31 to 38 µg/L. For the fourth quarter of 2012, individual TTHM ranged from 25 to 47 µg/L and individual HAA5 ranged from 21 to 29 µg/L. All individual samples were below the MCLs per the Stage 1 and Stage 2 D/DBP Rule.

PCWA is active in making distribution system operational modifications to ensure that DBP levels will continue to remain low throughout the Foothill distribution system.

Volatile and Synthetic Organic Compounds

There were no detectable levels of volatile organic compounds (VOCs) or synthetic organic compounds (SOCs) in the treated water for the Foothill WTP during the study period.

Detectable Title 22 Constituents and Unregulated

Please refer to **Section 3** for raw water hexavalent chromium sampling results.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data evaluated in **Section 3,** 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Foothill WTP.

The Foothill 40 mgd WTP and the Foothill 15 mgd WTP are classified as conventional filtration water treatment plants, and currently receive 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 and the IESWTR. When Foothill 2 is operated at 18 mgd, it is classified as a direct filtration plant and only receives reduction credit of 2-log *Giardia*, 1-log viruses, and 2-log *Cryptosporidium* for physical removal. Additional credit for required reduction is achieved through additional disinfection.

PCWA received a letter from DPH indicating that the Foothill WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

PCWA has been monitoring the raw and treated water for the Foothill WTP for all required Title 22 compliance constituents. **Table 5-1** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Foothill WTP. The Foothill WTP is currently in compliance with existing regulations.

Table 5-1
Regulatory Compliance Evaluation
Placer County Water Agency – Foothill WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the treated water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC < 2.0 mg/L in raw and treated water. Therefore, enhanced coagulation not required. Unable to evaluate TTHM/HAA5 RAAs as there were only two quarters (second and fourth quarters of 2011) when DBP samples were collected during periods of American River usage. However, individual TTHM and HAA5 during these two quarters were below the MCLs for TTHM and HAA5.
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Unable to evaluate TTHM/HAA5 LRAAs as there was only one applicable quarter (fourth quarter of 2012) when DBP samples were collected during periods of American River usage. However, individual TTHM and HAA5 during this quarter were below the MCLs for TTHM and HAA5.

EL DORADO IRRIGATION DISTRICT (EID)

Strawberry Water Treatment Plant

System Description

The raw water intake location for the Strawberry WTP is located off the upper South Fork of the American River. Strawberry is a small microfiltration plant with a design capacity of 100 gallons per minute (gpm), with flows normally varying from 70 to 90 gpm.

The plant consists of 20 microfiltration modules and is monitored with supervisory control and data acquisition (SCADA) controls and alarms in Placerville. There is no pretreatment of the influent water. The filtered water is disinfected with chlorine and the pH is adjusted with soda ash before entering the distribution system. The distribution system has one 0.20 mg covered storage reservoir.

Backwash of the microfiltration modules occurs every 45 minutes for three minutes, with filter-to-waste capability. Filter-to-waste and filter backwash water are sent to a wastewater tank, which then recycles the decant water back to the headworks.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Strawberry WTP is located furthest upstream in the watershed on the South Fork of the American River. From the upper watershed, recreational use is heavy and the potential for forest fires could increase the impact of erosion potential. Also of interest are the potential spills associated with Highway 50, timber harvesting activities, and the potential impact of residences for both recreation and sanitation issues adjacent to the river.

Water Quality Summary

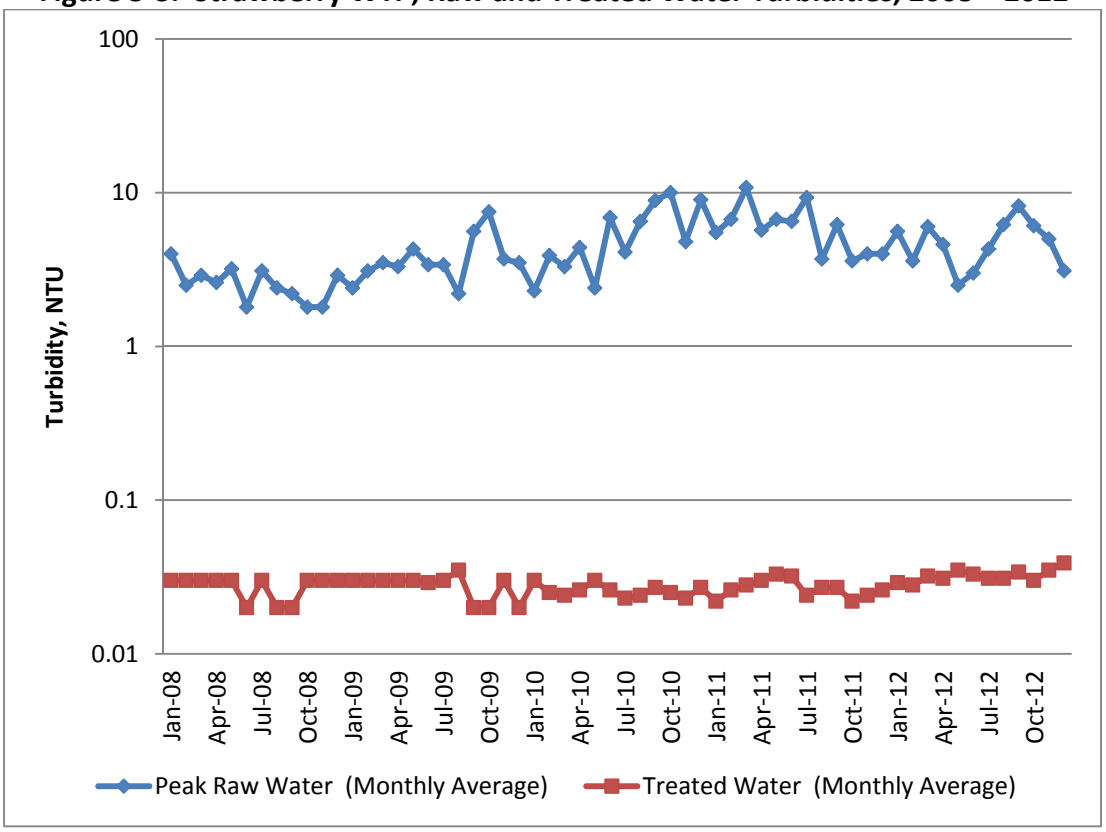
Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

<u>Turbidity</u>

The average of peak daily raw water turbidity at Strawberry WTP for the period of study was 4.6 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average solids removal of 99.4 percent. **Figure 5-3** shows a time series plot of raw and treated water turbidities. It should be noted that the raw water turbidities plotted are a

monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Strawberry WTP meets all current treated water turbidity standards.

Figure 5-3. Strawberry WTP, Raw and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

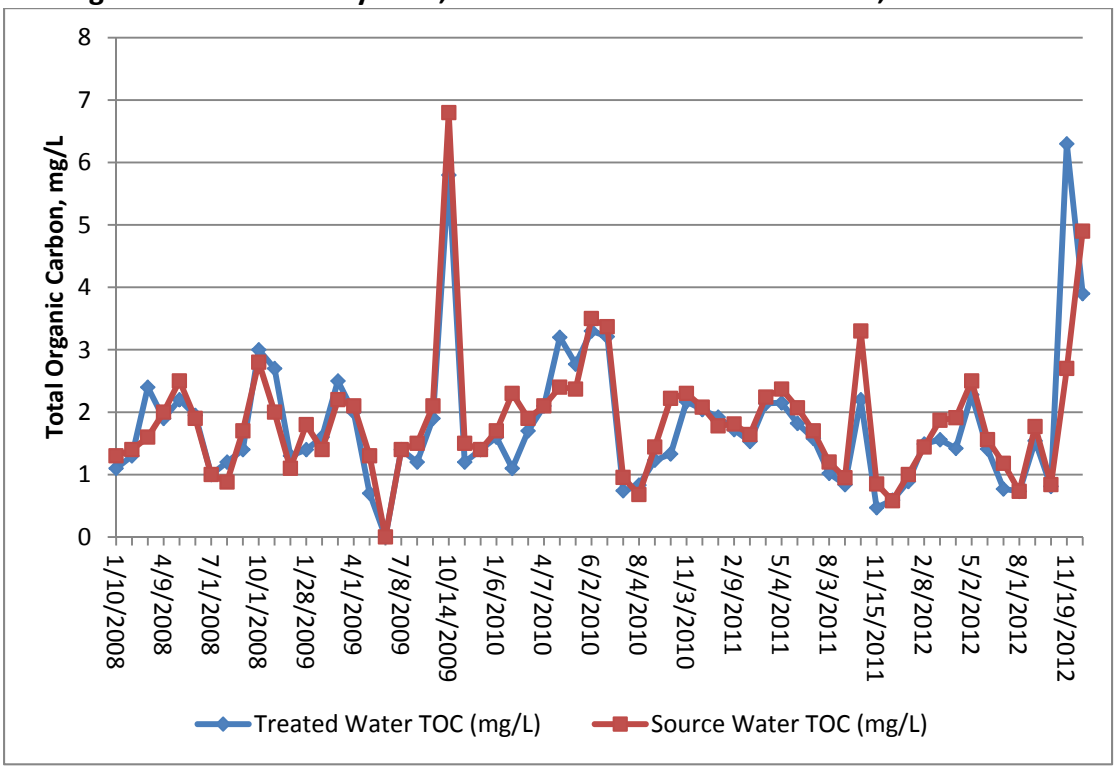
There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products and Precursors

EID monitors TOC levels in the raw and treated water on a monthly basis. As the Strawberry WTP utilizes membranes, it is not required to achieve any TOC removal. The average raw and treated water TOC levels at Strawberry WTP were 1.87 mg/L and 1.79 mg/L, respectively, equating to four percent average removal.

Figure 5-4 shows a time series plot of raw and treated water TOC at Strawberry WTP. The highest recorded level in the raw water was 6.8 mg/L in October 2009. There are no seasonal trends in either the raw or treated TOC data.

Figure 5-4. Strawberry WTP, TOC in Raw and Treated Waters, 2008 – 2012



Stage 1 Compliance

EID has collected both TTHM and HAA5 data for the Strawberry WTP distribution system. Prior to 2007, EID monitored annually for TTHM and HAA5 at four sites in the distribution system. Beginning in 2007, EID reduced monitoring to annually for one site in the distribution system as they were previously oversampling. In the third quarter of 2011, the annual TTHM sample exceeded 80 µg/L, and EID was required to sample quarterly for TTHM and HAAs. EID voluntarily elected to conduct monthly sampling in order to collect additional information and make timely operational changes. From 2008 to 2012, the RAA for TTHM ranged from 20.0 to 70.3 µg/L, with an average value of 53.5 µg/L. The RAA for HAA5 ranged from 28.2 to 64.1 µg/L, with an average value of 48.4 µg/L. Over the reporting period, there were two HAA5 RAAs in 2012 which exceeded the 60 µg/L MCL per the Stage 1 D/DBP Rule, which resulted in an MCL violation. There were no TTHM RAAs which exceeded the 80 µg/L MCL per the Stage 1 D/DBP Rule.

Figures 5-5 and **5-6** show TTHM and HAA5 results over the reporting period. The increase in TTHM levels beginning in 2011 is attributed to conservation efforts which reduced water usage, increasing water age in the distribution system, and caused the subsequent formation of DBPs.

Figure 5-5. Strawberry WTP, Distribution System TTHM, 2008 – 2012

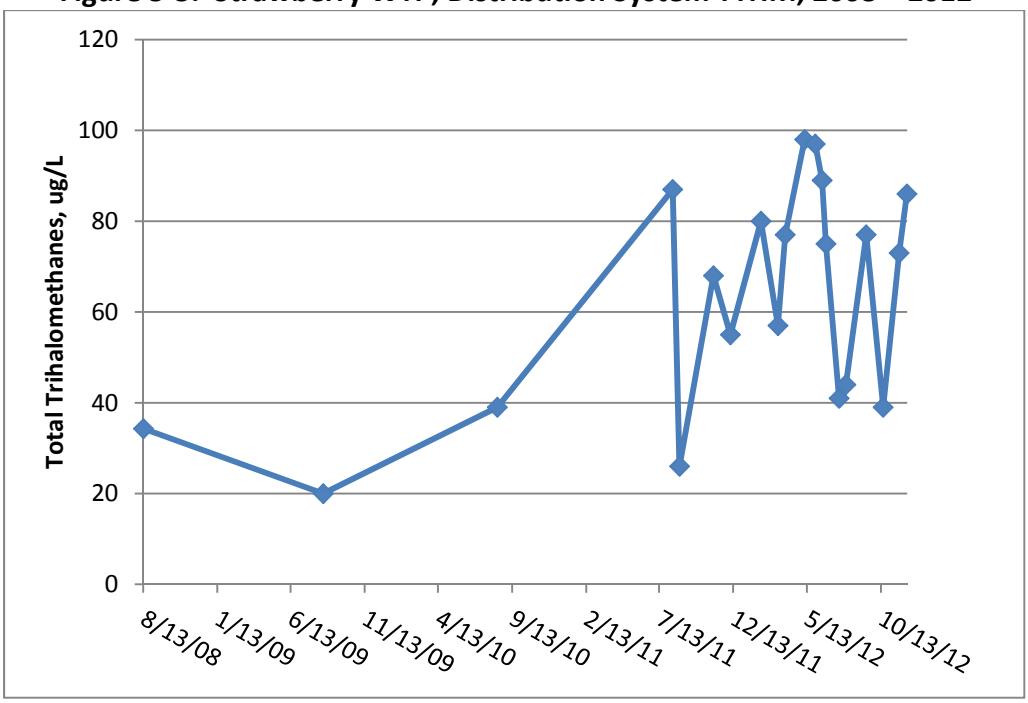
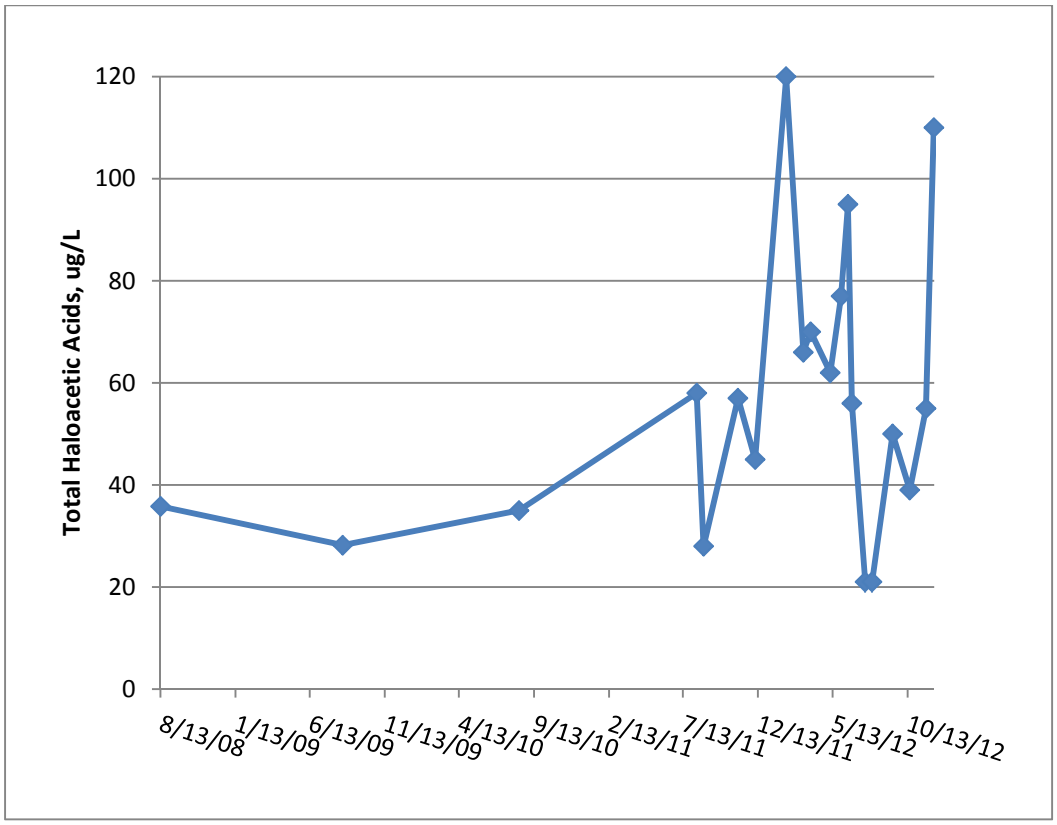


Figure 5-6. Strawberry WTP, Distribution System HAA5, 2008 – 2012



Stage 2 Compliance

The Strawberry WTP is still under Stage 1 compliance and is not required to be in compliance with Stage 2 until October 2013. EID plans to sample two sites, with the existing Stage 1 site to continue as a Stage 2 site. As there were two HAA5 RAA/LRAAs in 2012 which exceeded the HAA MCL of 60 µg/L, this issue could carryover to Stage 2 compliance. EID has hired a consultant to assist with reducing the elevated DBP levels.

Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Strawberry WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

As reported in the 2008 Consumer Confidence Report (CCR), one distribution site exceeded the Action Level for lead but the 90th percentile was below the Action Level. Aluminum was detected at 61 µg/L for the Strawberry water system as reported in the 2010 CCR; however, this is well below the primary MCL of 1,000 µg/L and below the secondary MCL of 200 µg/L.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Strawberry WTP.

The Strawberry WTP is classified as an alternative treatment technology, and currently receives reduction credit for 3.0-log *Giardia,* 0-log viruses, and 2-log *Cryptosporidium* for physical removal. Disinfection with chlorine provides 4.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and the LT1ESWTR.

EID completed *E. coli* source water sampling to comply with the LT2ESWTR in 2009 and was classified as Bin 1 by DPH.

Regulatory Compliance Evaluation

EID has been monitoring the raw and treated water for the Strawberry WTP for all required Title 22 compliance constituents. **Table 5-2** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Strawberry WTP. The Strawberry WTP is currently in compliance with existing regulations, except for exceeding the HAA5 RAA. However, EID is continuing to work on managing this issue.

Table 5-2
Regulatory Compliance Evaluation
El Dorado Irrigation District – Strawberry WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
LT1ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as an alternative technology. TTHM RAAs comply with drinking water standards of < 80 µg/L, but HAA5 RAAs exceeded the MCL of 60 µg/L twice during the study period.
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to be in compliance with Stage 2 until October 2013. Evaluation of TTHM/HAA5 LRAA for Stage 1 2012 data indicates that HAA5 LRAA may exceed the Stage 2 MCL, and the TTHM LRAA was close to the Stage 2 MCL. However, EID is working to reduce formation of DBPs.

Reservoir One Water Treatment Plant

System Description

Reservoir One WTP receives water from the South Fork of the American River at Kyburz, which diverts water into the El Dorado Canal. Water then travels 21.9 miles to the Forebay Reservoir. From the Forebay Reservoir, water moves through the El Dorado Irrigation Ditch System 3.3 miles to the Reservoir One water WTP. Reservoir One is a conventional water treatment plant. The plant design flow is 26 mgd, with average flows of 6 to 13 mgd in winter (October through March) and 20 to 26 mgd in summer (April through September).

Alum or polyaluminum chloride is used as the primary coagulant, and hydrated lime or soda ash is added for pH adjustment. Primary coagulants vary in use seasonally. Chemicals are mixed by a hydraulic jump. The coagulated water enters a flocculation basin, and then into a sedimentation basin. The clarified water is then filtered through eight dual media gravity filters. The filter loading rate is six gpm/sf.

The filters are backwashed based on an as needed basis. Backwash water is recycled to the plant influent after settling in a wastewater tank. The plant has filter-to-waste capability after backwash or plant start-up. The filtered water is disinfected with chlorine, and stored in a 2.7 mg floating cover reservoir to meet CT requirements.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The diversion for the Reservoir One WTP is located downstream of Kyburz on the South Fork of the American River. The water then flows through the El Dorado Canal, Forebay Reservoir, and the Main Canal, which do receive some local drainage. From the upper watershed, recreational use is heavy and the potential for forest fires could increase the impact of erosion potential. Also of interest are the potential spills associated with Highway 50, timber harvesting activities, and the potential impact of septic systems adjacent to the river or canals.

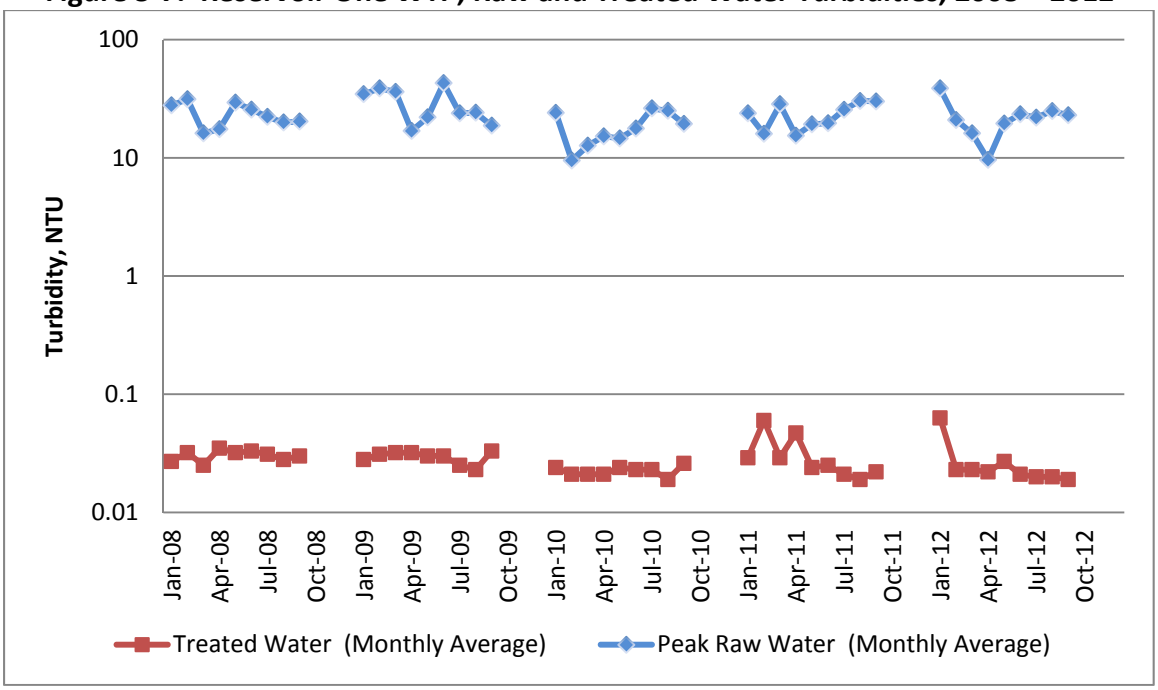
Water Quality Summary

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 of peak daily raw water turbidity at Reservoir One WTP for the period of study was 23.1 NTU, and on average the treatment process decreased this to 0.027 NTU, which equates to an average solids removal of 99.9 percent. **Figure 5-7** shows a time series 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, based on all 4-hr samples in a 24 hour period. Reservoir One WTP meets all current treated water turbidity standards.

Figure 5-7. Reservoir One WTP, Raw and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

Please see El Dorado Hills (EDH) WTP subsection below for information on coliform monitoring results in the Main distribution system.

Disinfection By-Products and Precursors

EID monitors TOC levels in its raw and treated water on a monthly basis in order to determine TOC removal compliance. The average raw and treated water TOC levels at Reservoir One WTP were 1.8 mg/L and 1.28 mg/L, respectively, equating to 28.8 percent average removal. **Figure 5-8** shows a time series plot of raw and treated water TOC at Reservoir One WTP.

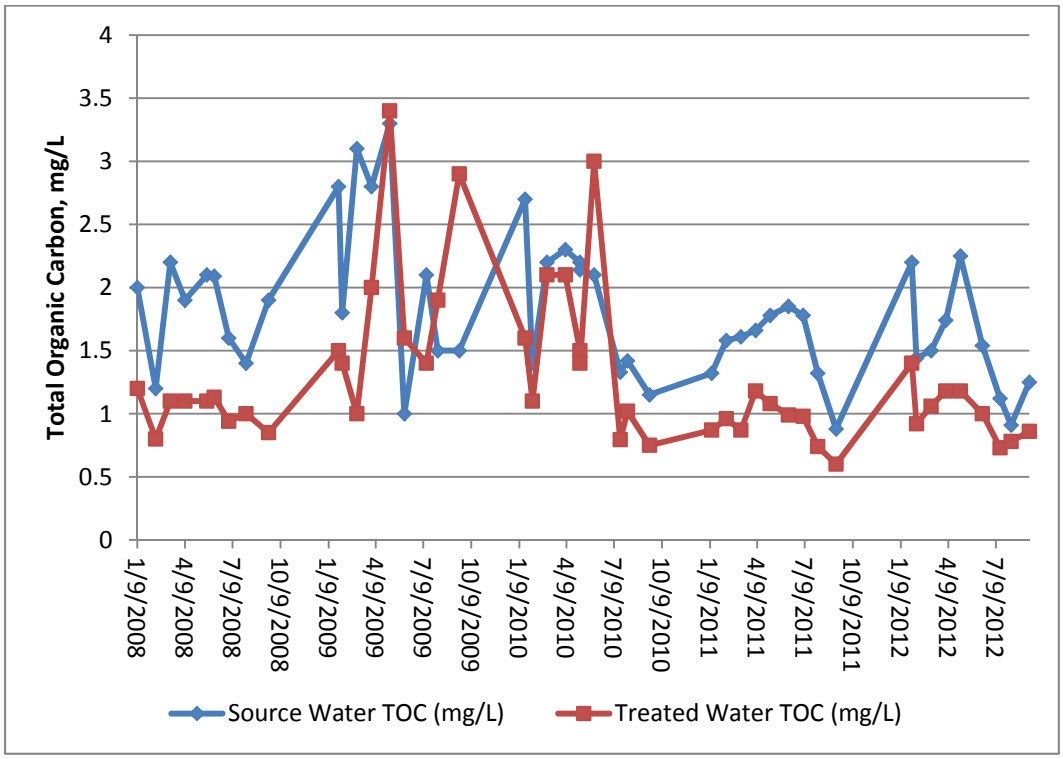
Sixty-five percent of the time, TOC levels in the raw water were below 2.0 mg/L; the highest recorded level was 3.3 mg/L in May 2009. Of particular interest is that there were five months when the treated water TOC was higher than the raw water TOC. According to EID, this was due to the methodology used for the TOC analysis. Since changing the method from Standard Methods (SM) 5310B (combustion) to SM 5310C (oxidation) in May 2010, the raw water TOC measurements have been higher than the treated water.

During the time period in 2009 when the treated water TOC was higher than the raw water TOC, and both the source and treated water TOC were greater than 2.0 mg/L, the Reservoir One WTP was not able to meet the TOC percent removal required, which resulted in a TOC percent removal ratio less than 1.0. The lowest RAA for the TOC percent removal ratio was 0.73 in 2010 and 0.81 in 2011. These are reported in the 2010 and 2011 CCRs. In September

2010, the DPH allowed EID to demonstrate that the treatment technique infraction was due to an analytical testing error. Since July 2010, the required percent TOC reduction has been met. There was no resultant MCL violation.

Please see EDH WTP subsection below for information on distribution system disinfection by-product levels.

Figure 5-8. Reservoir One WTP, TOC Levels in Raw and Treated Water, 2008 – 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Reservoir One WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

As reported in the 2011 CCR, one distribution site in the Main system exceeded the Action Level for lead, but the 90th percentile was less than the Action Level. Please refer to **Section 3** for treated water n-Nitrosodimethylamine (NDMA) sampling results.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Reservoir One WTP.

The Reservoir One 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 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 and the IESWTR. In 2007, EID received a letter from DPH indicating that the Reservoir One WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

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

Table 5-3
Regulatory Compliance Evaluation
El Dorado Irrigation District – Reservoir One WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC was frequently greater than 2.0 mg/L in both the raw and treated water. Therefore, enhanced coagulation was required. In 2010 and 2011, the plant had difficulty meeting the TOC removal ratio of 1.0 or greater due to the methodology used for the TOC analysis. However, DPH granted an extension in September 2010 until July 2011 to demonstrate the treatment technique infraction was due to an analytical testing error. Since July 2010, the required percent TOC reduction has been met. There was no resultant MCL violation. Please see EDH WTP for Stage 1 D/DBP Results.
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Please see EDH WTP for Stage 2 D/DBP Results.

El Dorado Hills Water Treatment Plant

System Description

The raw water intake location for the El Dorado Hills (EDH) WTP is located at Folsom Lake, where the South Fork of the American River enters the lake. The EDH WTP utilizes Microfloc units, so it is an approved alternative filtration technology. The plant design flow is 19.4 mgd, with flows ranging from two to three mgd in the winter, and 3 to 19.4 mgd in the summer.

The influent water is pre-oxidized with chlorine, and polyaluminum chloride is the primary coagulant. Caustic Soda is also added for pH adjustment. Chemicals are mixed by pumped injection. The water is flocculated and clarified in buoyant media upflow clarifiers which are the Microfloc units. The clarified water is then filtered through six dual media gravity filters. The filter loading rate is six gpm/sf.

The filters are backwashed based on turbidity, head loss, time, and/or production. Filter backwash water is sent to a wastewater tank then treated for solids separation; the decant is recycled to the plant influent. The plant has filter-to-waste capability after backwash or plant start-up. The filtered water is then disinfected with chlorine, soda ash is added for pH adjustment, and is then stored in a 0.47 mg baffled clearwell to meet CT requirements.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The EDH WTP intake is located on Folsom Lake near the confluence with the South Fork of the American River. Recreational use is heavy along the South Fork of the American as well as within Folsom Lake. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential. Also of interest are urban runoff from the Placerville and El Dorado Hills communities and potential spills associated with wastewater treatment and collection facilities and roads.

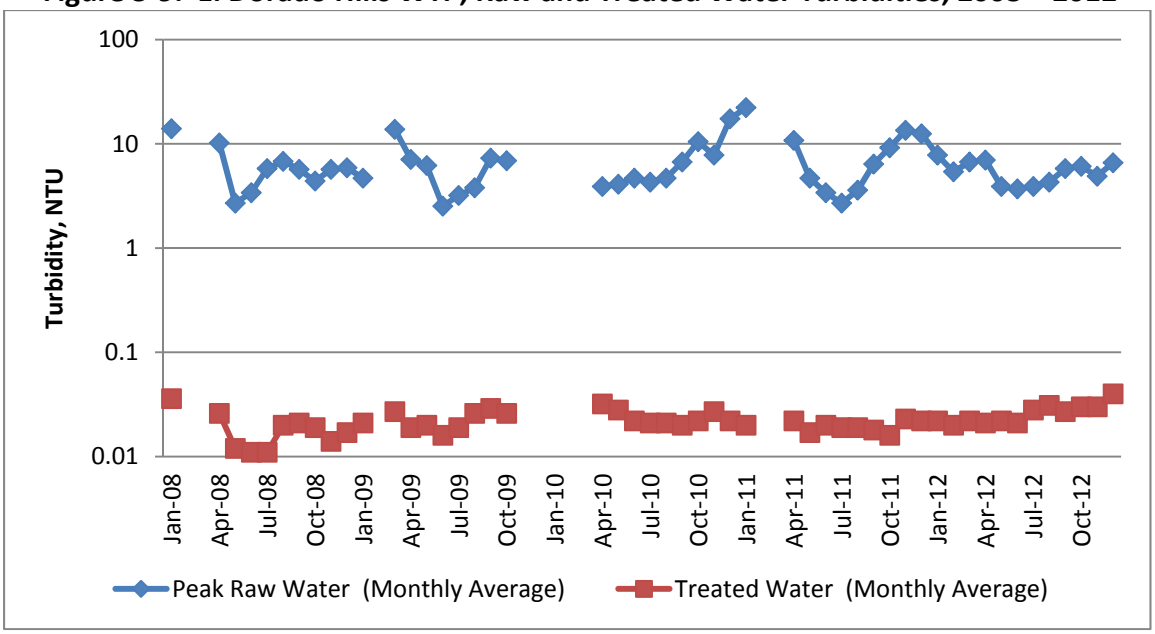
Water Quality Summary

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 of peak daily raw water turbidity at EDH WTP for the period of study was 6.8 NTU, and on average the treatment process decreased this to 0.022 NTU, which equates to an average solids removal of 99.6 percent. **Figure 5-9** shows a time series plot of raw and treated water turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. EDH WTP meets all current treated water turbidity standards.

Figure 5-9. El Dorado Hills WTP, Raw and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

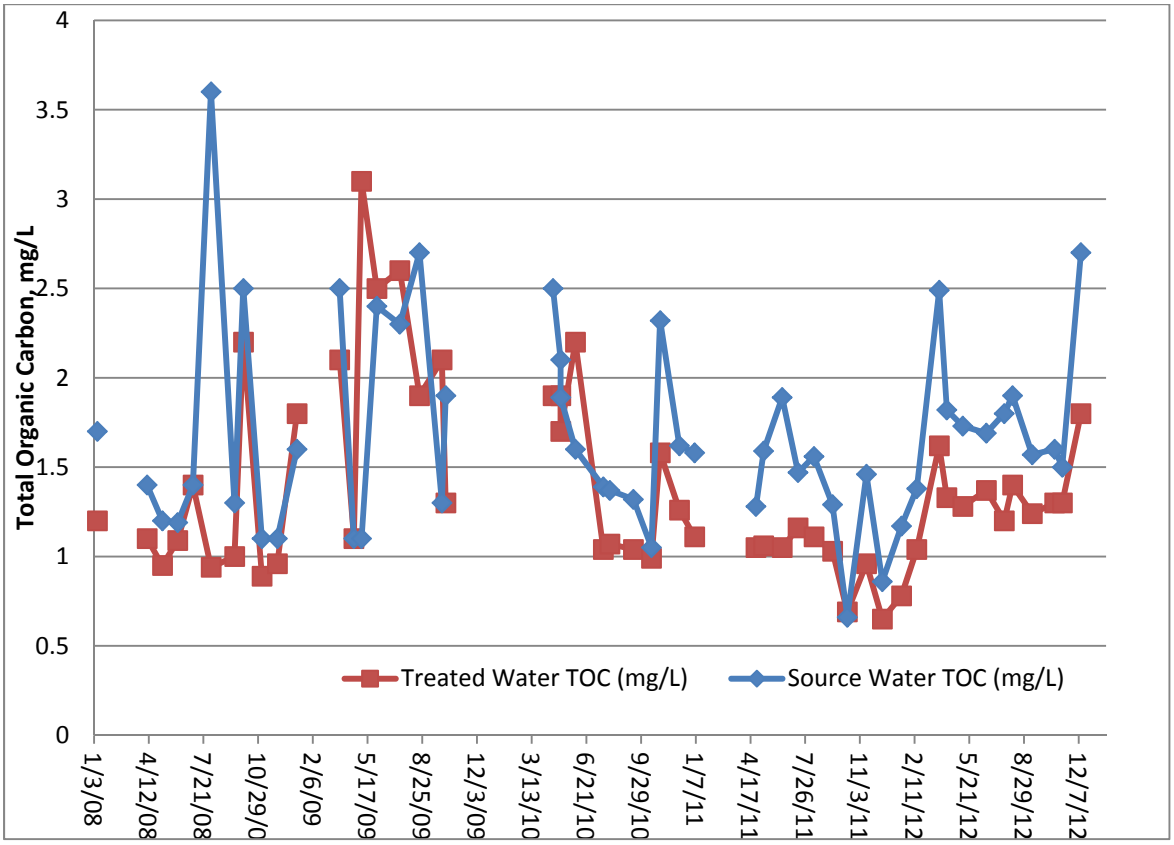
Distribution system monitoring for coliforms as part of the Total Coliform Rule resulted in a few detections of total coliform in the Main distribution system during the study period. As reported in the 2009 CCR, one percent of monthly total coliform samples collected for the Main system were positive. However, less than five percent of samples were positive and there were no fecal coliform detected. Therefore, there was no violation of the coliform MCL.

Disinfection By-Products and Precursors

EID monitors TOC levels in its raw and treated water on a monthly basis. The average raw and treated water TOC levels at EDH WTP were 1.68 mg/L and 1.38 mg/L, respectively, equating to 18 percent average removal. As the EDH WTP utilizes Microfloc units, which are an approved alternative filtration technology, TOC removal is not required under the Stage 1 D/DBP Rule.

Figure 5-10 shows a time series plot of raw and treated water TOC at EDH WTP. The highest recorded level was 3.6 mg/L in August 2008. There were five months in 2009 when the treated water TOC was higher than the raw water TOC. According to EID, this was due to the methodology used for the TOC analysis. Since changing the method from SM 5310B (combustion) to SM 5310C (oxidation) in May 2010, the raw water TOC measurements have been higher than the treated water.

Figure 5-10. El Dorado Hills WTP – Total Organic Carbon in Raw and Treated Water, 2008-2012



Stage 1 Compliance

EID has collected both TTHM and HAA5 data for the Main distribution system, which is supplied by both the Reservoir One and EDH WTPs. Over the reporting period, EID sampled twelve sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2012. It should be noted that the distribution system is also combined with treated water from the Cosumnes River. There was no way to isolate treated American River water only sites in the distribution system; all sites were evaluated.

EID converted to the eight Stage 2 D/DBP monitoring sites in February 2012. The TTHM RAA ranged from 36.7 to 54.3 µg/L, with an average of 46.7 µg/L. The HAA5 RAA ranged from 35.6 to 48.8 µg/L, with an average of 42.7 µg/L. Over the reporting period, RAAs are well below the MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, EID converted to eight Stage 2 D/DBP monitoring sites in February 2012. It should be noted that ten sites were monitored in February 2012. Two extra sites were monitored as some of the sites originally selected for Stage 2 monitoring from the IDSE were not representative of the water system. The extra samples were needed to collect additional data. A letter was mailed to DPH in November 2012 to finalize the eight sites. This evaluation included data from the eight final Stage 2 sites.

Out of the eight sites, three sites are existing Stage 1 sites (ST1-230 4771 Sly Park Rd., ST1-295 5170 Highcrest Dr., and ST1-550 Latrobe Rd.) and five sites are new. Since sampling for Stage 2 began in February 2012, there is only enough data to calculate one LRAA per site. As shown in **Figure 5-11**, TTHM LRAAs ranged from 44.3 to 76 µg/L, with site ST1-5 (Site 1 McGuire Ct. and Rock Rd.) having the highest TTHM LRAA of 76 µg/L. The second highest site was site ST1-230 (site 5 4771 Sly Park Rd.) with a TTHM LRAA of 72.3 µg/L. Sites 1 and 5 are close to the LRAA TTHM MCL of 80 µg/L, and exceed 80 percent of the MCL for TTHM. As of September 2013, the 4771 Sly Park Road site is now called Sly Park Road and Jenkinson Circle.

As shown in **Figure 5-12**, HAA5 LRAAs ranged from 36.2 to 50.3 µg/L, with site ST1-5 (Site 1 McGuire Ct. and Rock Rd.) having the highest LRAA of 50.3 µg/L. The second highest site was site ST1-550 (site 8 4625 Latrobe Rd.) with an HAA5 LRAA of 49.5 µg/L. Sites 1 and 8 are close to the LRAA HAA5 MCL of 60 µg/L, and exceed 80 percent of the MCL for HAA5.

It should be noted that LRAAs calculated for sites 9 and 10 are for information purposes only, as these sites were not official Stage 2 sites until October 1, 2012.

Figure 5-11. El Dorado Hills WTP, Distribution System TTHM LRAAs, 2012

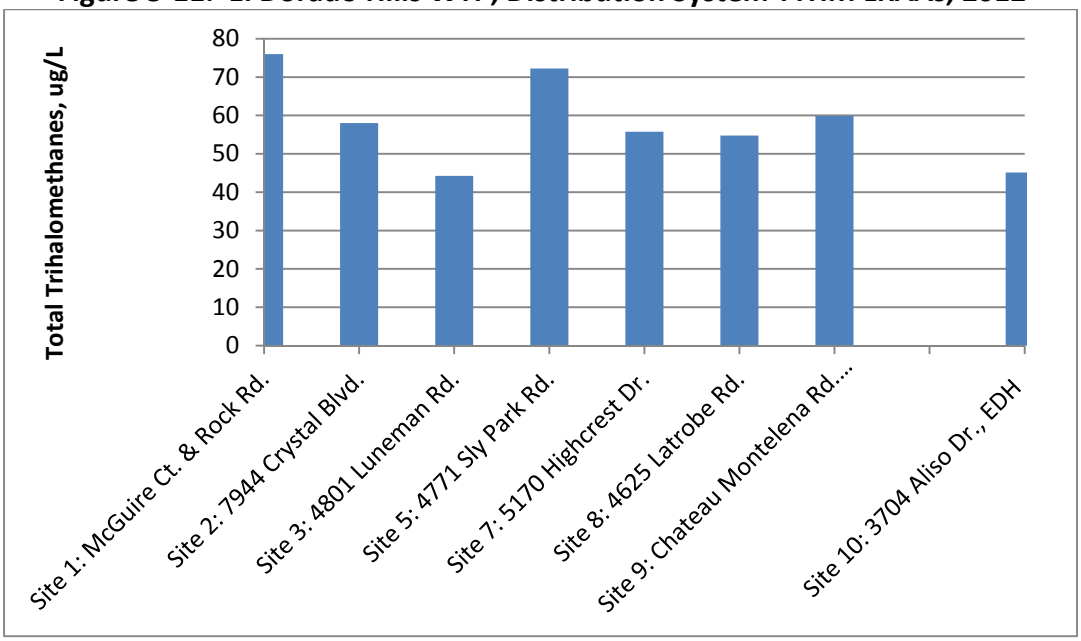
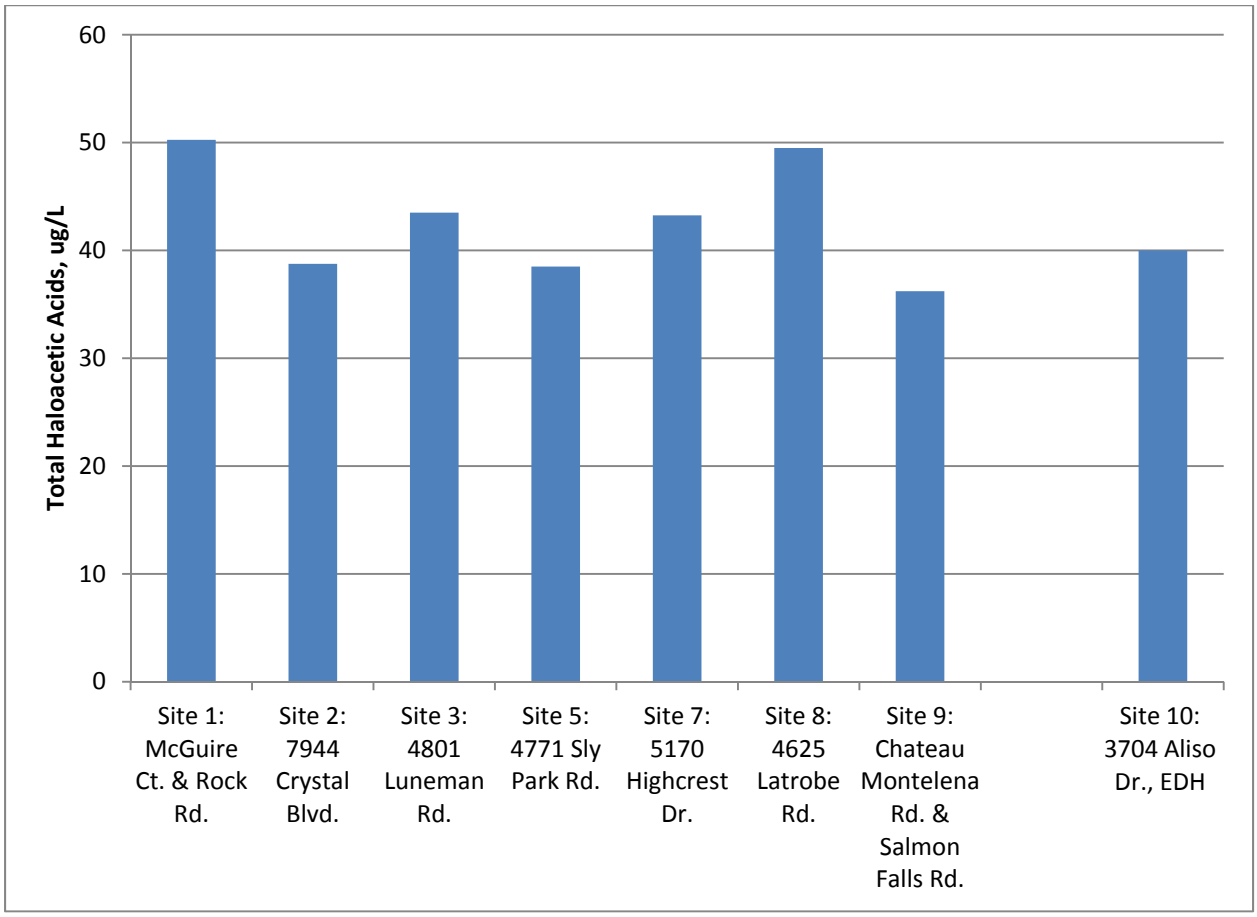


Figure 5-12. El Dorado Hills WTP, Distribution System HAA5 LRAAs, 2012



IDSE Monitoring

From November 2007 to September 2008, EID conducted monitoring at 16 sites for the IDSE under the Stage 2 D/DBP Rule. IDSE LRAAs for TTHM ranged from 17.7 to 67 µg/L, and IDSE LRAAs for HAA5 ranged from 19.8 to 48.2 µg/L. Therefore, IDSE TTHM LRAAs and IDSE HAA5 LRAAs were less than the TTHM and HAA5 MCLs, 80 µg/L and 60 µg/L, respectively.

Sites ST1-230 4771 Sly Park Rd., ST1-295 5170 Highcrest Dr., and ST1-550 Latrobe Rd. are both Stage 1 and Stage 2 monitoring sites, so they have continuous data over the reporting period. Individual TTHM and HAA5 are shown in **Figures 5-13** and **5-14**. Site ST1-230 shows a dramatic increase in TTHM beginning in 2011. As of September 2013, the 4771 Sly Park Road site is now called Sly Park Road and Jenkinson Circle.

Figure 5-13. El Dorado Main System, Distribution System THMs for Sites ST1-230, ST1-295 and ST1-550, January 2008 – December 2012

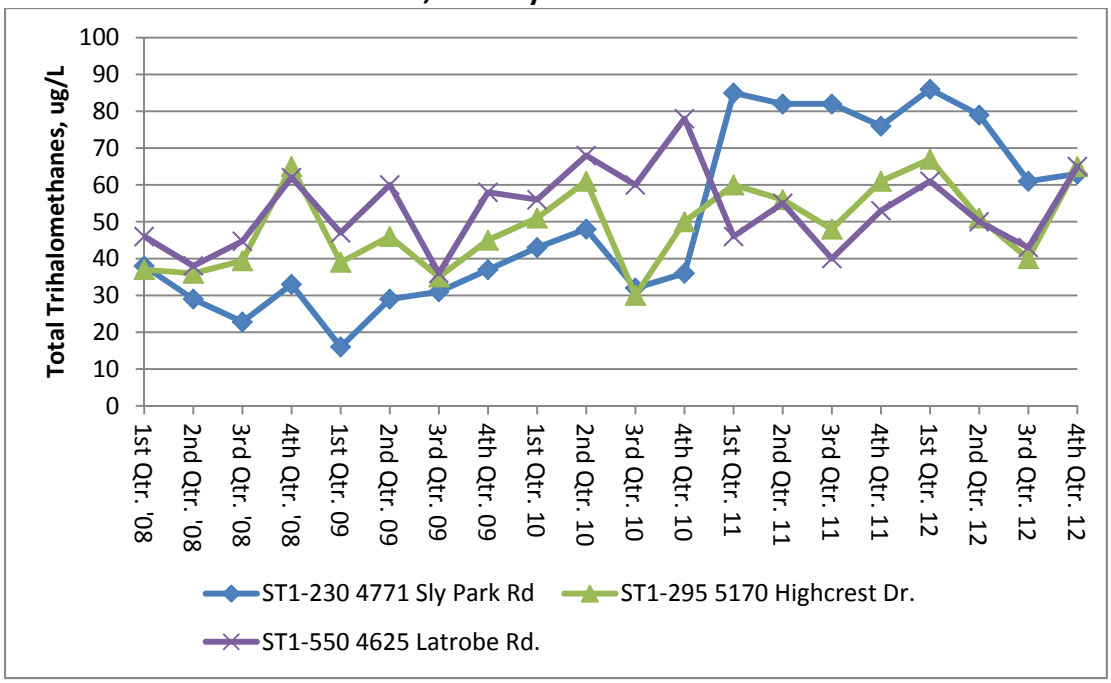
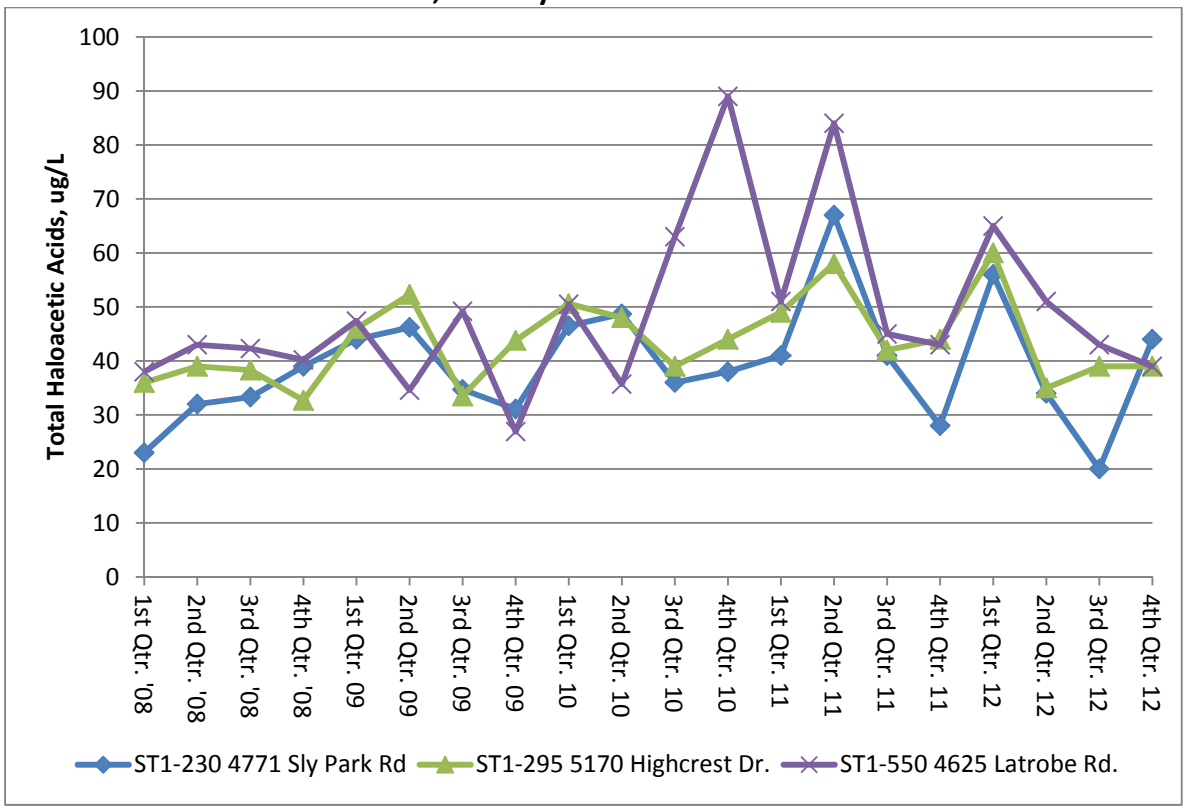


Figure 5-14. El Dorado Main System, Distribution System HAA5 for Sites ST1-230, ST1-295 and ST1-550, January 2008 – December 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the El Dorado Hills WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

As reported in the 2011 CCR, one distribution site in the Main System exceeded the Action Level for lead, but the 90th percentile was less than the Action Level. Please refer to **Section 3** for treated water NDMA sampling results.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the EDH WTP.

The EDH WTP is classified as an alternative filtration technology, and currently receives reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal based on performance testing. 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 and the IESWTR.

In February 2007, EID received a letter from DPH indicating that the EDH WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

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

Table 5-4
Regulatory Compliance Evaluation
El Dorado Irrigation District – El Dorado Hills WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as an alternative filtration technology. TTHM/HAA5 RAAs comply with drinking water standards (<80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Evaluation of TTHM LRAAs for 2012 Stage 2 D/DBP data indicates that TTHM LRAAs for Sites 1 and 5 are very close to the 80 µg/L MCL. LRAAs were equal to or greater than 80 percent of the MCL at two sites for TTHM and two sites for HAA5.

CITY OF FOLSOM

System Description

Folsom Water Treatment Plant

The raw water intake location for the Folsom WTP is the shared diversion facilities at Folsom Dam. Water is provided to the water utilities through the Temperature Control Device (TCD), which is a louvered column that allows for water to be diverted from various depths in the lake to preserve the coldwater pool. Folsom WTP is a conventional water treatment plant. The plant design flow is 40 mgd, with average winter flows at 14 mgd and average summer flows at 32 mgd.

The influent water is pre-oxidized with sodium hypochlorite, and polyaluminum chloride and anionic polymer are added as the primary coagulant and coagulant aid. Chemicals are mixed by a static mixer. The coagulated water is then sent to Actiflo® pretreatment where coagulation, sand injection, maturation, and settling occur. The water is then filtered through ten dual

media gravity filters. The filter loading rate is 5.6 gpm/sf. Non-ionic polymer is used as a filter aid as needed.

The filters can be backwashed based on turbidity, headloss, or time. Currently, the filters are backwashed based on time, which is typically every two days during the summer and every three days in the winter. The plant has filter-to-waste capability after backwash or plant start-up. Backwash water and filter-to-waste flow to a return backwash water pond. Decant water from the pond is returned to the plant, ahead of chemical feed. The filtered water is disinfected with sodium hypochlorite and stored in a 1.2 mg covered storage reservoir to meet CT requirements. The City of Folsom distribution system has a total of 34.5 mg storage.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Folsom WTP diversion is located at the Folsom Dam. Recreational use is heavy in the upper watershed as well as within Folsom Lake. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential. Also of interest are urban runoff from the Auburn, Placerville and El Dorado Hills communities and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

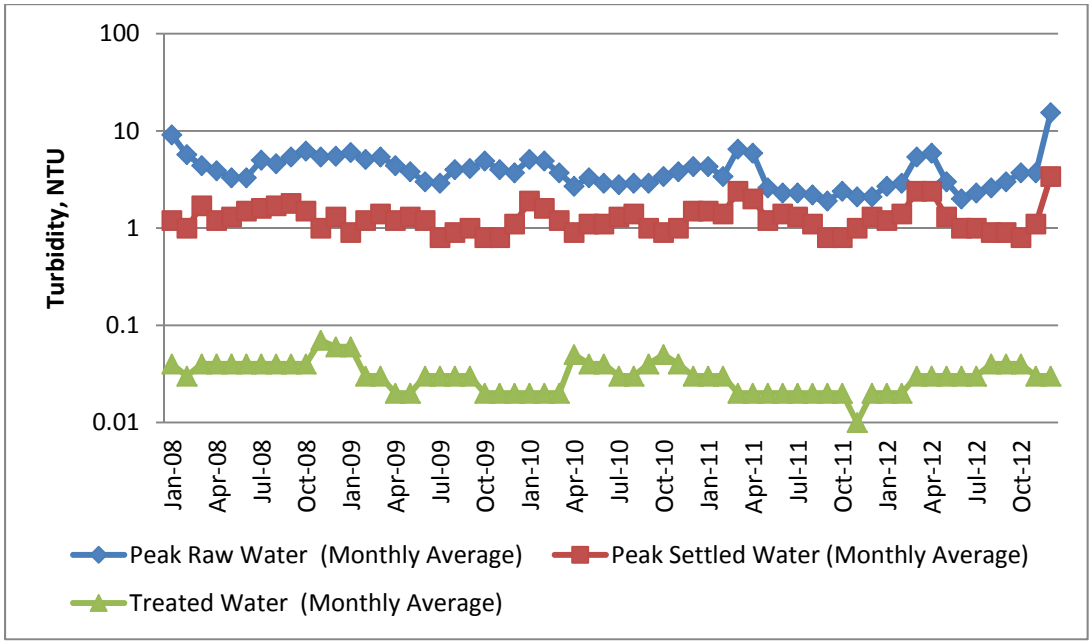
Water Quality Summary

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 of peak daily raw water turbidity at Folsom WTP for the period of study was 4.1 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average solids removal of 99.2 percent. **Figure 5-15** shows a time series plot of raw and treated water turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Folsom WTP meets all current treated water turbidity standards.

Figure 5-15. City of Folsom – Raw, Settled, and Treated Water Turbidity, 2008 – 2012



Microbiological Constituent Review

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

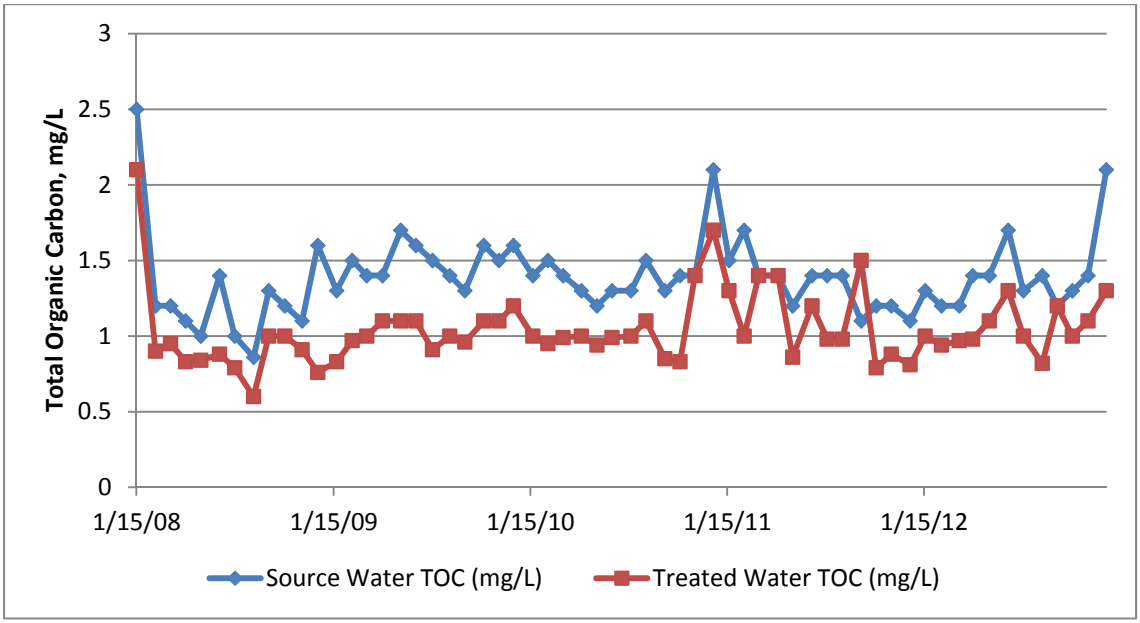
Disinfection By-Products and Precursors

The City of Folsom 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 Folsom WTP were 1.39 mg/L and 1.04 mg/L, respectively, equating to 24.4 percent average removal. **Figure 5-16** shows a time series plot of raw and treated water TOC at Folsom WTP. Ninety-six percent of the time, TOC levels in the raw water were below 2.0 mg/L; the highest recorded level was 2.5 mg/L in January 2008. As the source water running annual averages for years 2008 through 2012 were less than 2.0 mg/L, no TOC removal was required. Raw water TOC levels appear to increase after storm events.

<u>Stage 1 Compliance</u>

Over the reporting period, the City of Folsom sampled four sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to April 2010. The City of Folsom converted to the eight Stage 2 D/DBP monitoring sites in July 2010. The TTHM RAA ranged from 17.8 to 26.4 µg/L, with an average of 21.4 µg/L. The HAA5 RAA ranged from 15.9 to 20.3 µg/L, with an average of 17.8 µg/L. Over the reporting period, RAAs are well below the MCLs per the Stage 1 D/DBP Rule.

Figure 5-16. City of Folsom – Raw and Treated Total Organic Carbon, 2008 – 2012



Stage 2 Compliance

As stated above, the City of Folsom converted to eight Stage 2 D/DBP monitoring sites in July 2010. Out of the eight sites, two sites are existing Stage 1 sites (WTP Effluent and F1A-1 12423 Folsom Blvd), and six sites are new. As shown in **Figure 5-17**, TTHM LRAAs from July 2010 to December 2012 ranged from 24 to 55.8 µg/L, with site FO2-8 (Backflow at Prairie City Rd. and Hwy 50) having the highest LRAA of 55.8 µg/L. As shown in **Figure 5-18**, HAA5 LRAAs ranged from 17.3 to 52.5 µg/L, with site FO4-2 (487 Serpa Drive) having the highest LRAA of 52.5 µg/L. Over the reporting period, all LRAAs are well below the MCLs per the Stage 2 D/DBP Rule, except for site FO4-2 which is close to the HAA5 MCL of 60 µg/L, and exceeds 80 percent of the MCL.

The City of Folsom noted DBP increasing trends in 2011 so they stopped addition of sodium hypochlorite at the plant influent. This resulted in reduction of DBP formation.

Figure 5-17. City of Folsom, Distribution System TTHM LRAAs, July 2010 – December 2012

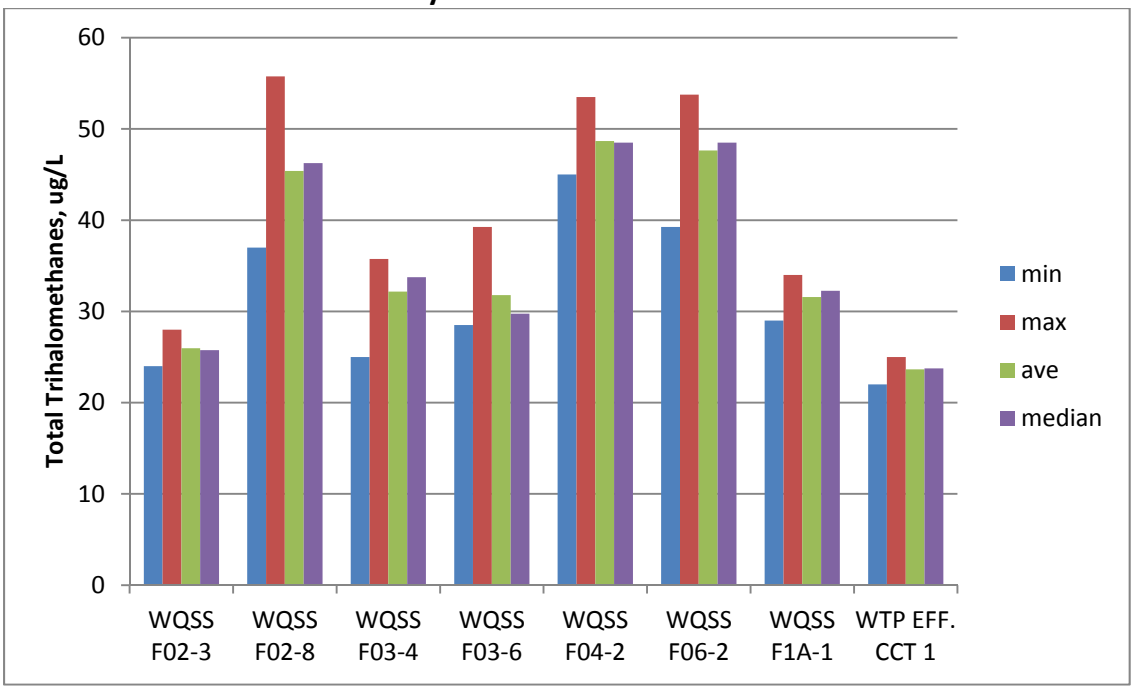
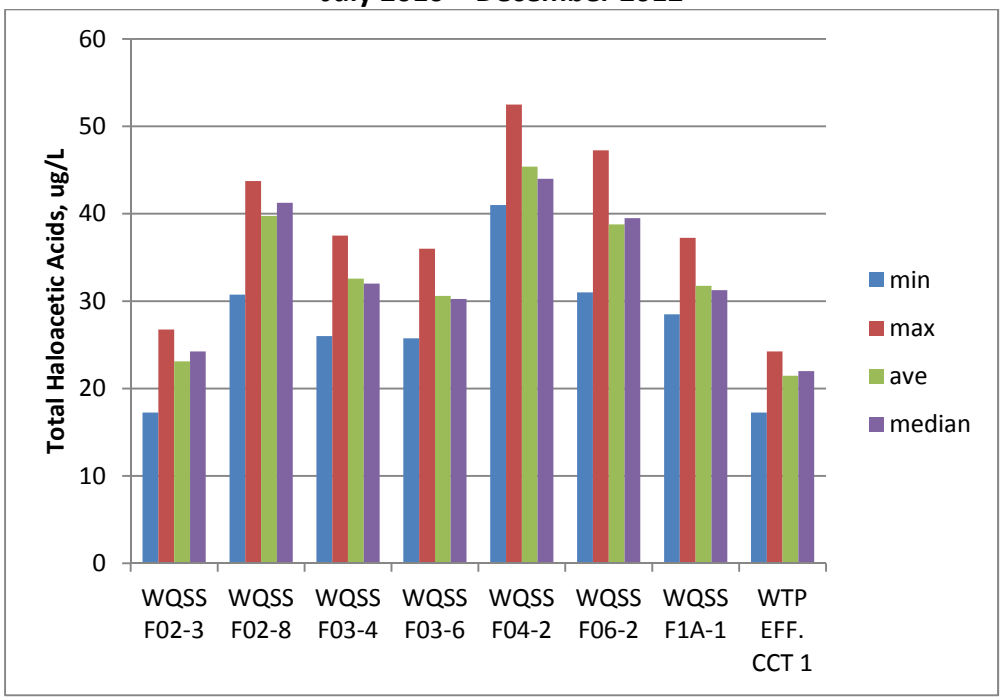


Figure 5-18. City of Folsom, Distribution System HAA5 LRAAs, July 2010 – December 2012



IDSE Monitoring

The City of Folsom completed their IDSE requirement by conducting a System Specific Study (SSS) water quality model. The City also conducted one round of TTHM sampling in July 2007 at sixteen sites. The TTHM ranged from 22 to 50 µg/L, which is similar to RAAs calculated for the Stage 1 data.

As sites WTP Eff and Site F1A-1 are both Stage 1 and Stage 2 monitoring sites, they are the only sites with continuous data over the reporting period. Individual TTHM and HAA5 are shown in **Figures 5-19** and **5-20**. Generally, it appears as if HAA5 levels increased in 2011 and 2012.

Figure 5-19. City of Folsom, Distribution System TTHM for Sites F1A-1 and WTP Eff, January 2008 – December 2012

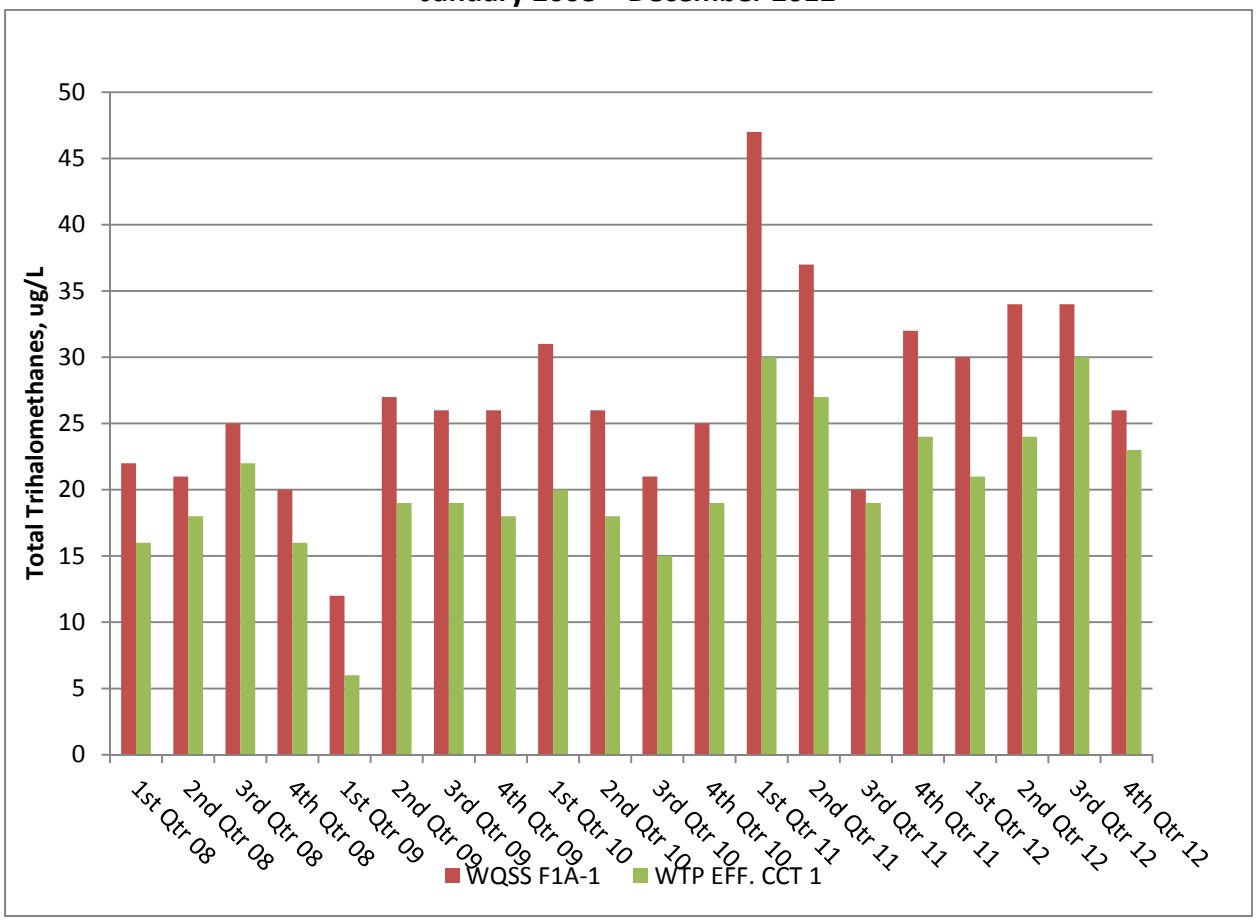
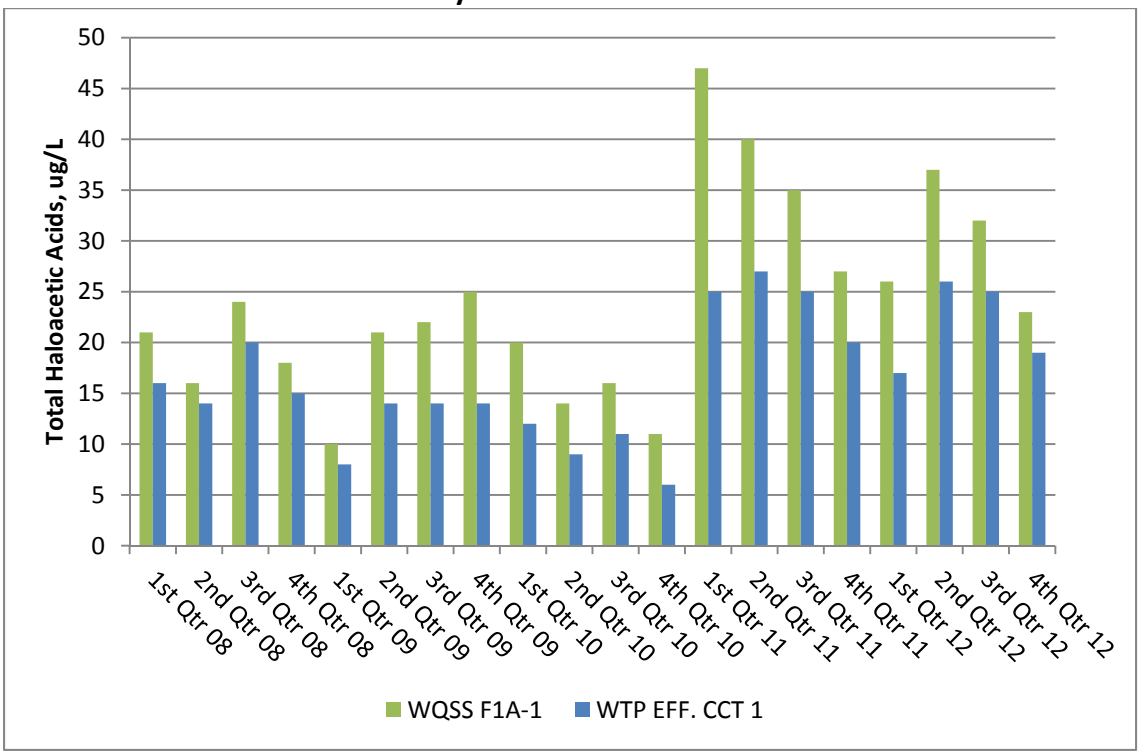


Figure 5-20. City of Folsom, Distribution System HAA5 for Sites F1A-1 and WTP Eff, January 2008 – December 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Folsom WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

The Folsom WTP effluent exceeded the manganese secondary MCL of 50 µg/L, as reported in the 2010 and 2011 CCRs. The 2010 CCR reported an average of 327 µg/L, ranging from non-detect (ND) to 1,500 µg/L. The 2011 CCR reported an average of 200 µg/L, ranging from ND to 1,400 µg/L. Both of these exceed the secondary MCL of 50 µg/L. According to Folsom WTP staff, the cause was attributed to the use of potassium permanganate at the WTP several years ago.

***Giardia/*Virus*/Cryptosporidium* Reduction Requirements**

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Folsom WTP at this time.

The Folsom 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 and the IESWTR.

In 2007, the City of Folsom received a letter from DPH indicating that the Folsom WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

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

Table 5-5
Regulatory Compliance Evaluation
City of Folsom – Folsom WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC < 2.0 mg/L in raw and treated water. Therefore, enhanced coagulation not required. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Current TTHM/HAA5 LRAAs for Stage 2 data are well below the MCLs (<80/60 µg/L, respectively), except for site FO4-2 which is close to the HAA5 LRAA of 60 µg/L and greater than 80 percent of the MCL.

FOLSOM STATE PRISON

System Description

Folsom Prison Water Treatment Plant

The raw water intake location for the Folsom State Prison WTP is the shared diversion facilities at Folsom Dam. Water is provided to the water utilities through the TCD, which is a louvered column that allows for water to be diverted from various depths in the lake to preserve the coldwater pool. Folsom State Prison WTP is a Micro-floc Two-Stage Filtration Package plant, utilizing direct filtration. The plant design flow is 4 mgd, with average winter flows at 1.5 mgd and average summer flows at 1.9 mgd.

The influent water is pre-chlorinated, and alum is added as the primary coagulant. Chemicals are mixed by an in-line mixer, then flocculated and clarified in an upflow clarifier. The water is then filtered through two tri media gravity filters. The filter loading rate is 5.2 gpm/sf.

The filters are backwashed based on time or headloss. The plant has filter-to-waste capability after backwash. Backwash water and filter-to-waste flow to a reclamation basin. Decant water from the basin is returned to the plant, ahead of chemical feed. The filtered water is then disinfected with chlorine and lime is added for pH adjustment, before being stored in two 1 mg covered storage reservoirs.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Folsom State Prison WTP diversion is located at the Folsom Dam. Recreational use is heavy in the upper watershed as well as within Folsom Lake. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential. Also of interest are urban runoff from the Auburn, Placerville and El Dorado Hills communities and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

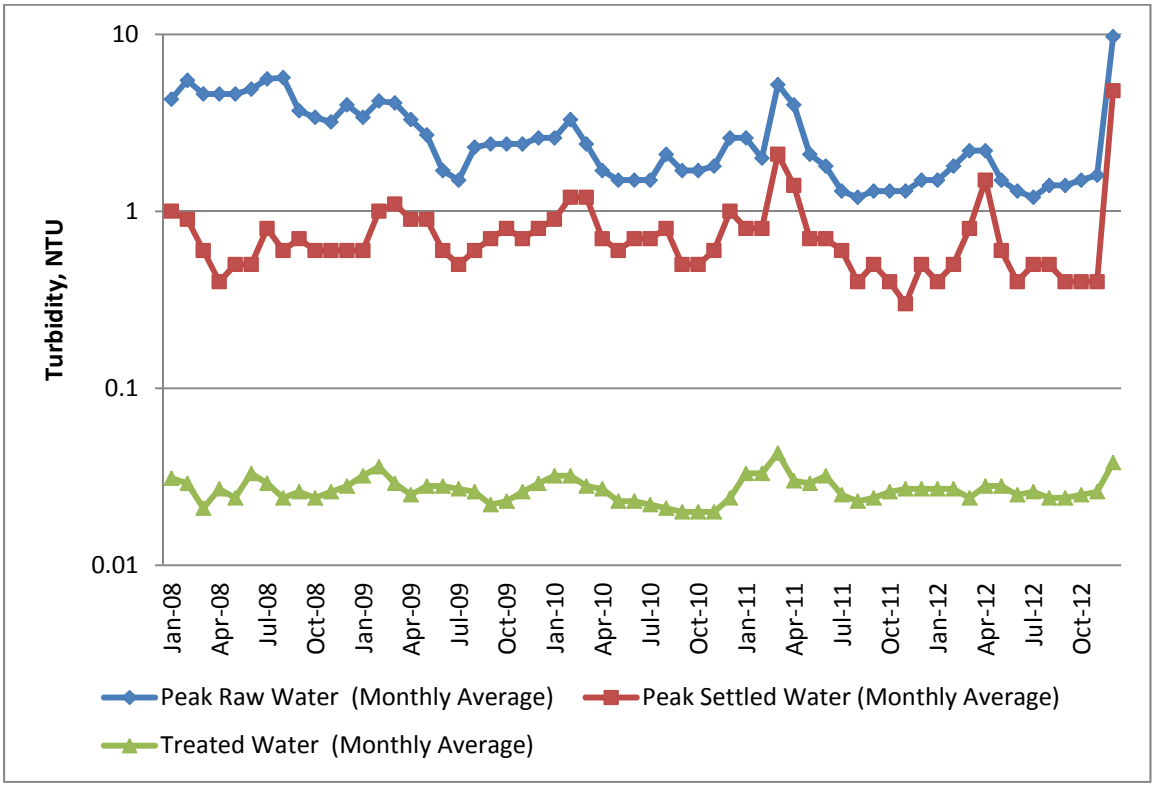
Water Quality Summary

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 of peak daily raw water turbidity at Folsom State Prison WTP for the period of study was 2.74 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average solids removal of 99 percent. **Figure 5-21** shows a time series plot of raw and treated water turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Folsom State Prison WTP meets all current treated water turbidity standards.

Figure 5-21. Folsom State Prison WTP- Raw, Settled, and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

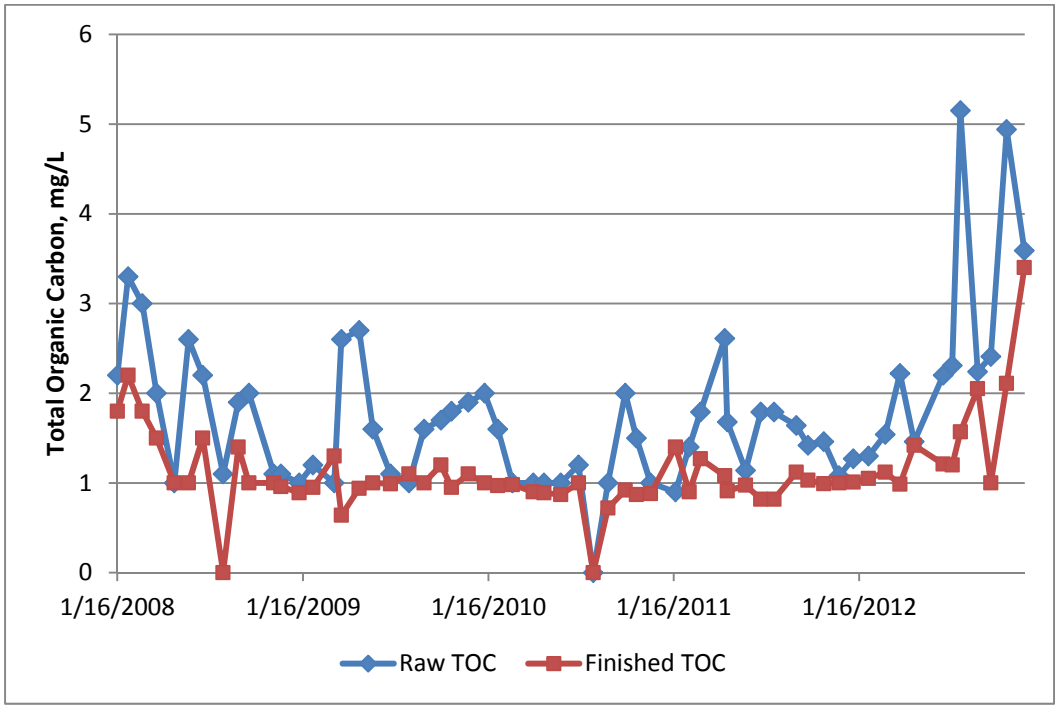
There were no positive coliform samples in the distribution system during the period of study.

Disinfection By-Products and Precursors

The Folsom State Prison WTP monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water on a monthly basis. As Folsom State Prison WTP is a direct filtration plant, it is not required to achieve any TOC removal. The average raw and treated water TOC levels at Folsom State Prison WTP were 1.8 mg/L and 1.2 mg/L, respectively, equating to 33.3 percent

average removal. **Figure 5-22** shows a time series plot of raw and treated water TOC at Folsom State Prison WTP. Seventy-three percent of the time, TOC levels in the raw water are less than 2.0 mg/L. This is in contrast to TOC levels as measured by other Folsom Lake users such as the City of Folsom, City of Roseville, and San Juan Water District. These agencies have source water TOC levels less than 2 mg/L from 95 to 98 percent of the time. It is likely that the differences in TOC levels are due to differences in laboratory methods, as the Folsom State Prison WTP alternates between the SM 5310B (combustion) and SM 5310C (oxidation) methods, and the other Folsom Lake users consistently employ the SM 5310C (oxidation) method to measure TOC.

Figure 5-22. Folsom State Prison, Raw and Treated Total Organic Carbon, 2008 – 2012



Stage 1 Compliance

The Folsom State Prison WTP monitors quarterly for TTHM at one site in the distribution system; therefore, the RAA is the same as the LRAA. On May 11, 2006 the DPH granted an annual waiver from HAA5 testing. Therefore, HAA5 is monitored once a year in the third quarter. The RAA/LRAA for TTHM ranged from 27.3 to 47.5 µg/L, with an average value of 35.2 µg/L. The RAA/LRAA for HAA5 has ranged from 17.0 to 28 µg/L, with an average value of 20.1 µg/L. Over the reporting period, RAAs and LRAAs are well below the MCLs per the Stage 1 D/DBP Rule and the MCLs per the Stage 2 D/DBP Rule.

Stage 2 Compliance

As stated above, Folsom State Prison WTP will convert to Stage 2 monitoring sites in October 2013. As the site locations and number of sites were undetermined at the time of preparation of this report, an evaluation of Stage 2 compliance could not be completed. However, evaluation of TTHM/HAA5 LRAAs for Stage 1 indicates expected compliance with Stage 2 MCL.

Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Folsom State Prison WTP during the reporting period.

***Giardia/*Virus*/Cryptosporidium* Reduction Requirements**

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Folsom State Prison WTP.

The Folsom State Prison 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 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 and the LT1ESWTR.

The Folsom State Prison WTP received a letter from DPH indicating Bin 1 classification under the LT2ESWTR.

Regulatory Compliance Evaluation

Folsom State Prison has been monitoring the raw and treated water for the Folsom State Prison WTP for all required Title 22 compliance constituents. **Table 5-6** lists the key existing drinking water regulations and a compliance evaluation for these standards. The Folsom State Prison WTP is currently in compliance with existing regulations.

Table 5-6
Regulatory Compliance Evaluation
Folsom State Prison – FSP WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
LT1ESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as a direct filtration plant. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to be in compliance with Stage 2 until October 2013. Evaluation of TTHM/HAA5 LRAA for Stage 1 indicates likely compliance with Stage 2 MCL.

SAN JUAN WATER DISTRICT (SJWD)

System Description

Sidney N. Peterson Water Treatment Plant

The raw water intake location for the Peterson WTP is the shared diversion facilities at Folsom Dam. Water is provided to the water utilities through the TCD which is a louvered column that allows for water to be diverted from various depths in the lake to preserve the coldwater pool. The Peterson WTP is a conventional water treatment plant. The original plant design was 100 mgd. In 2013 it was permitted by DPH to operate up to 150 mgd based on process and hydraulic improvements that were implemented over the years**.**

The influent water is pre-chlorinated, and an alumimum sulfate/2 percent cationic blend is used as the primary coagulant. Chemicals are mixed by a mechanical mixer at a G-value of 300 1 per second. The water then enters a 3-stage flocculation basin with horizontal mechanical mixers, and then into sedimentation basins. Polymer is added as a filter aid before the clarified water enters the 24 gravity dual media filter groups, each made of 10 - 8-foot by 8-foot filter cells,

which are operated up to but not to exceed 8.5 gpm/ft². Filters are backwashed based on time, turbidity, or head loss. The plant does not have filter-to-waste capability.

Backwash water flows to a wastewater basin, and the decant water is sent to the process upstream of chemical feed. The filtered water is disinfected with chlorine, and pH adjusted with calcium hydroxide. The treatment plant has a 62 MG floating cover reservoir on site, with an additional 6.26 MG from other distribution reservoirs.

Highlight of Changes Since 2008 Update

Since the 2008 Update, the following projects have been completed at the Peterson WTP:

- Raw water pipeline hydraulic improvements,
- Rehabilitation of sedimentation basin walls,
- Replacement of two inch tube settlers with four inch tube settlers and increased launderer size in sedimentation basins,
- Filter basin caulking replacement,
- Construction of a new filter effluent 60 inch treated water pipeline,
- Conversion of primary coagulant from alumimum sulfate to alumimum sulfate/2 percent cationic blend,
- Chlorine-feed system improvements,
- Peterson WTP generator replacement, and
- SCADA replacement.

Significant Potential Contaminating Activities

The Peterson WTP diversion is located at the Folsom Dam. Recreational use is heavy in the upper watershed as well as within Folsom Lake. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential. Also of interest are urban runoff from the Auburn, Placerville and El Dorado Hills communities and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

Water Quality Summary

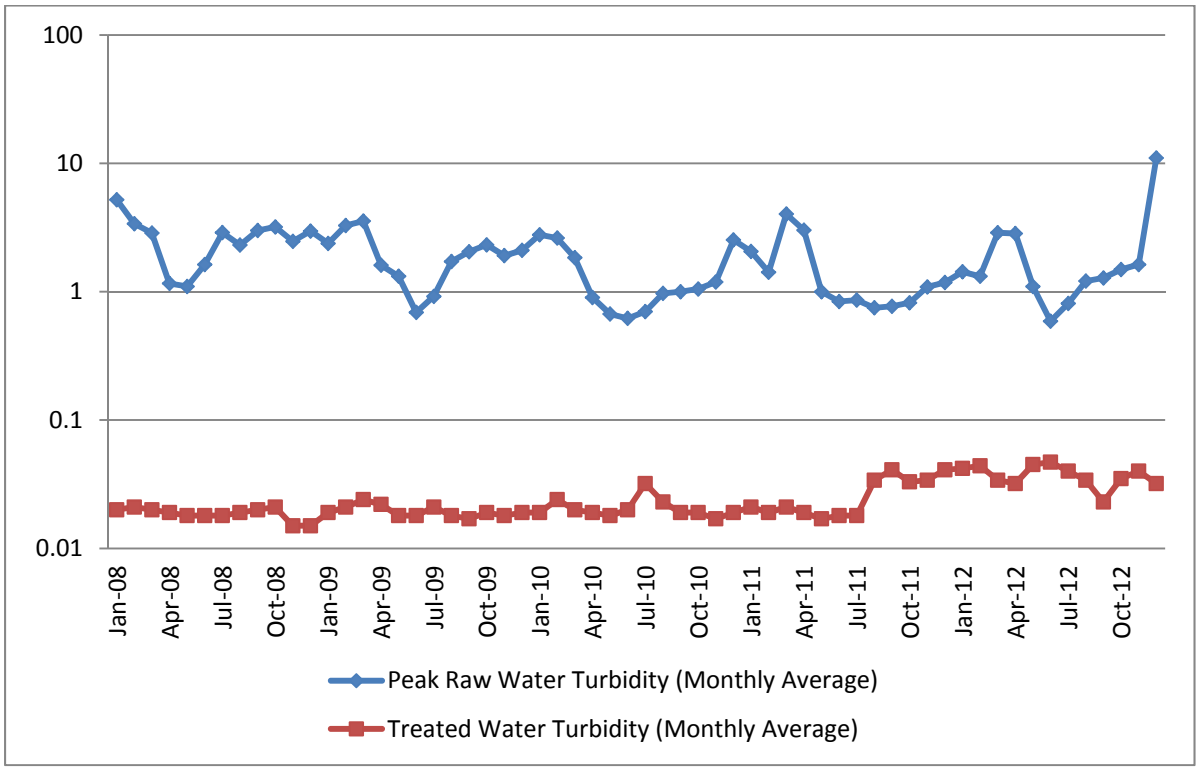
Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average of peak daily raw water turbidity at the Peterson WTP for the period of study was 1.97 NTU, and on average the treatment process decreased this to 0.024 NTU, which equates to an average solids removal of 98.7 percent. **Figure 5-23** shows a time series plot of raw and

treated turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Peterson WTP meets all current treated water turbidity standards.

Figure 5-23. San Juan Water District – Raw, Settled, and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

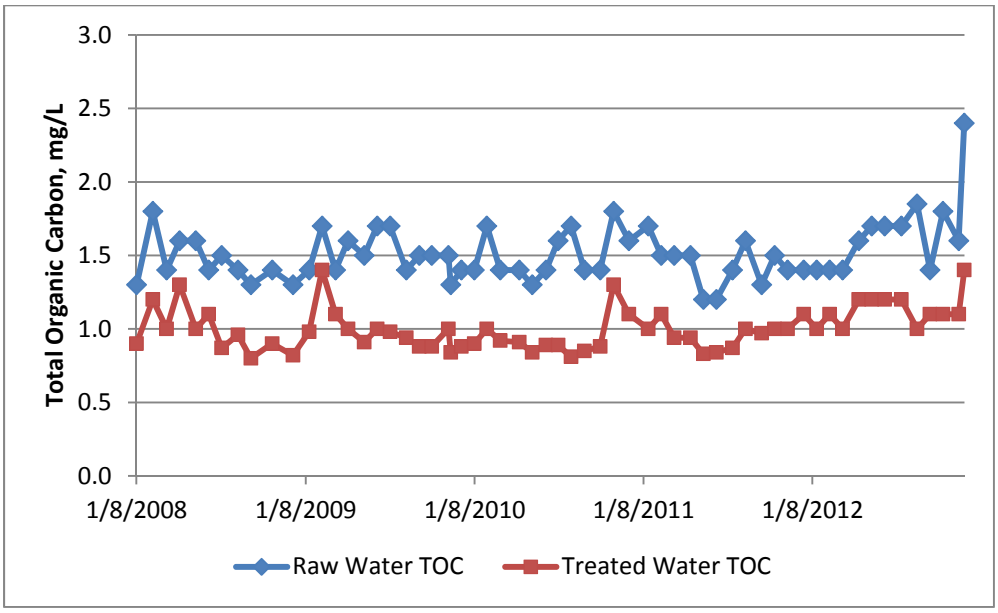
There were no positive coliform samples in the distribution system during the period of study, except in 2010. In 2010, one month had 1.89 percent of monthly total coliform samples for the Peterson WTP distribution system positive. However, this was not in violation of the Total Coliform Rule since it was less than five percent and there were no detections of fecal coliform.

Disinfection By-Products and Precursors

SJWD 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 Peterson WTP were 1.5 mg/L and 1.0 mg/L, respectively, equating to 33 percent average removal. **Figure 5-24** shows a time series plot of raw and treated water TOC. TOC levels in the raw water were below 2.0 mg/L in all individual samples except for one sample; the highest recorded level was 2.4 mg/L in December 2012. As the source water running

annual averages for years 2008 through 2012 were less than 2.0 mg/L, no TOC removal was required under the Stage 1 D/DBP Rule.

Figure 5-24. San Juan Water District – Raw and Treated Total Organic Carbon, mg/L, 2008 – 2012



Stage 1 Compliance

Over the reporting period, SJWD sampled four sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2010. SJWD converted to the four Stage 2 D/DBP monitoring sites in January 2011. Between January 2008 and December 2010, the TTHM RAA ranged from 30.9 to 37.8 µg/L, with an average of 35.7 µg/L. The HAA5 RAA ranged from 13.2 to 26.2 µg/L, with an average of 20 µg/L. Over this reporting period, RAAs are well below the MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, SJWD converted to the four Stage 2 D/DBP monitoring sites in January 2011. Out of the four sites, two sites are existing Stage 1 sites, and two sites are new. As shown in **Figure 5-25**, TTHM LRAAs from January 2011 to December 2012 ranged from 35 to 59 µg/L, with site 5 (4680 Lawrence) having the highest LRAA. As shown in **Figure 5-26**, HAA5 LRAAs ranged from 24 to 34 µg/L, with site 2 (Snowberry) having the highest LRAA. Over the reporting period, LRAAs are well below the TTHM and HAA5 MCLs per the Stage 2 D/DBP Rule.

SJWD provides treated water to several consecutive treated water systems. During the study period those systems were noting increasing trends in the DBP levels in the distribution system. SJWD has implemented disinfection optimization practices at the Peterson WTP which have been very effective at managing DBP levels in the treated water.

Figure 5-25. San Juan Water District, Distribution System TTHM LRAAs, January 2011 – December 2012

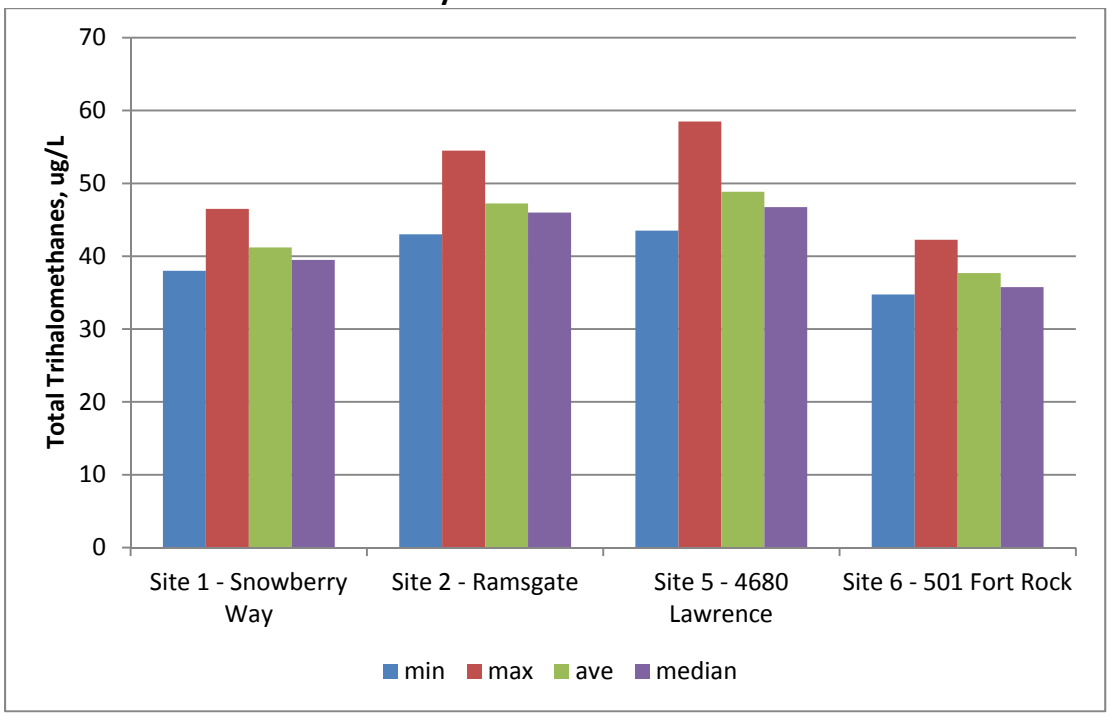
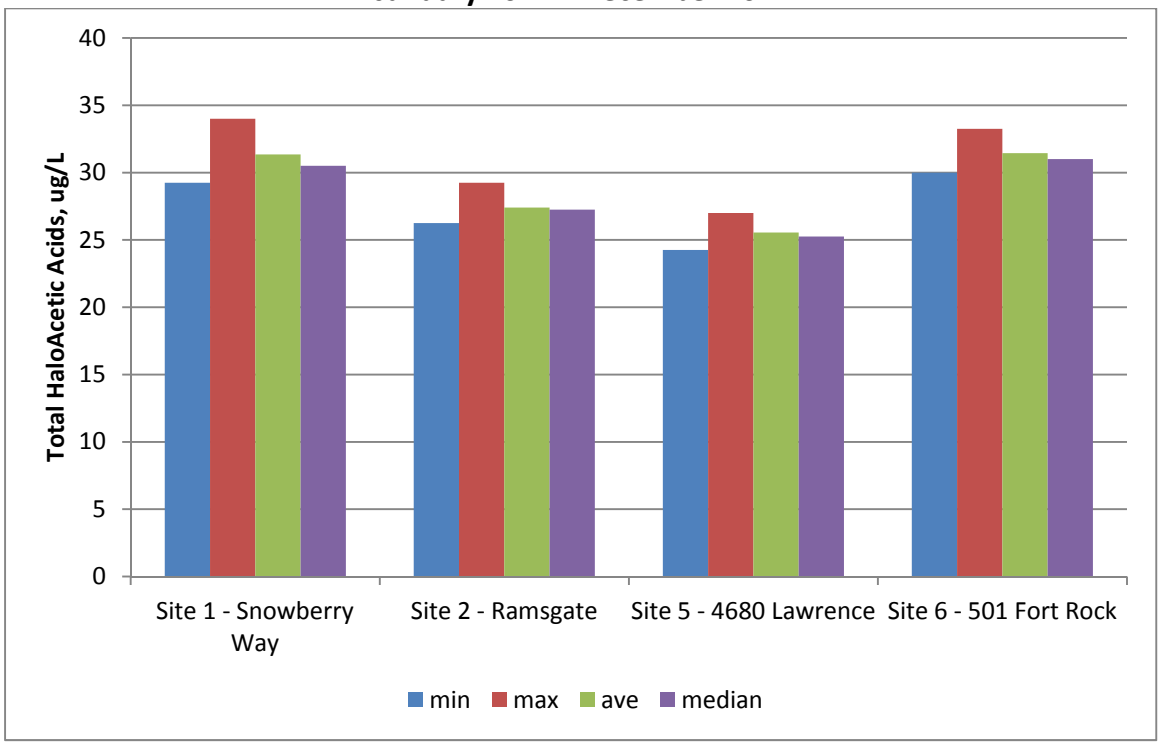


Figure 5-26. San Juan Water District, Distribution System HAA5 LRAAs, January 2011 – December 2012



IDSE Monitoring

From September 2007 to July 2008, SJWD conducted monitoring at eight sites for the IDSE under the Stage 2 D/DBP Rule. Individual TTHM results ranged from 8 to 50 µg/L and HAA5 results ranged from 8 to 27 µg/L. TTHM LRAAs and HAA5 LRAAs were less than 80 µg/L and 60 µg/L, respectively.

Sites 1 Snowberry Way and Site 2 Ramsgate are both Stage 1 and Stage 2 monitoring sites, so they are the only sites with continuous data over the reporting period. Individual TTHM and HAA5 data are shown in **Figures 5-27** and **5-28**.

Figure 5-27. San Juan Water District, Distribution System TTHM for Sites 1 and 2, January 2008 – December 2012

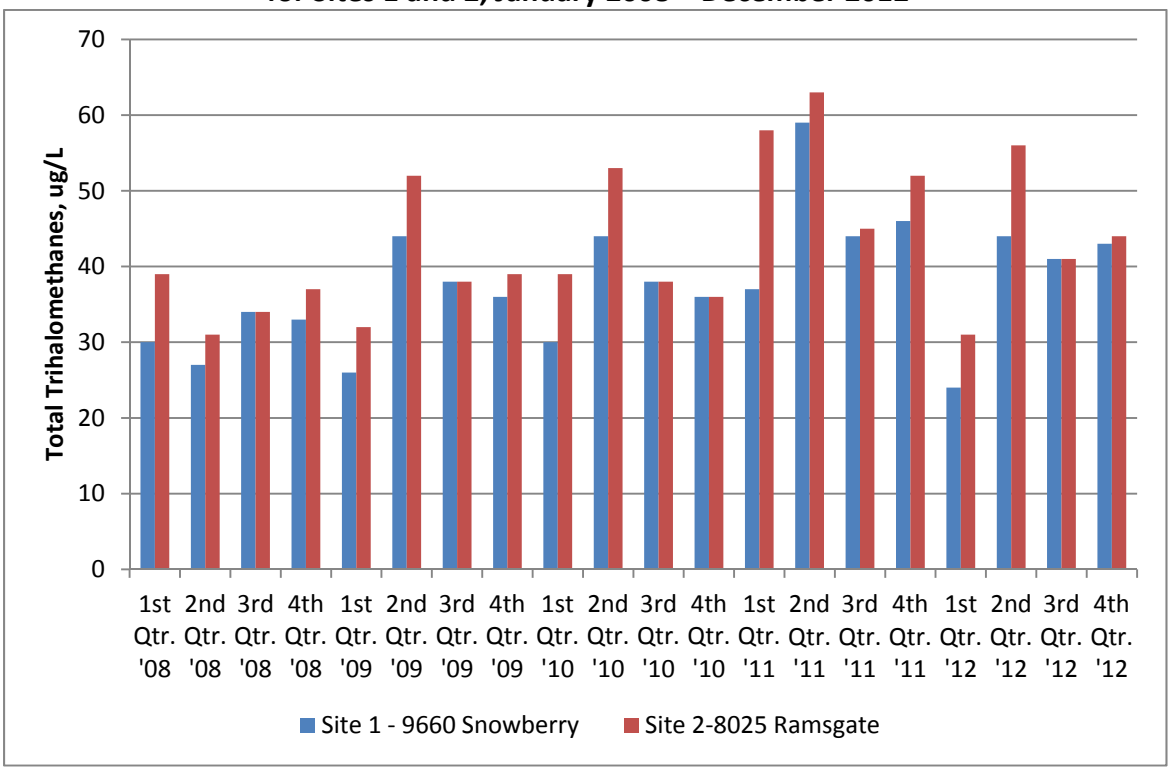
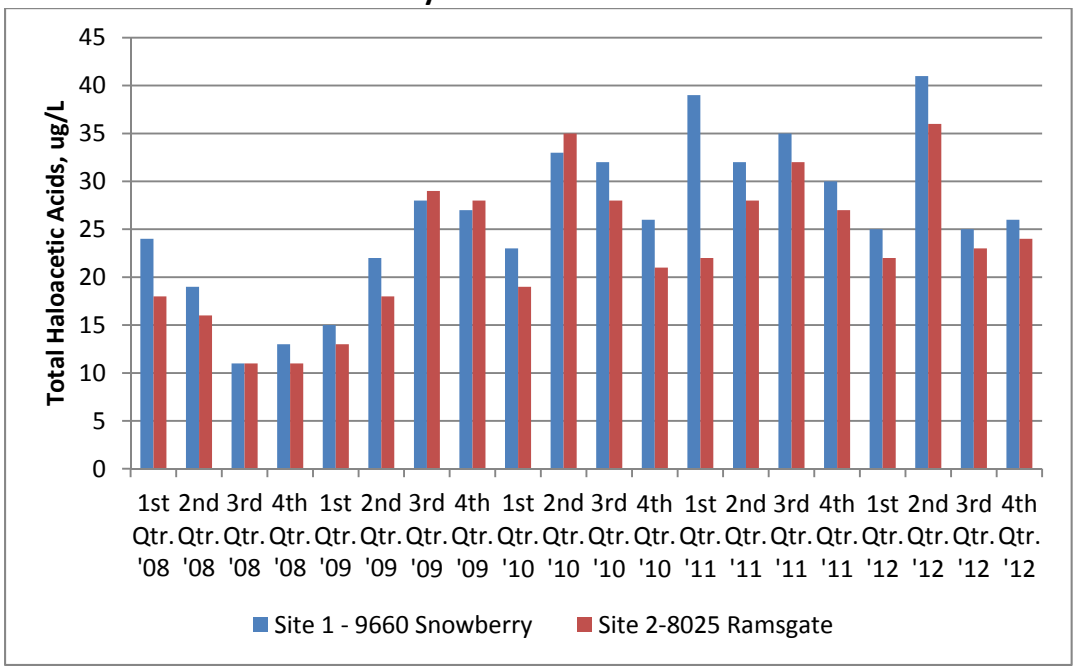


Figure 5-28. San Juan Water District, Distribution System HAA5 for Sites 1 and 2, January 2008 – December 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in either the raw or treated water for the Peterson WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

Please refer to **Section 3** for raw water hexavalent chromium and treated water NDMA sampling results.

***Giardia/*Virus*/Cryptosporidium* Reduction Requirements**

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for Peterson WTP.

The Peterson 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 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 and the IESWTR.

In 2006, SJWD received a letter from DPH indicating that the Peterson WTP was classified as Bin 1 for the LT2ESTWR.

Regulatory Compliance Evaluation

SJWD has been monitoring the raw and treated water for the Peterson WTP for all required Title 22 compliance constituents. **Table 5-7** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Peterson WTP. The Peterson WTP is currently in compliance with existing regulations.

Table 5-7
Regulatory Compliance Evaluation
San Juan Water District – Peterson WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw or treated water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC < 2.0 mg/L in raw and treated water. Therefore, enhanced coagulation not required. TTHM/HAA5 RAAs comply with drinking water standards (<80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Current TTHM/HAA5 LRAAs for Stage 2 data are below the MCLs (<80/60 µg/L, respectively).

CITY OF ROSEVILLE

System Description

Roseville Water Treatment Plant

The raw water intake location for the Roseville WTP is the shared diversion facilities at Folsom Dam. Water is provided to the water utilities through the TCD which is a louvered column that allows for water to be diverted from various depths in the lake to preserve the coldwater pool.

Roseville WTP is a conventional water treatment plant. The plant design flow is 100 mgd, with average winter flows of 16 mgd and average summer flows of 36 mgd.

The influent water is pre-chlorinated, and alum and nonionic polymer are the primary coagulant and coagulant aid, respectively. Chemicals are mixed hydraulically using the headloss at the inlet control valve. The treatment plant has two trains. The original train achieves flocculation and sedimentation in three upflow clarifiers. The newer train has two parallel sub-trains, with long, rectangular 4-stage flocculation and sedimentation basins. A non-ionic polymer is used as filter aid upstream of the filters. The clarified water is then filtered through twelve dual media gravity filters.

The filters can be backwashed based on time or turbidity, but normally based on time. The plant has filter-to-waste capability after backwash or plant start-up. Backwash water and filter-to-waste flow to reclamation basins, where the decant is returned ahead of chemical injection. The filtered water is then disinfected with sodium hypochlorite, sodium hypofluosilic acid is added for fluoride, and pH is adjusted using either calcium oxide or sodium hydroxide. The Roseville WTP has 28 mg of covered storage, 12 mg of storage at the Roseville WTP and 16 mg of storage in the distribution system.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Roseville WTP diversion is located at the Folsom Dam. Recreational use is heavy in the upper watershed as well as within Folsom Lake. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential. Also of interest are urban runoff from the Auburn, Placerville and El Dorado Hills communities and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

Water Quality Summary

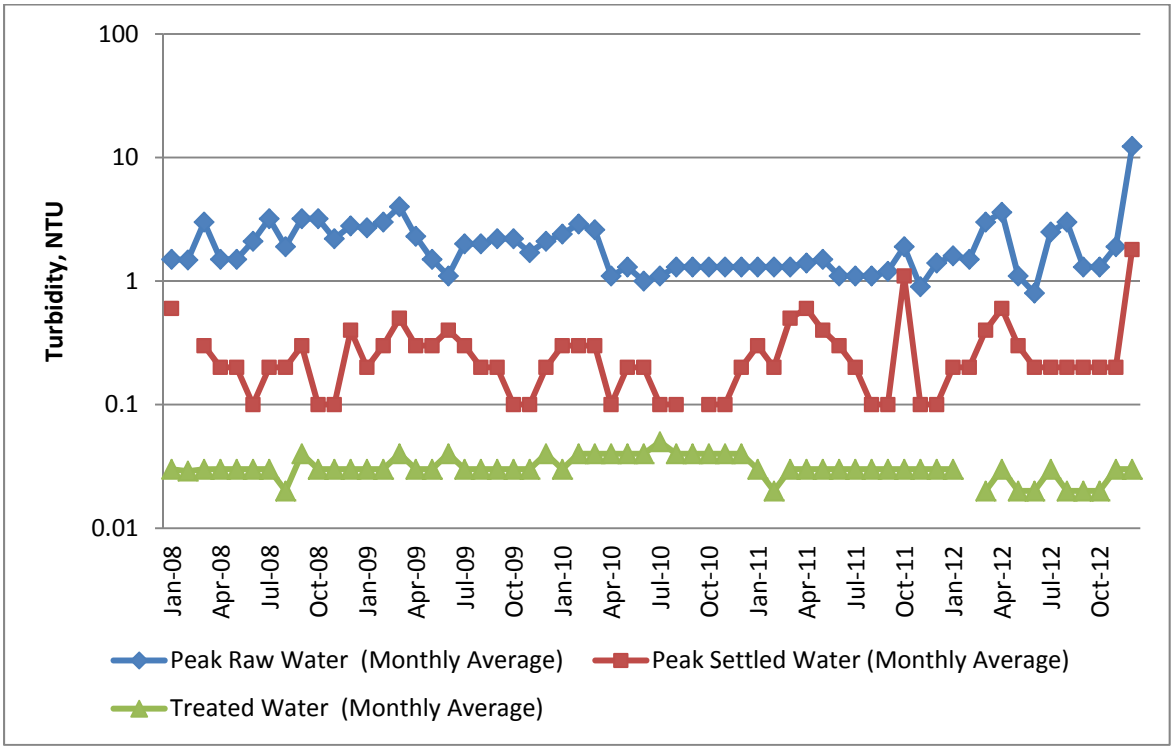
Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average of peak daily raw water turbidity at Roseville WTP (West Train) for the period of study was 2.0 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average solids removal of 98.5 percent. **Figure 5-29** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are a

monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Roseville WTP meets all current treated water turbidity standards.

Figure 5-29. City of Roseville – Raw, Settled, and Treated Water Turbidity, 2008 – 2012



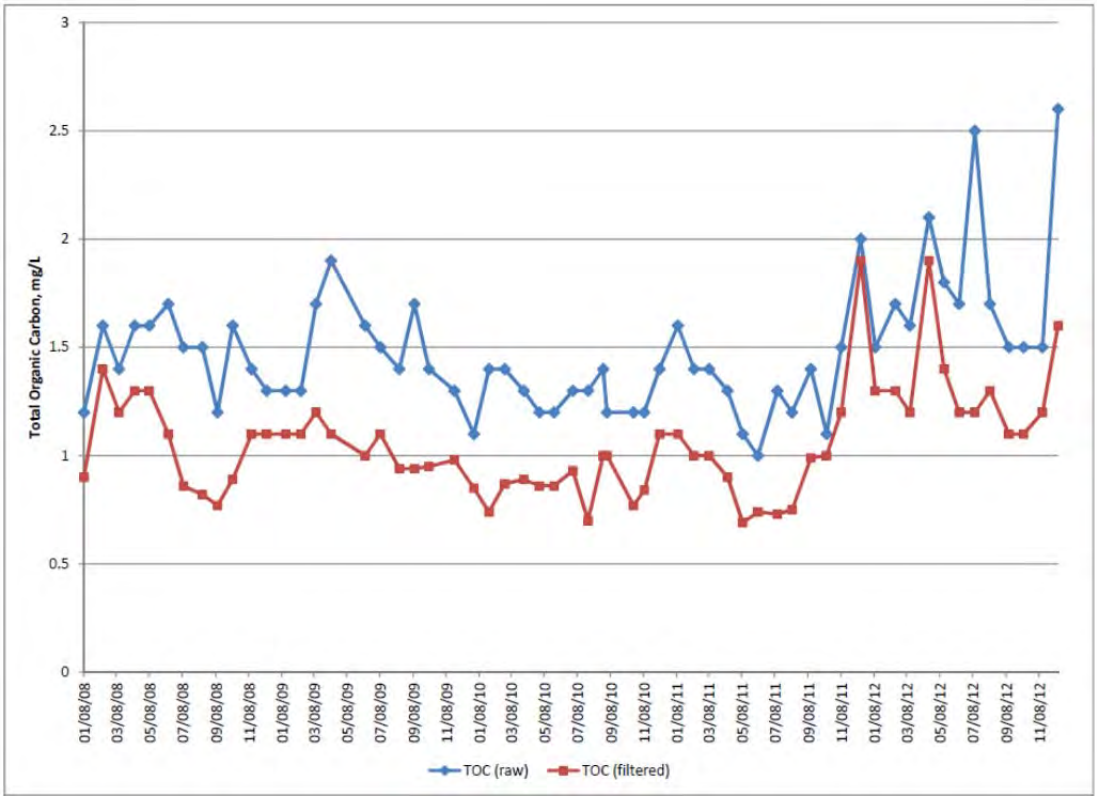
Microbiological Constituent Review

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

Disinfection By-Products and Precursors

The City of Roseville 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 Roseville WTP were 1.5 mg/L and 1.1 mg/L, respectively, equating to 27 percent average removal. **Figure 5-30** shows a time series plot of raw and treated water TOC at Roseville WTP. Ninety-five percent of the time, TOC levels in the raw water are below 2.0 mg/L, and the highest raw TOC level was 2.6 mg/L in December 2012. As the source water running annual averages for years 2008 through 2012 were less than 2.0 mg/L, no TOC removal was required.

Figure 5-30. City of Roseville, Raw and Treated TOC, 2008 – 2012



Stage 1 Compliance

Over the reporting period, the City of Roseville sampled five sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2010. The City of Roseville converted to the eight Stage 2 D/DBP monitoring sites in January 2011. The TTHM RAA for January 2009 to December 2010 ranged from 32.4 to 42.8 µg/L, with an average of 37.8 µg/L. The HAA5 RAA ranged from 19.6 to 31.7 µg/L, with an average of 25.8 µg/L. Over this reporting period, RAAs are well below the MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, the City of Roseville converted to the eight Stage 2 D/DBP monitoring sites in January 2011. Out of the eight sites, two sites are existing Stage 1 sites, and six sites are new. As shown in **Figure 5-31**, TTHM LRAAs from January 2011 to December 2012 ranged from 35 to 73 µg/L, with site 6 (118 Wills Road) having the highest LRAA. As shown in **Figure 5-32**, HAA5 LRAAs ranged from 18 to 34 µg/L, with site 8 (6817 Maple Creek) having the highest LRAA. Over the reporting period, LRAAs are well below the MCLs per the Stage 2 D/DBP Rule, except for the Wills Road site and the Pleasant Grove WWTP site, as they both exceed 80 percent of the TTHM MCL of 80 µg/L. The Wills Road site is a dead-end location and experiences elevated DBP levels.

Figure 5-31. City of Roseville, Distribution System TTHM LRAAs, 2008 – 2012

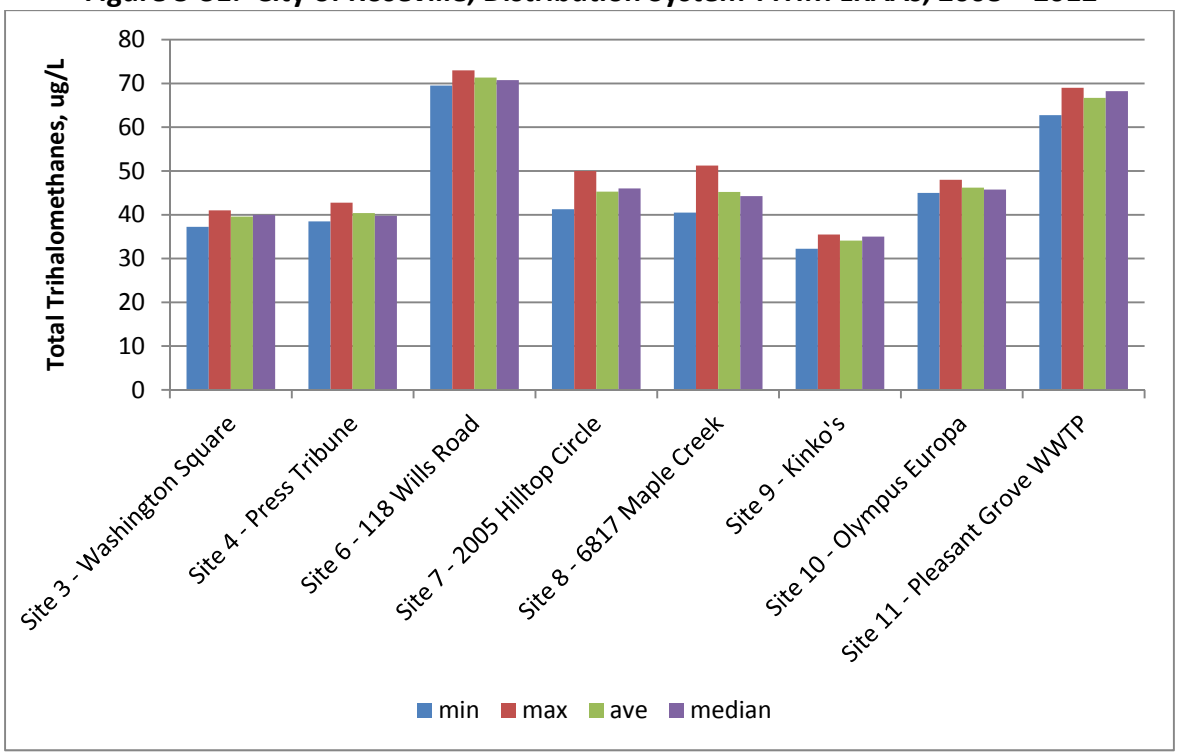
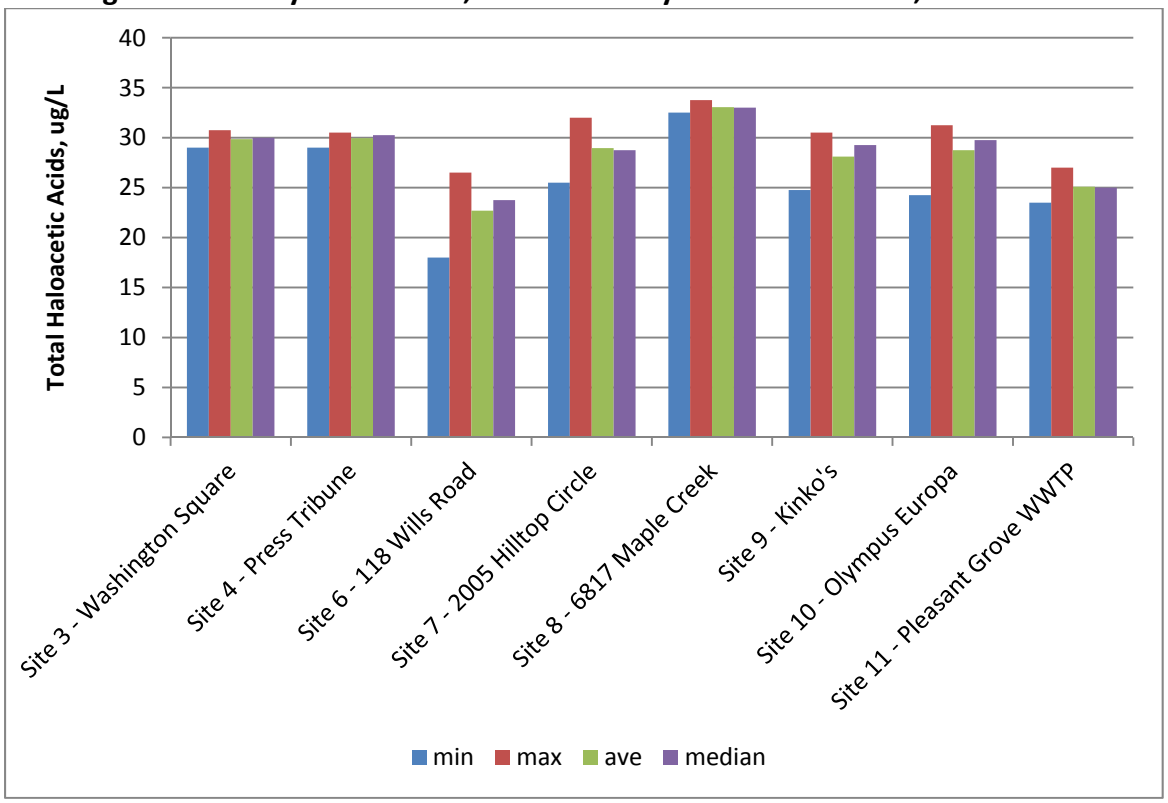


Figure 5-32. City of Roseville, Distribution System HAA5 LRAAs, 2008 – 2012



IDSE Monitoring

From October 2007 to August 2008, the City of Roseville conducted monitoring at sixteen sites for the IDSE under the Stage 2 D/DBP Rule. Individual TTHM results ranged from 0 to 86 µg/L and HAA5 results ranged from 0 to 35 µg/L. TTHM LRAAs and HAA5 LRAAs were less than 80 µg/L and 60 µg/L, respectively.

Site 3 Washington Square and Site 4 Press Tribune are both Stage 1 and Stage 2 monitoring sites, so they are the only sites with continuous data over the reporting period. Individual TTHM and HAA5 are shown in **Figures 5-33** and **5-34**.

Figure 5-33. City of Roseville, Distribution System TTHM for Sites 3 and 4, January 2008 – December 2012

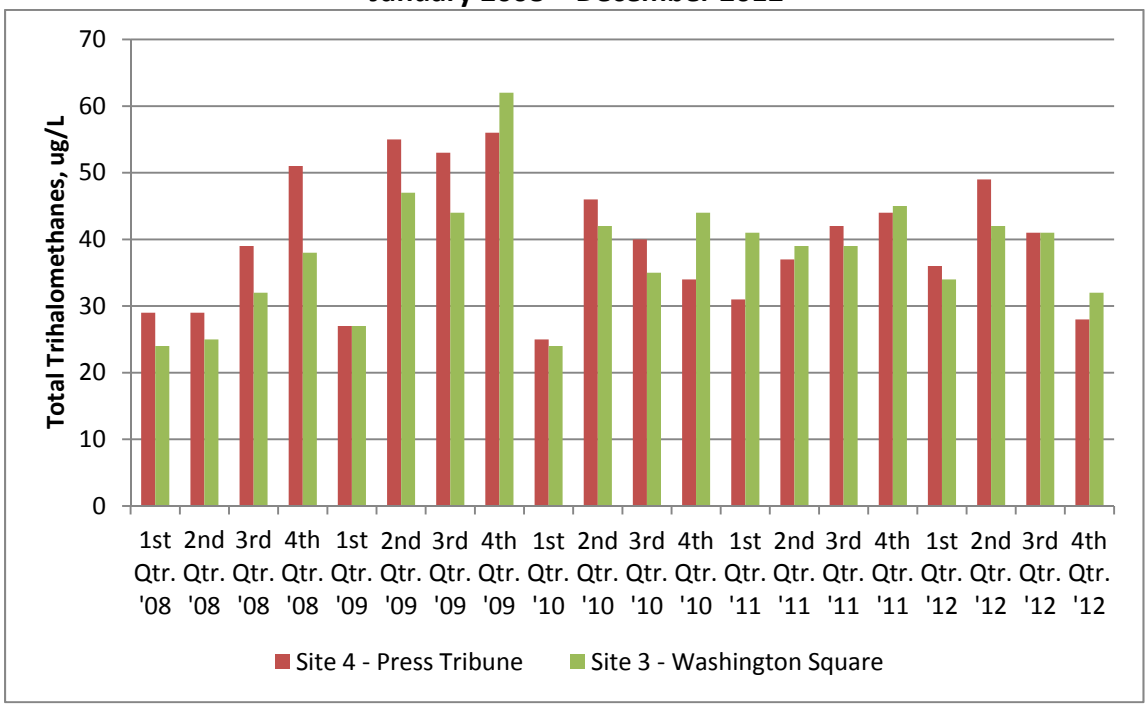
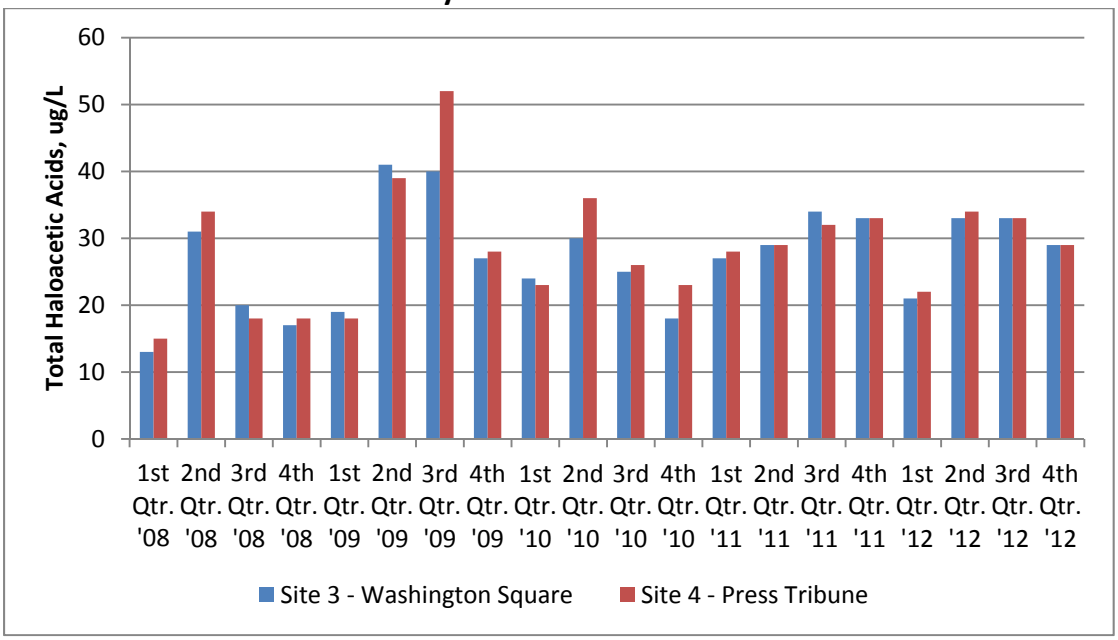


Figure 5-34. City of Roseville, Distribution System HAA5 for Sites 3 and 4, January 2008 – December 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Roseville WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

As reported in the 2008 and 2010 CCRs, barium was detected at 0.014 mg/L and 0.11 mg/L, respectively. However, this is well below the primary MCL of 1 mg/L.

***Giardia/*Virus*/Cryptosporidium* Reduction Requirements**

Based on the total coliform data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for Roseville WTP.

The Roseville 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 and the IESWTR.

The City of Roseville received notification from DPH indicating that the Roseville WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

The City of Roseville has been monitoring the raw and treated water for the Roseville WTP for all required Title 22 compliance constituents. **Table 5-8** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Roseville WTP. The Roseville WTP is currently in compliance with existing regulations.

Table 5-8
Regulatory Compliance Evaluation
City of Roseville – Roseville WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC < 2.0 mg/L in raw and treated water. Therefore, enhanced coagulation not required. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Current TTHM/HAA5 LRAAs for Stage 2 data are well below the MCLs (< 80/60 µg/L, respectively), except for the Wills Road and Pleasant Grove WWTP sites. For these two sites, LRAAs were equal to or greater than 80 percent of the TTHM MCL.

GOLDEN STATE WATER COMPANY (GSWC)

GSWC operates two independent water treatment plants, Coloma and Pyrites water treatment plants, which treat American River water. They are both located on the same property and supplied with the same water, but they have independent water treatment processes. The Pyrites WTP was added to the water supply permit on June 1, 2005. However, the plant was not put on-line until March 2006.

Coloma Water Treatment Plant

System Description

The raw water for the Coloma WTP is diverted off the Folsom South Canal, approximately one to two miles downstream of the Nimbus Dam. The Coloma WTP is classified by DPH as an alternative treatment technology water treatment plant, due to the size of the sedimentation basins. The plant design flow is 15.7 mgd (including Pyrites), with average flows of 5.3 mgd in the winter and 11.5 mgd in the summer. Once the water is diverted from the Folsom South Canal, it is treated with potassium permanganate to help prevent algal growth along the pipeline to the water treatment plant and for taste and odor problems.

There are two parallel flocculation and sedimentation basins. Basin 1 is the original facility. Polymers are added to the water and are mixed with a static mixer. There is a flocculation/sedimentation basin that has a vertical paddle flocculator with a rectangular sedimentation basin. Basin 2 includes hydraulic mixing, two stage flocculation with vertical paddles, and a rectangular sedimentation basin.

Cationic polymer is added as a filter aid upstream of the filters. The clarified water passes through ten dual media pressure filters. The filter loading rate ranges from two to three gpm/sf.

The filters are backwashed based on either turbidity or headloss. The plant has filter-to-waste capability after backwash. Backwash water and filter-to-waste water is sent to an upflow clarifier, where the effluent is sent to the headworks upstream of chemical feed. The filtered water is disinfected with chlorine and passes through three clearwells to meet CT requirements.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Coloma WTP diversion is located at Lake Natoma, just upstream of Nimbus Dam. Recreational use is heavy in the upper watershed, Folsom Lake, and Lake Natoma. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential from the upper watershed. Also of interest are urban runoff and local drainage, potential discharges from the Aerojet facility, geese waste management at Lake Natoma, and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

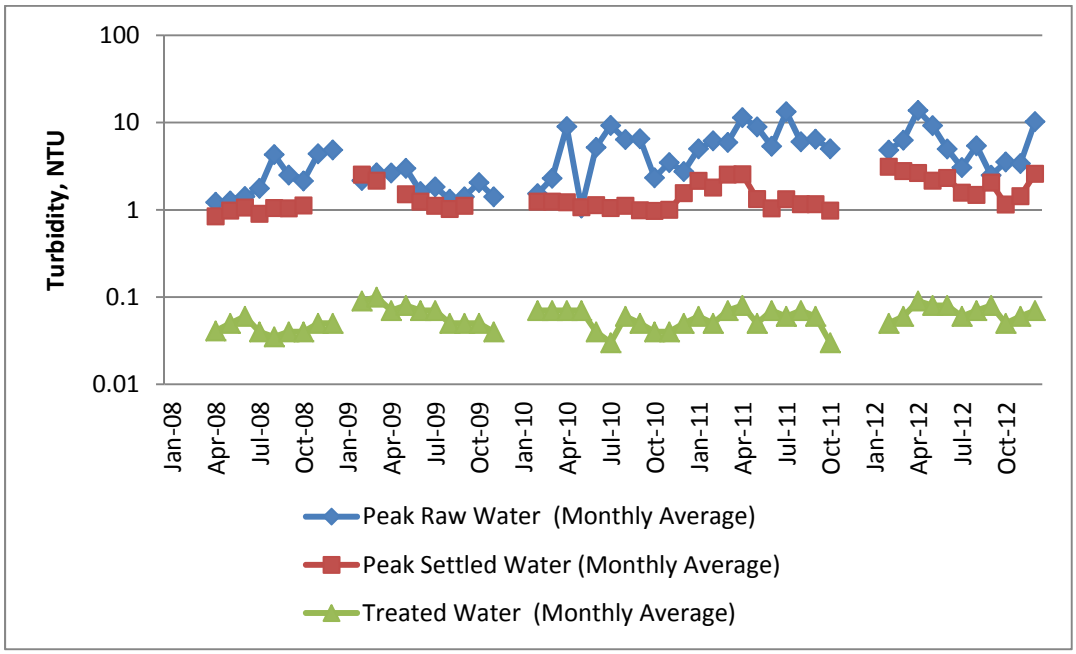
Water Quality Summary

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 of peak daily raw water turbidity at Coloma WTP for the period of study was 4.6 NTU, and on average the treatment process decreased this to 0.06 NTU, which equates to an average solids removal of 98.7 percent. **Figure 5-35** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Coloma WTP meets all current treated water turbidity standards.

Figure 5-35. Coloma WTP – Raw, Settled, and Treated Water Turbidities, 2008 – 2012



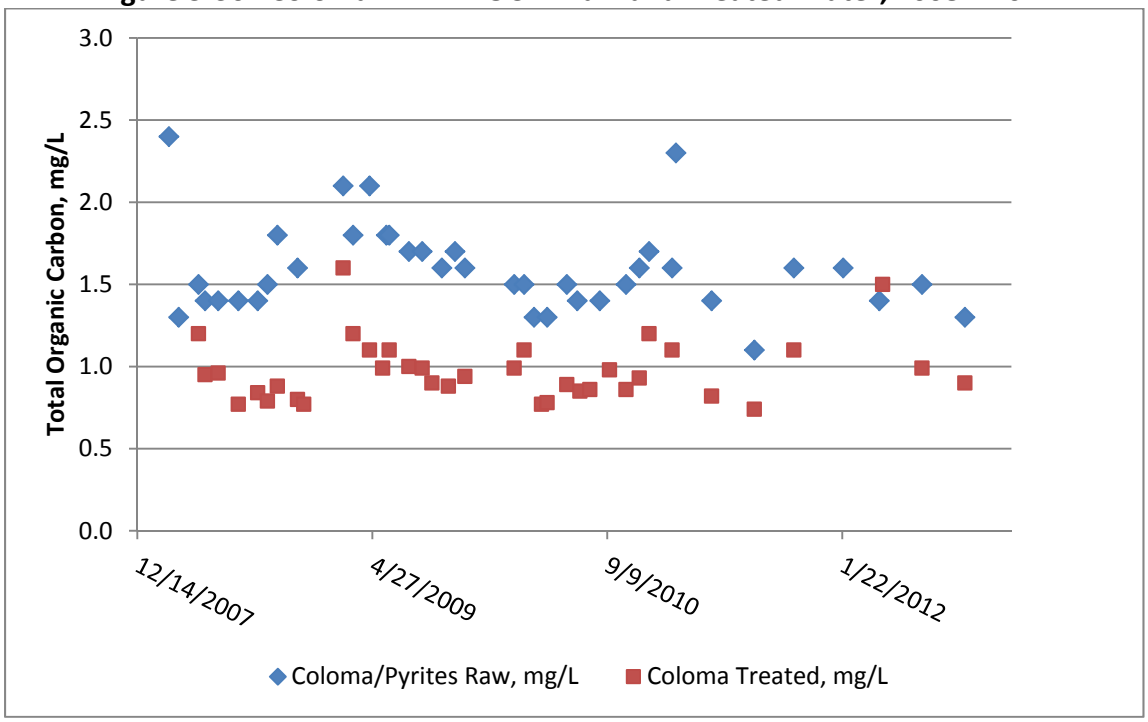
Microbiological Constituent Review

The Cordova system had maximum monthly results of 1.59 percent and 9.0 percent total coliform positive samples in 2008 and 2009, respectively. The 9.0 percent total coliform positive occurred during the month of November 2009. On November 3, 2009 six out of 12 samples collected were total coliform positive. Follow-up sampling was conducted on November 5, 2009 and all 18 follow-up samples were absent for coliforms. No definitive cause was identified. This resulted in an MCL violation of the Total Coliform Rule. There were no subsequent detections.

Disinfection By-Products and Precursors

GSWC monitors alkalinity and TOC levels in its raw water and TOC levels in its treated water on a monthly or quarterly basis. As the Coloma WTP is an alternative technology plant, it is not required to achieve any TOC removal. The average raw and treated water TOC levels at Coloma WTP were 1.6 mg/L and 1.0 mg/L, respectively, equating to 38 percent average removal. **Figure 5-36** shows a time series plot of raw and treated water TOC at the Coloma WTP. Ninety-one percent of the time, TOC levels in the raw water were less than 2.0 mg/L; and the highest raw TOC level was 2.4 mg/L in February 2008.

Figure 5-36. Coloma WTP – TOC in Raw and Treated Water, 2008 – 2012



Stage 1 Compliance

Over the reporting period, GSWC sampled eight sites in the Rancho Cordova distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2012. GSWC will convert to Stage 2 D/DBP monitoring sites in October 2013. TTHM and HAA5 levels are quite low, as the distribution system is combined with groundwater. The TTHM RAA ranged from 5.9 to 12.9 µg/L, with an average of 9.3 µg/L. The HAA5 RAA ranged from 4.8 to 9.9 µg/L, with an average of 7.1 µg/L. Over the study period, RAAs were well below the TTHM and HAA5 MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, GSWC will convert to four Stage 2 D/DBP monitoring sites in October 2013 including; sites 1, 3, 6 and 7. As the site locations were undetermined at the time of conduct of the evaluation, an evaluation of Stage 2 compliance was not completed. GSWC was not required to complete an IDSE as they received a 40/30 certification for the Stage 2 D/DBP Rule from the DPH.

Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw water for the Coloma WTP attributable to the American River water supply during the reporting period.

Detectable Title 22 Constituents and Unregulated

There were very low levels of aluminum, arsenic, and barium detected in the Cordova water system. However, all averages were ND. Please refer to **Section 3** for treated water NDMA sampling results.

Giardia/Virus/Cryptosporidium Reduction Requirements

As discussed in **Section 3**, the DPH water supply permit for GSWC requires an additional log reduction for *Giardia* and viruses if either the monthly median for *E. coli* is greater than 200 MPN/100mL or the monthly median for total coliform is greater than 1,000 MPN/100mL. Monthly medians for both total coliform and *E. coli* were evaluated.

Although *E. coli* data evaluated in **Section 3** support 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium*, 24 out of the 58 monthly medians for total coliform were above 1,000 MPN/100mL, which requires the plant to operate at 4/5-log reduction for *Giardia*/virus. GWSC elects to operate at 4/5-log reduction for *Giardia*/virus year-round.

The Coloma WTP is classified as an alternative technology plant, 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 the remaining reduction credit required for 4/5-log reduction for *Giardia*/virus which is 2.0-log credit for *Giardia* and 4.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and the IESWTR.

The Coloma WTP was classified by DPH as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

GSWC has been monitoring the raw and treated water for the Coloma WTP for all required Title 22 compliance constituents. **Table 5-9** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Coloma WTP. The Coloma WTP is currently in compliance with existing regulations.

Table 5-9
Regulatory Compliance Evaluation
Golden State Water Company – Coloma WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
SWTR	Microbial and Turbidity	Based on *E. coli* data, 3/4—log reduction requirement for *Giardia*/viruses is supported. Based on total coliform data, 4/5-log reduction for *Giardia*/viruses is required. All operations, monitoring and reporting requirements are met, and all treated water turbidity standards are met.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as a direct filtration plant. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to be in compliance with Stage 2 until October 2013. Evaluation of TTHM/HAA5 LRAA for Stage 1 indicates likely compliance with Stage 2 MCL.

Pyrites Water Treatment Plant

System Description

The raw water for the Pyrites WTP is the same intake as for the Coloma WTP. The Pyrites WTP is an alternative treatment technology water treatment plant, consisting of two US Filter Actifloc package plants operating in parallel. Each package plant employs a four stage microsand ballasted clarification pretreatment process followed by rapid sand gravity filtration. The plant design flow is 3,500 gpm, with average flows ranging from 1,750 to 3,500 gpm.

Once the water is diverted from the Folsom South Canal, it is treated with potassium permanganate to help prevent algal growth along the pipeline to the WTP and for taste and odor problems.

The Actifloc system uses a four stage microsand ballasted clarification pretreatment process followed by rapid sand gravity filtration. During stage 1, raw water with cationic polymer as the primary coagulant is slowly mixed to destabilize suspended solids and colloidal matter. Stage 2 is the injection tank, where a polymer and microsand are added and slowly mixed to initiate floc formation. Stage 3 is the maturation tank where gentle mixing allows bridging between the microsand and destabilized suspended solids. During stage 4, the ballasted floc enters the settling tank where the floc settles and the clarified water flows upward through tube settlers.

The clarified water then flows to a tri-media rapid sand pressure filter. The maximum filtration rate is five gpm/sf. The filter is backwashed based on either turbidity (greater than 0.20 NTU), headloss (greater than 7 feet), or time (48 hours). The plant has filter-to-waste capability after backwash. Backwash water and filter-to-waste water is sent to an upflow clarifier, where the effluent is sent to the headworks upstream of chemical feed. The filtered water is disinfected with chlorine and passes through three clearwells to meet CT requirements.

Highlight of Changes Since 2008 Update

There have been no major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Pyrites WTP diversion is located at Lake Natoma, just upstream of Nimbus Dam. Recreational use is heavy in the upper watershed, Folsom Lake and Lake Natoma. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential from the upper watershed. Also of interest are urban runoff and local drainage, potentially discharge from the Aerojet facility, geese waste management at Lake Natoma, and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

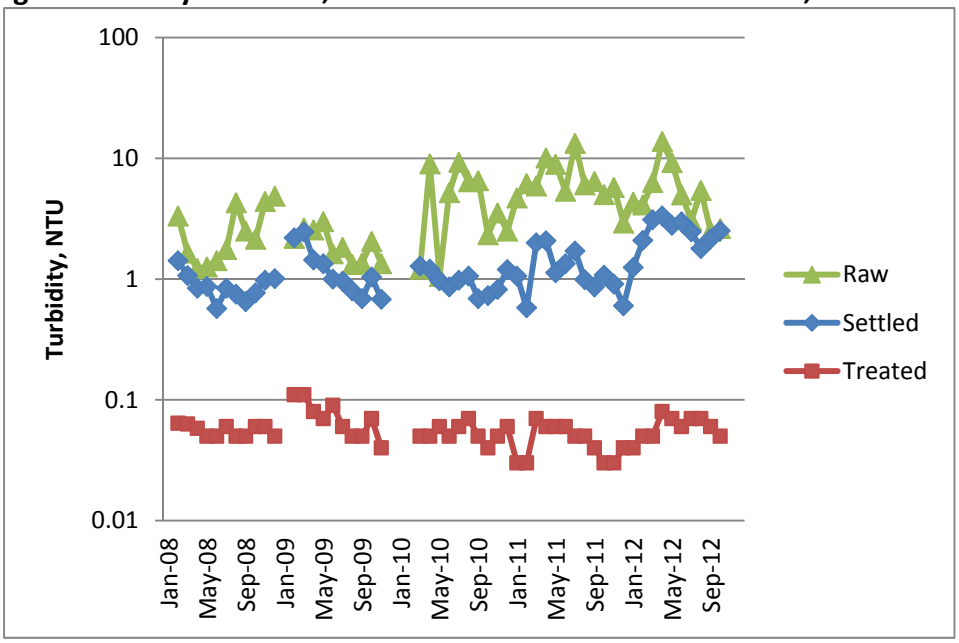
Water Quality Summary

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 of peak daily raw water turbidity at Pyrites WTP for the period of study was 4.4 NTU, and on average the treatment process decreased this to 0.06 NTU, which equates to an average solids removal of 98.6 percent. **Figure 5-37** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Pyrites WTP meets all current treated water turbidity standards.

Figure 5-37. Pyrites WTP, Raw and Treated Water Turbidities, 2008 - 2012



Microbiological Constituent Review

Please see discussion for Coloma WTP above.

Disinfection By-Products and Precursors

GSWC monitors for alkalinity and TOC levels in its raw water and TOC levels in its treated water on a monthly basis. As Pyrites WTP is a direct filtration plant, it is not required to achieve any TOC removal. The average raw and treated water TOC levels at Pyrites WTP were 1.6 mg/L and 1.1 mg/L, respectively, equating to 31 percent average removal. The raw water sampling point

is the same for both Coloma and Pyrites WTPs. As discussed for the Coloma WTP, TOC levels in the raw water are below 2.0 mg/L ninety-one percent of the time.

Please see TTHM and HAA5 discussion for Coloma WTP above.

Volatile and Synthetic Organic Compounds

Please see discussion for Coloma WTP above.

Giardia/Virus/Cryptosporidium Reduction Requirements

As discussed in **Section 3**, the DPH water supply permit for GSWC requires an additional log reduction for *Giardia* and viruses if either the monthly median for *E. coli* is greater than 200 MPN/100mL or the monthly median for total coliform is greater than 1,000 MPN/100mL. Monthly medians for both total coliform and *E. coli* were evaluated.

Although *E. coli* data evaluated in **Section 3** support 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium*, 24 out of the 58 monthly medians for total coliform were above 1,000 MPN/100mL, which requires the plant to operate at 4/5-log reduction for *Giardia*/virus. GWSC elects to operate at 4/5-log reduction for *Giardia*/virus year-round.

The Pyrites WTP is classified as an alternative treatment technology, 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 the remaining reduction credit required for 4/5-log reduction for *Giardia*/virus which is 2.0-log credit for *Giardia* and 4.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and the IESWTR.

Please see LT2ESWTR discussion for Coloma WTP above.

Regulatory Compliance Evaluation

GSWC has been monitoring the raw and treated water for the Pyrites WTP for all required Title 22 compliance constituents. **Table 5-10** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Pyrites WTP. The Pyrites WTP is currently in compliance with existing regulations.

Table 5-10
Regulatory Compliance Evaluation
Golden State Water Company – Pyrites WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw water.
SWTR	Microbial and Turbidity	Based on *E. coli* data, 3/4—log reduction requirement for *Giardia*/viruses is supported. Based on total coliform data, 4/5-log reduction for *Giardia*/viruses is required. All operations, monitoring and reporting requirements are met, and all treated water turbidity standards are met.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as a direct filtration plant. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to be in compliance with Stage 2 until October 2013. Evaluation of TTHM/HAA5 LRAA for Stage 1 indicates likely compliance with Stage 2 MCL.

CARMICHAEL WATER DISTRICT (CWD)

System Description

Bajamont Water Treatment Plant

The Bajamont WTP diverts water from the Lower American River near River Mile 17.5 through three Ranney Collectors. The Bajamont WTP is composed of microfiltration membrane units with a design capacity of 22 mgd, with average winter flows of 4.8 mgd and average summer flows of 12.0 mgd.

The membrane units are backwashed regularly based on time or pressure gradient. The backwash water is filtered prior to recycling to the headworks. After filtration, the water is chlorinated with sodium hypochlorite and the pH is adjusted with caustic prior to distribution. The CWD has 6 mg of covered storage.

Highlight of Changes Since 2008 Update

The Bajamont WTP expansion was completed in April 2008. There have been no other major changes to the plant over the reporting period.

Significant Potential Contaminating Activities

The Bajamont WTP diversion is located near Rossmoor Bar on the Lower American River. Recreational use is heavy in the upper watershed, at Lake Natoma, and along the Lower American River. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential from the upper watershed. Also of interest are urban runoff and local drainage, industrial discharges (both process and stormwater) from the Aerojet facility, and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

Water Quality Summary

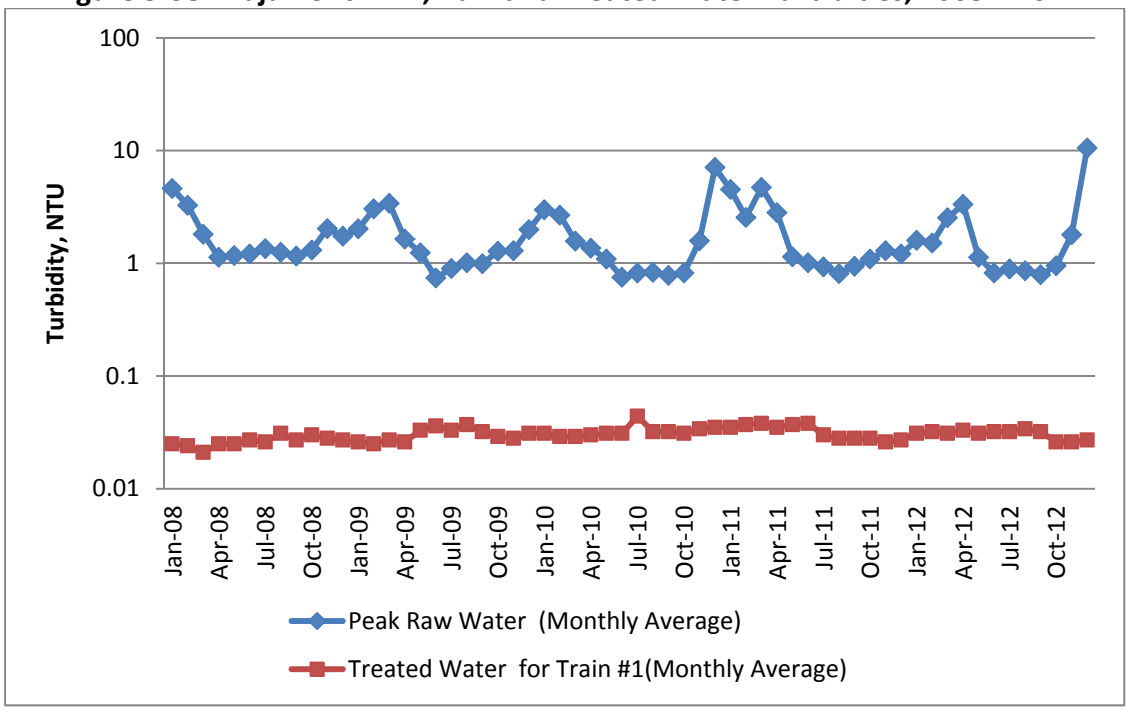
Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

The average of peak daily raw water turbidity at Bajamont WTP for the period of study was 1.9 NTU, and on average the treatment process decreased this to 0.03 NTU, which equates to an average solids removal of 98.3 percent. **Figure 5-38** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily

average, based on all 4-hr samples in a 24 hour period. Bajamont WTP meets all current treated water turbidity standards.

Figure 5-38. Bajamont WTP, Raw and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

In both 2009 and 2010, there was one month where 0.2 percent of monthly total coliform samples were positive. However, this was not in violation of the Total Coliform Rule since it was less than five percent and no fecal coliform were detected.

Disinfection By-Products and Precursors

As the Bajamont WTP employs microfiltration, it is not required to achieve any TOC removal or monitor for TOC. A limited number of TOC samples collected over the reporting period indicate that the plant influent and effluent concentrations for TOC are similar, indicating little TOC removal.

<u>Stage 1 Compliance</u>

Over the reporting period, CWD sampled four sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to December 2012. CWD converted to Stage 2 D/DBP monitoring sites in January 2013. During the study period, the TTHM RAA ranged from 7.3 to 14.6 µg/L, with an average of 10.5 µg/L. The HAA5 RAA

ranged from 4.9 to 9.7 µg/L, with an average of 7.3 µg/L. Over the study period, RAAs are well below the TTHM and HAA5 MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, CWD converted to the Stage 2 D/DBP monitoring sites in January 2013. Since this data is outside of the study period, and there are no Stage 1 sites which are also Stage 2 sites, no evaluation was completed. However, CWD has indicated that the LRAAs for the current Stage 2 sites are well below the MCLs per the Stage 2 D/DBP Rule.

IDSE Monitoring

CWD completed a Standard Monitoring Plan for the IDSE in 2004, and later received a 40/30 certification for the IDSE requirement for the Stage 2 D/DBP Rule from the DPH.

Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw or treated water for Bajamont WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

In 2010 and 2011, there were detectable levels of nitrate (as NO_3), measured at 1.1 and 1.2 mg/L. This is well below the primary MCL of 45 mg/L. Please refer to **Section 3** for treated water NDMA sampling results.

***Giardia/*Virus*/Cryptosporidium* Reduction Requirements**

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Bajamont WTP.

The Bajamont WTP is classified as an alternative treatment technology, and currently receives reduction credit for 4-log *Giardia,* 0-log viruses, and 4-log *Cryptosporidium* for physical removal. Disinfection with sodium hypochlorite provides 4.0-log credit for viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR and the IESWTR.

In September 2007, CWD received a letter from DPH indicating that the Bajamont WTP was classified as Bin 1.

Regulatory Compliance Evaluation

CWD has been monitoring the raw and treated water for the Bajamont WTP for all required Title 22 compliance constituents. **Table 5-11** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Bajamont WTP. The Bajamont WTP is currently in compliance with existing regulations.

Table 5-11
Regulatory Compliance Evaluation
Carmichael Water District – Bajamont WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw or treated water.
SWTR	Microbial and Turbidity	Coliform 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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Not required to achieve TOC removal as alternative technology. TTHM/HAA5 RAAs comply with drinking water standards (<80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Current TTHM/HAA5 LRAAs for Stage 2 data are below the Stage 2 D/DBP Rule MCLs (< 80/60 µg/L, respectively).

CITY OF SACRAMENTO

System Description

E.A. Fairbairn Water Treatment Plant

The raw water intake location for the Fairbairn WTP is located on the Lower American River near Howe Avenue. Fairbairn WTP is a conventional water treatment plant, and the plant design flow is 160 mgd, with average winter flows of 44 mgd and average summer flows of 66 mgd.

The influent water is pre-chlorinated, alum is used as the primary coagulant, and sodium hydroxide is used for pH adjustment if necessary. Chemicals are mixed by pumped injection. The original plant was expanded in 2005, which increased the plant capacity from 80 mgd to

160 mgd. The original plant has two 3-stage flocculation basins with horizontal mechanical flocculators. Floc aid polymer is normally added during flocculation. There are two sedimentation basins with a surface loading rate of 0.99 gpm/sf. After settling, a polymer can then be added as a filter aid. The clarified water then passes through eight tri-media gravity filters. The filtration rate is 5.7 gpm/sf at 100 mgd with seven filters in operation.

The plant expansion essentially duplicated the existing plant, except there are two 4-stage flocculation basins, two sedimentation basins with a surface loading rate of 0.97 gpm/sf, and eight dual-media gravity filters, operated at a filtration rate of 5.1 gpm/sf at 100 mgd with seven filters in operation.

The filters are backwashed based on time, headloss, or turbidity. Backwash water is sent to an equalization basin and lagoons. After settling, the decant water is recycled back to the headworks, upstream of chemical feed.

The plant has filter-to-waste capability after backwash. The filtered water is then disinfected with chlorine, hydrofluosilicic acid is added for fluoridation, and calcium oxide is added for pH adjustment. The City of Sacramento has 45 mg of covered storage.

Highlight of Changes Since 2008 Update

Two new intake pumps were added in 2009. The pumps were added to increase plant capacity. Currently, there are plans to mechanically remove solids from the Filter Waste Washwater lagoons. This will improve the quality of the recycle flow through the lagoons and back into the plant, and also prevent solids from carrying over from the recycle stream into the plant.

Significant Potential Contaminating Activities

The Fairbairn WTP diversion is located near Howe Avenue on the Lower American River. Recreational use is heavy in the upper watershed, at Lake Natoma, and along the Lower American River. The potential for forest fires, as well as timber harvesting activities, could increase the impact of erosion potential from the upper watershed. Also of interest are urban runoff and local drainage, industrial discharges (both process and stormwater) from the Aerojet facility, and potential spills associated with wastewater treatment and collection facilities, roads, railroads, and petroleum pipelines.

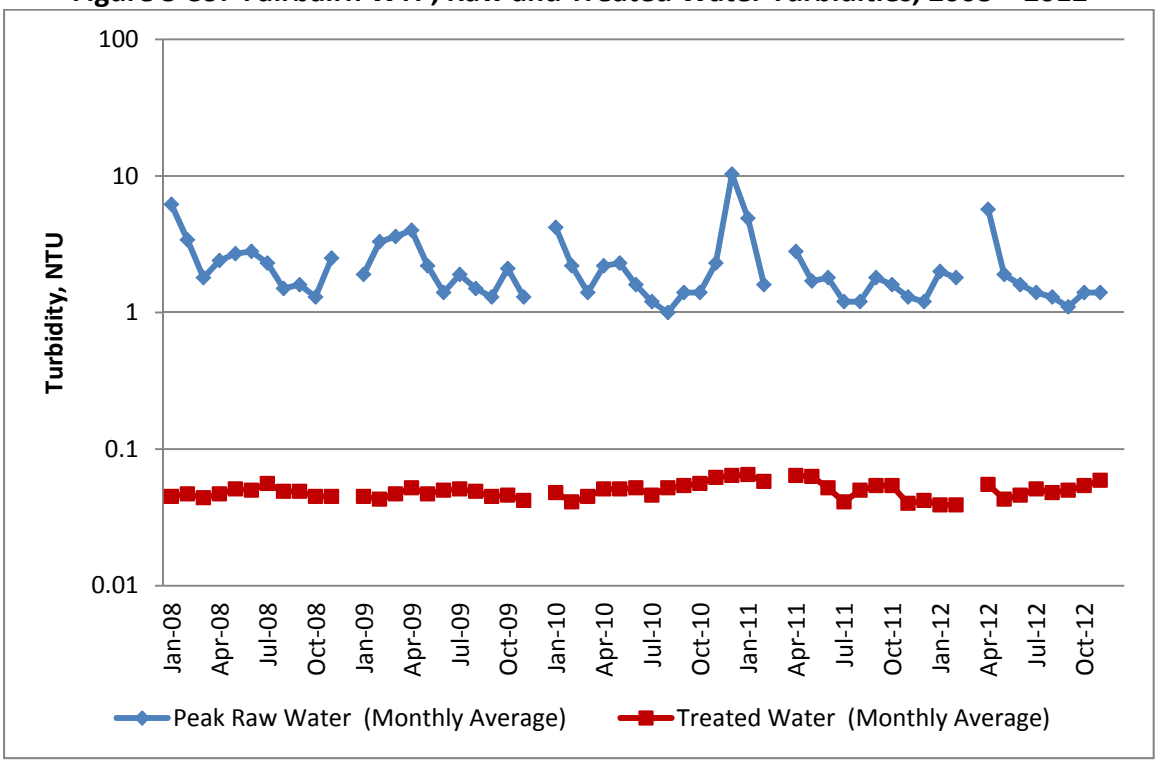
Water Quality Summary

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 of peak daily raw water turbidity at Fairbairn WTP for the period of study was 2.3 NTU, and on average the treatment process decreased this to 0.05 NTU, which equates to an average solids removal of 97.8 percent. **Figure 5-39** shows a time series plot of raw and treated turbidities. It should be noted that the raw water turbidities plotted are a monthly average of peak daily grab samples. The treated water turbidities are a monthly average of a daily average, based on all 4-hr samples in a 24 hour period. Fairbairn WTP meets all current treated water turbidity standards.

Figure 5-39. Fairbairn WTP, Raw and Treated Water Turbidities, 2008 – 2012



Microbiological Constituent Review

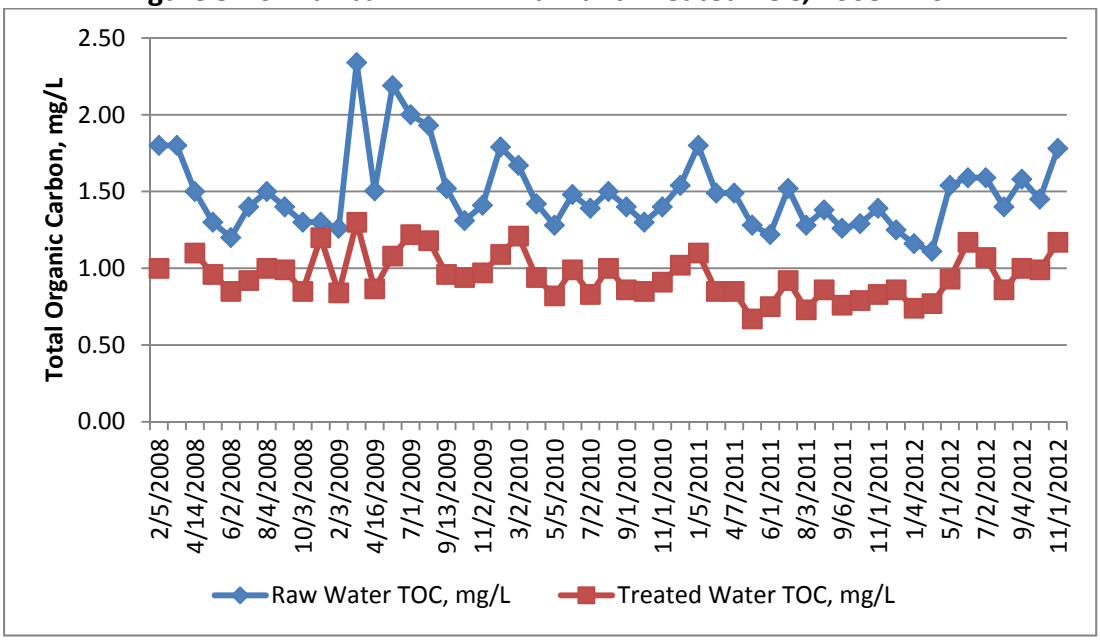
There were some months with positive total coliform samples in the distribution system during the period of study, with monthly percent positive for these months ranging from 0.78 to 1.9. However, these were not violations of the Total Coliform Rule since all months were less than five percent and there were no detections of fecal coliform.

Disinfection By-Products and Precursors

The City of Sacramento monitors for TOC in its raw and treated water monthly in order to determine TOC removal compliance. The average raw and treated water TOC levels at Fairbairn WTP were 1.49 mg/L and 0.95 mg/L, respectively, equating to 57 percent average removal.

Figure 5-40 shows a time series plot of raw and treated water TOC at Fairbairn WTP. Ninety-four percent of the time, TOC levels in the raw water were below 2.0 mg/L; the highest recorded level was 2.34 mg/L in March 2009. As the source water running annual averages for years 2008 through 2012 were less than 2.0 mg/L, no TOC removal was required.

Figure 5-40. Fairbairn WTP – Raw and Treated TOC, 2008 – 2012



Stage 1 Compliance

Over the reporting period, the City of Sacramento sampled 12 sites in the distribution system for TTHM and HAA5 on a quarterly basis for Stage 1 D/DBP monitoring from January 2008 to January 2011. The City of Sacramento converted to the 12 Stage 2 D/DBP monitoring sites in April 2011. It should be noted that only sites associated with treated American River water from the Fairbairn WTP were evaluated in this report. For the Stage 1 D/DBP monitoring sites, the relevant sites are 2S12, 3S6, 3SB, and 5SJ.

The TTHM RAA ranged from 44.8 to 56.2 µg/L, with an average of 48.7 µg/L. The HAA5 RAA ranged from 22.4 to 37.8 µg/L, with an average of 31.2 µg/L. Over the study period, RAAs were well below the MCLs per the Stage 1 D/DBP Rule.

Stage 2 Compliance

As stated above, the City of Sacramento converted to the 12 Stage 2 D/DBP monitoring sites in April 2011. Again, it should be noted that only sites associated with treated American River water from the Fairbairn WTP were evaluated. For the Stage 2 D/DBP monitoring sites, the relevant sites were 3S6, 3SB, and 5SJ.

As shown in **Figure 5-41**, TTHM LRAAs from April 2011 to December 2012 ranged from 43 to 58 µg/L, with site 5SJ having the highest LRAA. As shown in **Figure 5-42**, HAA5 LRAAs ranged from 20 to 29 µg/L, with site 3S6 having the highest LRAA. Over the reporting period, LRAAs are well below the TTHM and HAA5 MCLs per the Stage 2 D/DBP Rule.

IDSE Monitoring

From November 2007 to September 2008, the City of Sacramento conducted monitoring at 24 sites for the IDSE under the Stage 2 D/DBP Rule. However, only four sites pertain to the Fairbairn WTP. Considering these four sites (1307 37th Street, 3SC, 5800 Spillman, and Fairbairn WTP Effluent), individual TTHM results ranged from 30 to 50 µg/L and HAA5 results ranged from 13 to 41 µg/L. All TTHM LRAAs and HAA5 LRAAs were less than the MCLs, 80 µg/L and 60 µg/L, respectively.

Sites 3S6, 3SB, and 5SJ are both Stage 1 and Stage 2 monitoring sites, so continuous data is available for these two sites over the reporting period. Individual TTHM and HAA5 are shown in **Figures 5-43** and **5-44**.

Figure 5-41. City of Sacramento,
Fairbairn WTP Associated Distribution System TTHM LRAAs
April 2011 – December 2012
(Excludes data when primarily groundwater at site 5SJ)

Figure 5-42. City of Sacramento, Fairbairn WTP Associated Distribution System HAA5 LRAAs April 2011 – December 2012 (Excludes data when primarily groundwater at site 5SJ)

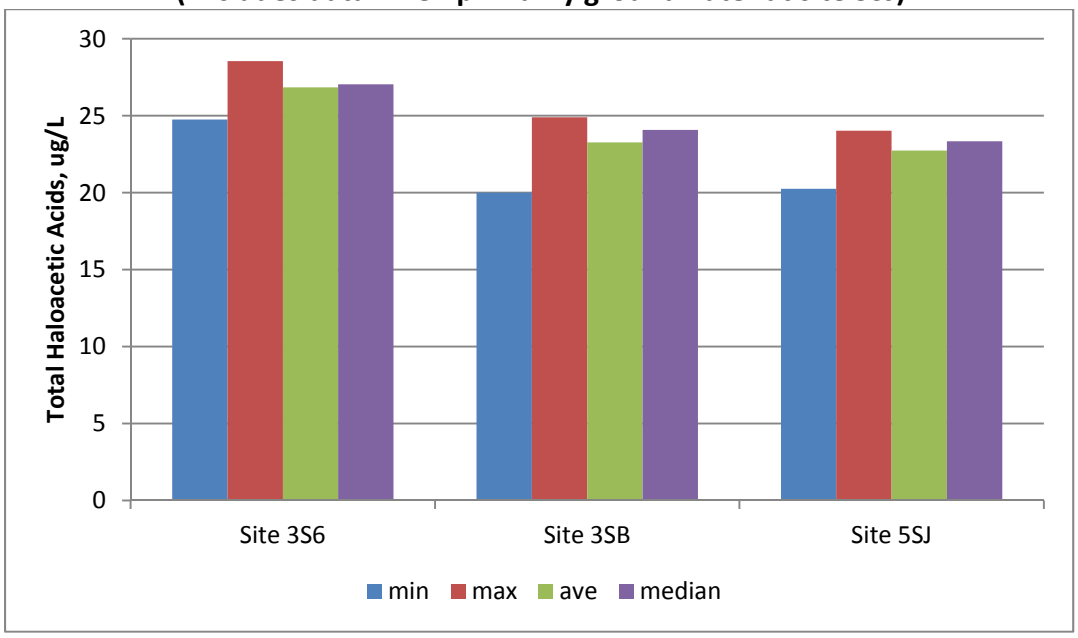


Figure 5-43. City of Sacramento, Distribution System TTHMs for Sites 3S6, 3SB, and 5SJ January 2008 – December 2012

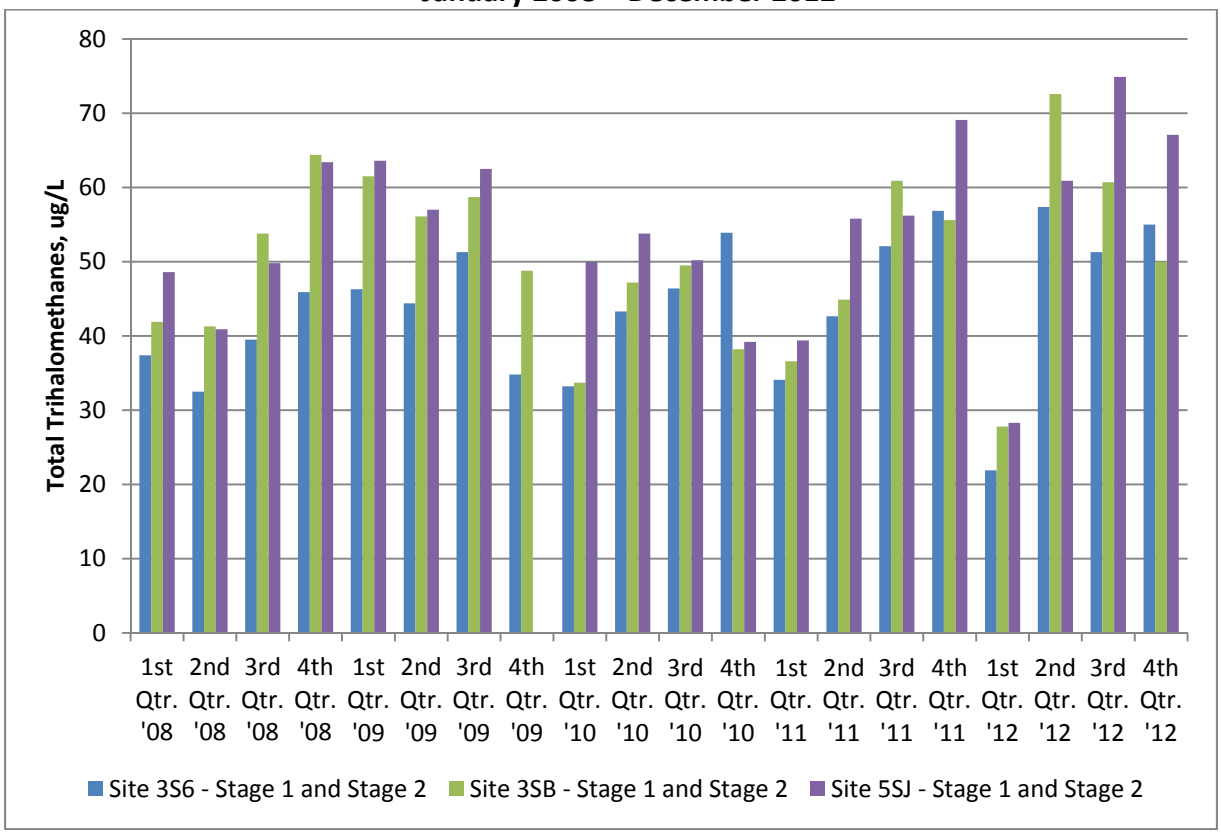
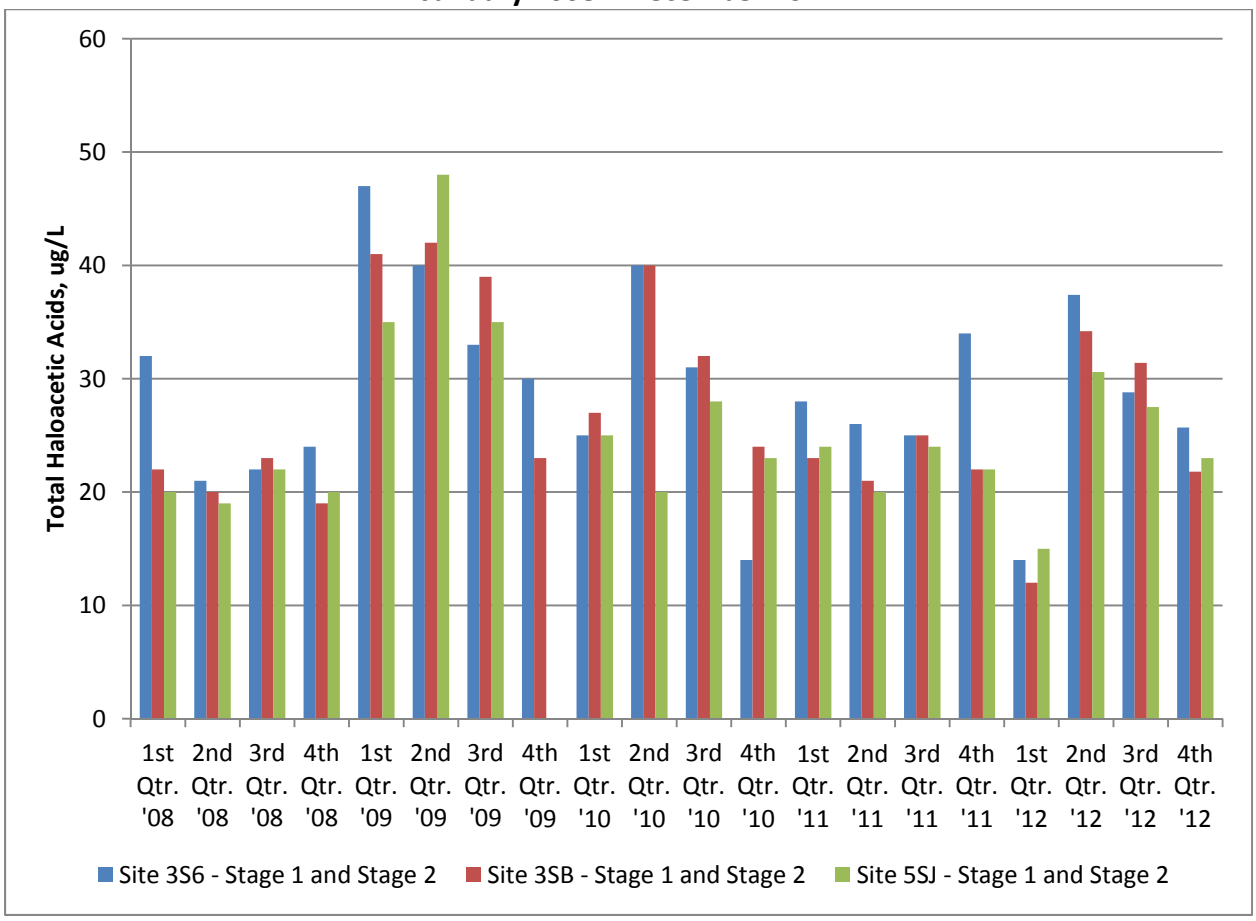


Figure 5-44. City of Sacramento, Distribution System HAA5 for Sites 3S6, 3SB, and 5SJ January 2008 – December 2012



Volatile and Synthetic Organic Compounds

There were no detectable levels of VOCs or SOCs in the raw or treated water for the Fairbairn WTP during the reporting period.

Detectable Title 22 Constituents and Unregulated

Aluminum was detected once at 61 µg/L as reported in the 2009 CCR; however, this is well below the primary MCL of 1,000 µg/L and the secondary MCL of 200 µg/L, and the average was ND. Please refer to **Section 3** for raw water hexavalent chromium and treated water NDMA sampling results.

*Giardia/*Virus*/Cryptosporidium* Reduction Requirements

Based on the *E. coli* data evaluated in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* continue to be appropriate reduction requirements for the Fairbairn WTP.

The Fairbairn 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 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 and the IESWTR. The City of Sacramento received an email from DPH indicating that the Fairbairn WTP was classified as Bin 1 for the LT2ESWTR.

Regulatory Compliance Evaluation

The City of Sacramento has been monitoring the raw and treated water for the Fairbairn WTP for all required Title 22 compliance constituents. **Table 5-12** lists the key existing drinking water regulations and a compliance evaluation for these standards at the Fairbairn WTP. The Fairbairn WTP is currently in compliance with existing regulations.

Table 5-12
Regulatory Compliance Evaluation
City of Sacramento – Fairbairn WTP

	Targeted Compounds	Key Issues and Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded in the raw or treated water.
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.
IESWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	RAA TOC < 2.0 mg/L in raw and treated water. Therefore, enhanced coagulation not required. TTHM/HAA5 RAAs comply with drinking water standards (< 80/60 µg/L, respectively).
LT2ESWTR	Microbial	Classified as Bin 1.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	Current TTHM/HAA5 LRAAs for Stage 2 data are below the MCLs (< 80/60 µg/L, respectively).

This section consists of a discussion of the key findings for this 2013 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 IN THE PAST FIVE YEARS

During the past five years, new information has been generated that was used to evaluate source water quality, treatment capabilities, and potential contaminating activities in the watershed. This new information, which is highlighted below, was obtained and evaluated for this 2013 Update.

- Two of the water treatment plants underwent modifications, including:
  - Placer County Water Agency's (PCWA) Foothill Water Treatment Plant (WTP) received approval from the California Department of Public Health (DPH) to operate Foothill 2 up to 18 mgd, classified as direct filtration above 15 million gallons per day (mgd). Raw water piping to Foothill 2 was upsized from 24-inch diameter to 36-inch diameter. The WTP changed from chlorine gas to sodium hypochlorite feed, to eliminate safety concerns and associated costs, and added pre-caustic feed. Finally, there was an addition of a multi-purpose chemical feed system to allow the chemical feed process to be streamlined and optimized.
  - San Juan Water District's (SJWD) Peterson WTP completed several improvement projects, including raw water pipeline hydraulic improvements, rehabilitation of sedimentation basin walls, replacement of tube settlers and launderer improvements, filter basin caulking replacement, construction of a new filter effluent pipe, conversion to a new primary coagulant (an aluminum sulfate/cationic polymer blend), chlorine-feed system improvements, and generator and supervisory control and data acquisition replacements.

- All of the participating water utilities are in various stages of converting to the requirements under the Stage 2 Disinfectants/Disinfection By-Product (D/DBP) Rule, depending on water system size.

- There has been resurgence in the number of visitors at Auburn and Folsom Lake State Recreation Areas (SRA) and a similar increase in the number of whitewater rafters on the South Fork American River below Chili Bar.

- The Colfax Wastewater Treatment Plant and the Placerville Water Reclamation Facility completed major upgrades and expansions.

KEY FINDINGS

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

American River Water Quality

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

Turbidity

The average of the monthly average raw water turbidity ranged from 1.9 nephelometric turbidity units (NTU) at Carmichael Water District's (CWD) Bajamont WTP to 23.1 NTU at El Dorado Irrigation District's (EID) Reservoir One WTP. EID's Strawberry WTP and Reservoir One WTP and Golden State Water Company's (GSWC) Coloma WTP had slightly higher median turbidity levels during this study period (2008 to 2012) as compared with the previous period (2003 to 2007). The monthly average raw water turbidities for all but one of the water treatment plants (Reservoir One WTP) stayed below 10 NTU, generally between 2 and 5 NTU, except during storm events.

Turbidity levels generally increase during the winter storm season. Coloma WTP and Reservoir One WTP have unique seasonal patterns, likely attributable to their off-stream supply canals.

Microbiological Constituents

The median *Escherichia coli* (*E. coli)* values for the raw water data range from 2 most probable number per 100 milliliters (MPN/100 mL) at the City of Folsom's Folsom WTP and the Strawberry WTP to 23 MPN/100 mL at the Carmichael Water District monitoring site. Median *E. coli* values generally appear to increase from upstream to downstream. Similar to previous results, average *E. coli* values are much higher than the median, indicating the influence of higher bacteria counts associated with peak storm events.

GSWC's Coloma and Pyrites WTPs source water is similarly impacted by storm events, but may also be impacted by waterfowl on Lake Natoma, as *E. coli* increases in late spring and early fall. The City of Sacramento's Fairbairn WTP's source water is also impacted by first flush and winter storm events.

Total coliform was evaluated for GSWC's Coloma and Pyrites WTPs since it is listed as a trigger for additional log reduction for *Giardia*/viruses in their water supply permit from the

Department of Public Health (DPH). Over forty percent of monthly median total coliform values exceeded 1,000 MPN/100 mL and triggered the need to provide 4/5-log reduction for *Giardia* and viruses. GSWC provides 4/5-log reduction on a regular basis.

The fecal coliform and *E. coli* monthly medians are generally below 200 MPN/100mL for all the water treatment plants. Therefore the current level of treatment of 3/4-log reduction for *Giardia* and viruses appears appropriate, based on fecal coliform and *E. coli*, for all of the water treatment plants (except Coloma and Pyrites WTP based on total coliform trigger). The Bajamont WTP had four monthly medians above the trigger value, but these were raw river samples and did not represent the influent water from the Ranney Collectors.

Disinfection By-Product Precursors (Total Organic Carbon)

The water treatment plant intake total organic carbon (TOC) average levels range from 0.97 to 1.9 milligrams per liter (mg/L). Similar to turbidity, TOC levels are relatively stable throughout the watershed. With the exception of the Strawberry WTP, Reservoir One WTP, EID's El Dorado Hills (EHD) WTP, and Folsom State Prison's WTP, all other water treatment plants have source water TOC levels less than 2.0 mg/L, ninety percent of the time or greater. The peak levels of TOC in the source water are associated with storm events.

Volatile and Synthetic Organic Compounds

There were no detects of any volatile organic compound (VOC) or synthetic organic compound (SOC) at any of the water treatment plants. The Sacramento CMP database showed that there were increased detections of VOCs and SOCs in the downstream monitoring site at Discovery Park. Detected organics included; pyrene, fluoranthene, phenanthrene, naphthalene, n-Nitro-di-n-propylamine (NDPA), and bis (2-ethylhexyl) phthalate. NDPA was found at Nimbus Dam slightly above the DPH Notification Level. Bis (2-ethylhexyl) phthalate was detected at Discovery Park slightly above the DPH Maximum Contaminant Level (MCL).

Detectable Title 22 Constituents of Interest

A review of the Consumer Confidence Reports (CCRs) and Public Health Goal (PHG) Reports was conducted for each participating water utility to identify detectable constituents of interest in the source or treated water. This review resulted in no persistently detected constituents of interest based on the information presented. There were four MCL violations: two violations were at the City of Folsom's WTP related to manganese, one violation was in the GSWC Cordova system related to total coliform positive, and one violation was in the EID Strawberry system related to haloacetic acids (HAA5).

Hexavalent Chromium and NDMA Monitoring

Three participating water utilities have conducted raw water monitoring for hexavalent chromium in the American River. All results were either non-detect (ND) or less than 0.2 micrograms per liter (µg/L). These are all below the proposed MCL of 10 µg/L.

Five participating water utilities have conducted treated water monitoring for n-Nitrosodimethylamine (NDMA) during the study period. All results were either ND or less than 8 nanograms per liter (ng/L). These are below the current DPH Notification Level of 10 ng/L.

Temperature Control Device

The Temperature Control Device (TCD) was installed at Folsom Lake and operational in June 2003. An expanded review of the pre- and post-TCD conditions for temperature and treated water disinfection by-product (DBP) levels was conducted.

The pre-TCD peak water temperature typically occurred sometime between August and November and normally lasted one to two months. The post-TCD peak water temperatures now last three to four months, typically from July to October. The overall average temperature has increased 4.9 degrees Fahrenheit (°F), while the average temperature from July through November has increased 5.7°F. These continue the warming trend identified in the previous study period.

A review of the SJWD distribution system DBP data showed that pre-TCD total trihalomethanes (TTHM) had an average running annual average (RAA) of 28 µg/L, which increased to 38.4 µg/L after the TCD began operation, resulting in a 37 percent increase. The pre-TCD HAA5 had an average RAA of 16 µg/L, which increased to 19.3 µg/L, resulting in a 20.6 percent increase. There were no significant changes in source water TOC or distribution system operations, so it is likely that the temperature increase contributed to this rise in DBP levels.

Treatment and Regulatory Compliance

All of the water treatment plants are currently in compliance with all existing drinking water regulations. The participating water utilities implement various types of treatment processes, depending on facility size and source water quality, and meet all current drinking water standards (except as noted below), including MCLs and treatment technology requirements. Below is a summary of the selected treatment and regulatory compliance topics.

Turbidity

All the water treatment plants met the combined filter effluent turbidity standard of less than 0.3 NTU in 95 percent of measurements and never exceeding 1 NTU. Therefore, all conventional and direct filtration plants should be awarded 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced Surface Water Treatment Rule (IESWTR). The

average percent solids removal through the water treatment plants ranged from 97.8 to 99.9 percent, well exceeding the required 80 percent.

Microbiological Constituents

The treated water coliform standards were met in each of the distribution systems, with the exception of GSWC's Cordova system. The GSWC Cordova system had one month, November 2009, where the percent of total coliform positive samples exceeded five percent. No definitive cause was identified. A few other participating water utilities had occasions of total coliform positive results, but none resulted in fecal coliform detects or a sufficient number of detections in a month to cause a violation of the Total Coliform Rule.

Disinfection By-Products

The treated water DBP standards from the Stage 1 D/DBP Rule were met in each of the distribution systems, with the exception of HAA5 in the EID's Strawberry water system. All the other participating water utilities have DBP levels below the primary MCLs of 80 and 60 µg/L for TTHM and HAA5, respectively, based on RAAs. The RAA for TTHM ranged from 5.9 to 70.3 µg/L. The RAA for HAA5 ranged from 4.8 to 64.1 µg/L. The Strawberry water system had two RAAs in 2012 that exceeded the primary HAA5 MCL of 60 µg/L.

At the time of this report preparation, the larger water systems had been required to convert over to the Stage 2 D/DBP Rule requirement for complying with locational running annual averages (LRAA) as the MCLs, while the smaller water systems were still complying with RAAs. All LRAAs for TTHM are below 80 µg/L, ranging from 24 to 76 µg/L, but sites in the EID Main system and City of Roseville system are approaching the MCL. All LRAAs for HAA5 are below 60 µg/L, ranging from 17 to 52.5 µg/L.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the fecal coliform and *E. coli* data presented in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* appears to continue to be appropriate reduction requirements for all of the water treatment plants. Total coliform evaluation for Coloma and Pyrites WTP results in periodic increased log reduction requirements, as discussed previously.

The water treatment plants implement either conventional, direct, alternative, or membrane 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 Surface Water Treatment Rule (SWTR) and either the IESWTR or the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR).

Under the Long Term Stage 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), water treatment plants were classified in bins based on source water characterization. All the water

treatment plants in the American River watershed participating in this study have received a Bin 1 classification from DPH.

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.

Forest Activities

This study identified timber harvesting, wildfires, and off-highway vehicle (OHV) use as activities of significant interest. The United States Department of Agriculture Forest Service (USFS) and the State Water Resources Control Board (State Board) agree that the most important source of pollution in the forests is the timber harvesting road system, and for this reason they are working toward increased management of forest activities.

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 on state and private lands by the California Department of Forestry and Fire Protection (CalFIRE). The trends of conducting timber harvest on state and private lands continues.

A review of the Placer and El Dorado County Agricultural Commissioners' annual crop reports shows that there were nearly 310,000,000 board feet of timber harvested during the study period, a sixty percent decrease from the last study period.

The Regional Board's Waiver of Waste Discharge Requirements Related to Timber Harvest Activities was renewed and continues to require best management practices (BMPs) and protection of surface water bodies. The Waiver must be obtained for all lands in the Central Valley, both public and private, prior to the commencement of activities. The Waiver also contains monitoring and reporting conditions.

Wildfires cause the loss of ground cover, the chemical transformation of soil, and the reduction in soil infiltration rates; these all increase the likelihood of erosion and hydrophobic soils contributing to increased solids in the receiving water, resulting in an increase in the turbidity of the raw water at the water treatment plants. There were four major fires during the study period: the American River Complex Fire, Mammoth Fire, Eldorado National Forest (ENF) Wind Complex Fire, and Robbers Fire. Combined, these fires burned nearly 25,000 acres.

Both the Tahoe and Eldorado National Forests have completed off-highway vehicle (OHV) trail designation programs. The purpose of these programs was to identify all currently used trails, select the most appropriate trails for designation, and then close the remaining trails to OHV use. ENF has completed preparation of a Motor Vehicle Use Map (MVUM) and is implementing

the program. Tahoe National Forest (TNF) is almost complete with their MVUM and is expected to begin implementation in 2014.

El Dorado County, ENF, and the California Department of Parks and Recreation (DPR) have worked together extensively to implement a trail management program for the Rubicon Trail. This has been very effective at improving maintenance of the trail and its facilities, as well as creating a significant public education and outreach program.

Recreation

There is a large amount of recreation that occurs in the American River watershed. Recreation occurs in both the upper and lower watersheds, 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 the watershed. Non-body contact recreation includes camping, boating, fishing, hiking, biking, and winter activities such as snow play, skiing, and snowmobiling.

Whitewater rafting has historically been an intensive use in the upper watershed. User statistics from El Dorado County indicate that annual use of the South Fork American River below Chili Bar Reservoir increased during this study period, an almost 25 percent increase in annual users. Peak daily use in 2012 was nearly 84 percent of the determined carrying capacity of the river.

Auburn SRA provides numerous recreational opportunities in the Foothills. Use statistics from DPR indicates that there has been a significant, 49 percent, increase in the number of day use visitors to the SRA. The Marshall Gold Discovery State Historic Park continued to see a drop in visitorship, nearly 50 percent during the study period. Similar to Auburn SRA, day use at Folsom Lake SRA has increased significantly over the study period, nearly 57 percent, to nearly one and a half million day use visitors per year.

The American River Parkway continues to be a heavily used recreation area in the watershed. The “Keep Our Waters Clean” and “Pups on the Parkway” campaigns have been instrumental in providing public education and outreach materials on sanitation facilities between Folsom Lake and the American River Parkway and the location of pet waste stations in the American River Parkway.

There are numerous potentials for expansion of recreation facilities in the watershed including; Recreation Facility Analysis priorities by the USFS, General Plan/Resource Management Plan for Folsom Lake SRA, and Federal Energy Regulatory Commission (FERC) re-licensing projects. Of specific note is the possible expansion of motorized boating at Folsom Lake, with increased marina wet slips, launching space, and dredging to improve access.

River Corridor Activities

There were three river corridor activities of interest that were addressed in this section: goose management at Lake Natoma, pet waste management, and illegal camping/homelessness along the Lower American River.

Lake Natoma has a large population of resident and migratory geese. Feeding the geese is prohibited, but it has become a popular past-time leading to fecal waste issues along Nimbus Flat. Coliform data from the GSWC's Coloma WTP indicate peak levels occur in the spring and fall, which do not correlate with any other known source of fecal matter. The peaks could be contributed to by the waterfowl population.

Dog walking along the American River Parkway is a popular past-time. Some of the participating water utilities joined with the American River Parkway Foundation and the County of Sacramento Department of Regional Parks, Recreation, and Open Space to support development of the "Pups on the Parkway" program. This program provides 12 pet waste stations with Mutt Mitts®, between Sunrise Avenue and Paradise Beach to encourage owners to clean up after their pets. According to the American River Parkway Foundation approximately 32,000 bags per year are used.

Illegal camping primarily occurs in the lower three miles of the Lower American River. There is a constant, though shifting, population of around 200 to 400 homeless people who live in the floodplain. Community Link is working on a 10 year plan to end chronic homelessness in Sacramento, and they are working toward construction of permanent supportive housing. Statistics over the study period show a 25 percent decrease in the unsheltered homeless population in Sacramento County.

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 and plan measures to protect the water supply.

A review of the California Emergency Management Agency (Cal EMA) spill database revealed 182 incidents throughout the watershed during the study period, with 13 considered potentially significant. The majority of the spills were related to sewage, whether untreated or partially treated. The participating water utilities have developed a voluntary spill notification program through the American River Watershed Technical Committee (ARWTC) to ensure timely notification in the event that a spill threatens the source water quality. This has been effective for receiving timely notification for major spill events.

Cal EMA standard procedures for notification regarding spills that are potentially impacting drinking water supplies continue to include calls to DPH Duty Officers, with subsequent notification to water utilities if drinking water is noted to be impacted on the reporting form. These notifications are not always received by the water utilities in a timely manner.

Urban Runoff

There is little urban runoff in the upper watershed. There are currently four National Pollutant Discharge Elimination System (NPDES) Stormwater Permit Phase II permits, the City of Placerville, the City of Auburn, and Placer County west of Colfax (including Auburn and North Auburn), and Western El Dorado County (including El Dorado Hills). The new Phase II permit has identified a few additional census designated places in Placer and El Dorado counties, as well as converted some industrial permittees to municipal permittees. The existing Phase II permittees have Stormwater Management Plans and implemented the standard six program elements during the study period. The standard six program elements include: Public Education and Outreach on Stormwater Impacts, Public Involvement/Participation, Illicit Discharge Detection and Elimination, Construction Site Stormwater Runoff Control, Post Construction Stormwater Management in New Development and Redevelopment, and Pollution Prevention/Good Housekeeping for Municipal Operations.

Also permitted in the watershed are industrial sites, construction sites, and the California Department of Transportation (Caltrans). Industrial and construction activities are covered under separate general orders which have specific requirements. Caltrans is covered under a statewide general permit, addressing Caltrans' Phase I MS4 and construction requirements.

In the lower watershed there is significant urban runoff, and the Sacramento Stormwater Quality Partnership (SSQP) is the Phase I permitted entity along the Lower American River. They have significant joint activities, including: target pollutant reduction strategies, a water quality monitoring program, special studies, regional public outreach and education, regional development standards, and program effectiveness evaluation. There are numerous BMPs implemented that address drinking water constituents of interest. A review of the urban discharge and creek monitoring data tributary to the Lower American River shows that there were few constituents of interest that had detectable levels. Of most interest are the high levels of fecal coliform and *E. coli*, TOC, and total iron (which was detected at average levels exceeding the secondary MCL).

Wastewater

There are two permitted NPDES wastewater treatment plants in the American River watershed: the City of Colfax Wastewater Treatment Plant (WWTP) and the City of Placerville Water Reclamation Facility (WRF). These are shown on the Watershed Map, **Figure 2-1**. Each of these facilities has an associated collection system, also located within the watershed.

The City of Colfax WWTP discharges to Bunch Canyon, which is tributary to the North Fork American River. During the study period, there were two unpermitted discharges to Bunch Canyon. Neither of these events coincided with water quality data from the participating water utilities. The City of Colfax has completed an upgrade of the WWTP and is working toward lining the storage reservoir, which has historically leaked.

The City of Placerville WRF discharges to Hangtown Creek, which is tributary to the South Fork American River. During the study period, there were no unpermitted discharges to Hangtown Creek. The City of Placerville has also completed an upgrade of the WRF.

The presence of septic systems along the South Fork American River upstream of the Strawberry WTP was identified as a potential concern during the 2003 Update. The data were reviewed and continue to support the possible connection between recreational residences and peak levels of *E. coli* during the summer months. Many of these residences are on USFS property, and the owners are now required to sign a Water Quality Agreement which requires the owner to fix, repair, or replace the on-site waste system if there is any sign of failure.

Wastewater collection systems for various agencies in the watershed had numerous spills of untreated sewage into waterways, including the American River and its tributaries. The majority of the spills were very small and unlikely to significantly impact source water quality.

The participating water utilities have obtained voluntary direct notification agreements with all of the above wastewater agencies and are notified in the event of a significant spill to the American River or its tributaries.

Aerojet Industrial Facility

A review of the Aerojet General Corporation Superfund Site confirms that discharges to the American River continued to be expanded over the study period. The principal constituents of interest have not changed and consist of perchlorate, NDMA, 1,4-dioxane, and VOCs. There are currently eight Groundwater Extraction and Treatment (GET) facilities that treat and discharge up to 33.6 million gallons per day (mgd) to the American River or its tributaries, an increase of 8 mgd during the study period.

The GET facilities are permitted by the Regional Board and effluent limits are generally set below drinking water levels of concern. GET E/F is the largest facility at the site, and it has several treatment processes, including biological reduction for perchlorate removal, ultraviolet light (UV) treatment for NDMA, and air stripping for VOCs. There were several GET E/F discharges that were permit violations, or discharges of interest, during the study period.

The NPDES permit requires Aerojet to notify CWD, the City of Sacramento, the Freeport Regional Water Authority, and GSWC (if impacted) when effluent limits are exceeded in the discharge or receiving water.

RECOMMENDATIONS

Table 6-1 presents the recommendations developed for this 2013 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 utilities is critical. Recommendations may be implemented by the participating water utilities as they have resources available.

TABLE 6-1
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Continue to optimize treatment and distribution processes. Optimization may include: ➢ Monitoring source water quality. ➢ Conducting regular equipment inspection and maintenance. ➢ Optimizing facility controls such as; flow, coagulant type, loading rates, backwash procedures, and disinfection. ➢ Coordinating with distribution system operations and maintenance to preserve treated water quality and minimize degradation.	All Participating Utilities	Optimization is typically driven by treatment challenges posed by source water quality. Peak periods of interest include wet weather, first flush, and peak recreational use periods. It should also be noted that coordination with distribution system operations will increasingly become more important, as distribution system regulations relate back to source water quality and treatment strategies.
Conduct a second round of source water monitoring in accordance with United States Environmental Protection Agency (USEPA) guidance. Utilities will either conduct *Cryptosporidium* (plus *E. coli* and turbidity) or *E. coli* sampling, depending on system size. Those collecting *Cryptosporidium* samples should consider utilizing an analytical method that will provide results for *Giardia* as well to create a comprehensive data set.	All Participating Utilities	The second round of source water monitoring is a specific requirement of the LT2ESWTR. The current sample methods for *Cryptosporidium* include EPA Methods 1622 and 1623. When choosing Method 1623, a utility is also provided with the results for *Giardia* at only a slightly increased cost. This information assists in supporting the appropriate level of treatment that must be provided for the source water.

TABLE 6-1 Continued
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Ensure that monitoring plans are in place which account for regulation-specific monitoring requirements and that samples are collected at consistent periods.	All Participating Utilities	New regulations often have more specific monitoring requirements. The monitoring requirements often vary to account for the various source and system types. Each system should review their current monitoring requirements, ensure that they have a comprehensive monitoring plan in place to ensure that samples are collected from the correct locations and at the correct frequency, and update their plans as needed.
Continue to investigate high DBP levels in the distribution system for the Strawberry WTP.	EID	DBP levels in the Strawberry distribution system are elevated and have exceeded the HAA5 MCL, due to conservation efforts. EID should continue to work with their consultant to identify options for modifying treatment and distribution processes to reduce water age.
Consider revising the location for the source water coliform monitoring at the Bajamont WTP to post-Ranney Collectors.	CWD	CWD currently collects river samples to represent their raw water supply. These grab samples are not representative of the source water that enters the Bajamont WTP. The USEPA Guidance Materials for LT2ESWTR sampling state that when using bank filtration, water quality samples shall be collected after filtration unless receiving treatment credit for the filtration.

TABLE 6-1 Continued
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Consider converting to Standard Method 5310 C (oxidation method) for TOC analysis at the Folsom State Prison WTP.	FSP	During the study period SM 5310 B and SM 5310 C were both employed by Folsom State Prison, and the results with method B were inconsistent. Other Folsom Lake diverters use method C. American River water appears to have more consistency with method C, so it is recommended to utilize this method for all samples.
Continue to maintain voluntary direct notification and inter-notification procedures established by the ARWTC and supplemented on the Lower American River. Periodically check the currency of the contacts and notification agreements and conduct periodic dry-runs to test and improve the procedures.	American River - All Participating Utilities Lower American River – CWD, City of Sacramento, SCWA, EBMUD	Spills into the river do occur, and the water utilities need timely notification to make appropriate spill response decisions. This program has been in operation for nearly 15 years and has proven to be effective and useful to the water utilities. The Lower American River program is supplemental for the utilities downstream of Lake Natoma.
Consider utilizing the Regional Board's Drinking Water Policy Implementation Policy if LT2ESWTR *Cryptosporidium* monitoring results in a Bin 2 classification at a water treatment plant.	All	The Regional Board's Drinking Water Policy sets a narrative water quality objective for *Cryptosporidium* and *Giardia*, which is connected to the bin classification of the public water systems. If a water system is pushed into Bin 2 and is located downstream of Folsom Dam they can appeal to the Regional Board to perform an investigation of potential sources of the microbials and perhaps institute action.

TABLE 6-1 Continued
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Continue to support the Keep Our Waters Clean (KOWC) campaign.	Folsom, SJWD, Roseville, CWD, City of Sacramento, SCWA, and EBMUD (Future consideration for EID, Folsom State Prison and GSWC)	As recreational use of the rivers and reservoirs increases with increasing population, it may become more important to attend to and address sanitary issues related to recreational use. The KOWC campaign addresses this issue through public outreach to promote the use of restrooms and the pumpout at Folsom Lake and the use of restrooms along the Lower American River along with other sanitary practices.
Continue to support the Pups on the Parkway program.	GSWC, CWD, City of Sacramento, SCWA, and EBMUD	Dog waste is a problem in areas of the American River Parkway. This waste may be washed into the river during storms. The project includes signage, installation and maintenance of pet waste bag dispenser stations, and posting of local pet waste ordinances.
Consider communicating with the United States Bureau of Reclamation (USBR)/ California DPR on impacts to drinking water supplies of increasing marina space and dredging activities at Folsom Lake.	City of Folsom, Folsom State Prison, City of Roseville, SJWD, GSWC, CWD, City of Sacramento, SCWA, and EBMUD	The General Plan for Folsom Lake SRA provides planning initiative for a substantial increase in the number of marina slips, as well as dredging at Browns Ravine to increase seasonal access. The water utilities could request notification on any projects that get funded related to these two efforts so that water quality concerns could be identified and mitigated in project development.

TABLE 6-1 Continued
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Consider to communicate with, or continue to communicate with, the USBR and the United States Army Corps of Engineers (USACE) on possible operational revisions at Folsom Dam.	City of Folsom, Folsom State Prison, City of Roseville, SJWD, GSWC, CWD, City of Sacramento, SCWA, and EBMUD	Current and future projects with both the USBR and the USACE will result in revised operational scenarios at Folsom Dam. These revisions may result in impacts to water storage and release from Folsom Lake. These impacts could cause changes in water quality at the lake and downstream.
Continue to track events at the Aerojet site, receive notification for discharges, and act as an active stakeholder with regard to USEPA and Regional Board permitting.	CWD, City of Sacramento, SCWA, EBMUD	The water utilities' participation is important in ensuring their interests in protecting Lower American River water quality are considered. Proposed changes and new information may have the potential to affect the quality of the Lower American River. Considerations include issues such as the ability of the discharges to meet drinking water standards, maintaining currency with any new standards, NPDES permit revisions that affect discharge and monitoring requirements, and cleanup and reuse plans that affect the volume of water discharged.
Continue stakeholder participation in the CABY IRWMP and consider development of source water protection projects to implement. Consider coordinating efforts with the ARWTC.	PCWA and EID	Participation of the upper watershed water utilities is valuable and could be a key factor in the success of the watershed programs in addressing sources of sediment, and also in determining whether or not the projects eventually incorporate source water protection issues. PCWA and EID should consider providing periodic updates to the ARWTC on the findings on drinking water related activities.

TABLE 6-1 Continued
2013 Update Recommendations

Recommendation	Applies To	Basis for Recommendation
Consider coordinating with the SSQP to discuss key drinking water issues, such as organic carbon, pathogens, and metals.	CWD, City of Sacramento, SCWA, and EBMUD	The SSQP manages the urban runoff discharge tributary to the Lower American River. This program conducts significant monitoring and implements many BMPs. It may be worthwhile to discuss some of the key interests that drinking water utilities have related to their management efforts.
Continue coordination with CalFIRE and USFS when wildfires impact drinking water sources.	PCWA and EID	These fires can have significant impacts on source water quality. Coordination on fire-fighting activities will help keep drinking water impacts on the radar screen, and reforestation efforts will assist in minimizing the long-term impacts of habitat loss and its impact on receiving water quality.

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APPENDIX A
BIBLIOGRAPHY AND LIST OF CONTACTS

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APPENDIX B
SUMMARIES OF PARTICIPATING WATER UTILITY DATA

System Summary, PCWA

WATER SYSTEM:		
Utility Name		Placer County Water Agency
Service Area		Placer County
Number Customers - Retail/Wholesale		23,149 Total Active Connections per 2011 Annual Report
PWSID No.		CA3110025
SOURCE:		
Name		North Fork American River
Entitlement and Amount		120,000 Acre Feet per Year
INTAKE:		
Location and Description		Pump Station near Ophir Tunnel in Auburn
Intake Protection Facilities		Fish Screens and Bar Rack
WTP:		
Name		Foothill WTP #1
Type of Treatment		Actiflo Ballasted flocculation
State Approved Plant Capacity (MGD)		40 MGD
Capacity Flow Range (MGD)		5-40 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	10 MGD
	Summer (Apr-Sep)	30 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto Temp
	Treated Water	Turb only for 3 weeks out of year when AR water is in use
UNIT PROCESSES:		
Recycle Water	Flow	<10% Plant Flow
	Frequency	As Needed
Grit Removal	Grit Separator <5/8"	2 @ 30 MGD
	Fine Screening <2mm	2 @ 30 MGD
Pre-Chlorination	Chemical and Dose	Sodium Hypochlorite 12.5%; 0.5 mg/L
pH Adjustment	Chemical and Dose	NaOH; 2.0 mg/L
Chemical Addition	Chemical, Purpose & Dose	Alum or PACL-Flocculation, 6.0/2.0; PAC-Taste & Odor, 2.0
Rapid Mix	Volume Basin	NA
	Type of Mixing	High speed in line turbine
Clarification	No. of Basins	2
	Volume Basin	243,000 gals
	Surface Load Rate	25 gpm/sf
	Method of Sludge Removal	Scraper, sand recirculation
Chemical Addition	Chemical, Purpose & Dose	Polymer-Floc Aid, 0.06 mg/L
Post-Chlorination	Chemical and Dose	Sodium Hypochlorite 12.5%; 1.2 mg/L
Filtration	No. of Filters	9
	Type of Filter	Dual media
	Filter Box Volume	33181 gallons
	Underdrain Type	Leopold/IMS cap
	Media: Type, Depth, Area	Sand, anthracite (6', 38")
	Filtration Rate	10 gpm/sf
	Backwash: Criteria,Rate	LOH, time, turbidity, UFRV; 15 gpm/sf
	Filter -to-Waste Facilities	Yes - Pumped to Headworks
pH Adjustment	Chemical and Dose	NaOH 25%, 2.2 mg/L
Wastewater Handling	Facility	Backwash Ponds
	Sources	Filter Backwash
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Sludge Lagoons
	Sources	Sedimentation Basin Sludge; hydrocyclone waste; overflow of B/W ponds
	Decant Recycle Location	Headworks upstream of chemical feed
WTP:		
Name		Foothill WTP #2
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		15 MGD
Capacity Flow Range (MGD)		0 - 15 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	7 MGD
	Summer (Apr-Sep)	15 MGD
Hours of Operation		0 or 24 hours

System Summary, PCWA

Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto, Temp
	Treated Water	For 100% A. River: 1 wk in Oct, 3 wks in Nov, turb only
UNIT PROCESSES:		
Recycle Water	Flow	<10% Plant Flow
	Frequency	As Needed
Pre-Chlorination	Chemical and Dose	Sodium Hypochlorite 12.5% 0.5 mg/L
pH Adjustment	Chemical and Dose	NaOH 25%; 2.0 mg/L
Chemical Addition	Chemical, Purpose & Dose	Alum or PACL-Flocculation, 6.0/2.0; PAC-Taste & Odor, 2.0
Rapid Mix	Volume Basin	2610 gals
	Type of Mixing	Mechanical
	Mixing Energy (G)	700
Flocculation	No. of Basins	2
	Volume Basin	155,600 gals
	Type of Flocculators	Horizontal Shaft
	Mixing Energy	70/50/30
Sedimentation	No. of Basins	2
	Volume Basin	628,000 gals
	Surface Load Rate	2000 gpd/lf
	Method of Sludge Removal	Chain and Flight
Chemical Addition	Chemical, Purpose & Dose	Polymer-Floc Aid, 0.08 mg/L
Post-Chlorination	Chemical and Dose	Sodium Hypochlorite 12.5%; 1.2 mg/L
Filtration	No. of Filters	4
	Type of Filter	Dual media
	Filter Box Volume	35,400 gals
	Underdrain Type	Leopold under graded gravel
	Media: Type, Depth, Area	Gravel, sand, anthracite (12"/12"/24")
	Filtration Rate	5 gpm/sf
	Backwash: Criteria,Rate	LOH, time, turbidity, UFRV; 15 gpm/sf
	Filter -to-Waste Facilities	yes
pH Adjustment	Chemical and Dose	NaOH 25%; 2.2 mg/L
Wastewater Handling	Facility	Backwash Ponds
	Sources	Filter Backwash
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Sludge Lagoons
	Sources	Sedimentation Basin Sludge, Overflow of B/W ponds
	Decant Recycle Location	Headworks upstream of chemical feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	31 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Mike Burgess Redding DPH
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

Monthly Report for Source Water Coliform Monitoring
For Systems Using Surface Water

System Name: **American River** System No.: 3110025

Month: December Calendar Year: 2008

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels
Jan-08	1	23	0
Feb-08	1	130	23
Mar-08	1	17	0
Apr-08	1	17	4
May-08	1	2	2
Jun-08	1	30	30
Jul-08	1	80	23
Aug-08	1	23	2
Sep-08	1	27	4
Oct-08	1	70	50
Nov-08	1	500	50
Dec-08	1	8	0
Running Annual Average (RAA):		77	16

Denotes <2
Denotes >1600

Comments:

Signature: Brad Wilkins Date: 1/6/2009

Monthly Report for Source Water Coliform Monitoring
For Systems Using Surface Water

System Name: **Placer CWA - American River** System No.: 3110025-010

Month: December Calendar Year: 2009

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels
Jan-09	1	80	0
Feb-09	1	30	2
Mar-09	1	110	8
Apr-09	1	4	0
May-09	1	220	6
Jun-09	1	23	0
Jul-09	1	130	13
Aug-09	1	300	110
Sep-09	1	23	4
Oct-09	1	75	14
Nov-09	1	70	30
Dec-09	1	27	2
Running Annual Average (RAA):		91	16

Denotes <2
Denotes >1600

Comments:

Signature: Brad Wilkins Date: 1/6/2010

Monthly Report for Source Water Coliform Monitoring
For Systems Using Surface Water

System Name: **Placer CWA - American River** System No.: 3110025-010

Month: December Calendar Year: 2010

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels
Jan-10	1	4	0
Feb-10	1	13	0
Mar-10	1	170	11
Apr-10	1	27	2
May-10	1	80	22
Jun-10	1	23	8
Jul-10	1	22	8
Aug-10	1	80	4
Sep-10	1	500	13
Oct-10	1	130	50
Nov-10	1	220	23
Dec-10	1	170	50
Running Annual Average (RAA):		120	16

Denotes <2
Denotes >1600

Comments:

Signature: Brad Wilkins Date: 1/6/2011

Monthly Report for Source Water Coliform Monitoring
For Systems Using Surface Water

System Name: **Placer CWA - American River** System No.: 3110025-010

Month: December Calendar Year: 2011

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels
Jan-11	1	4	2
Feb-11	1	22	4
Mar-11	1	4	0
Apr-11	1	8	0
May-11	1	23	13
Jun-11	1	17	2
Jul-11	1	60	4
Aug-11	1	70	4
Sep-11	1	130	7
Oct-11	1	50	23
Nov-11	1	140	2
Dec-11	1	1600	4
Running Annual Average (RAA):		177	5

Denotes <2
Denotes >1600

Comments:

Signature: Brad Wilkins Date: 1/5/2012

Monthly Report for Source Water Coliform Monitoring
For Systems Using Surface Water

System Name: **Placer CWA - American River** System No.: 3110025-010

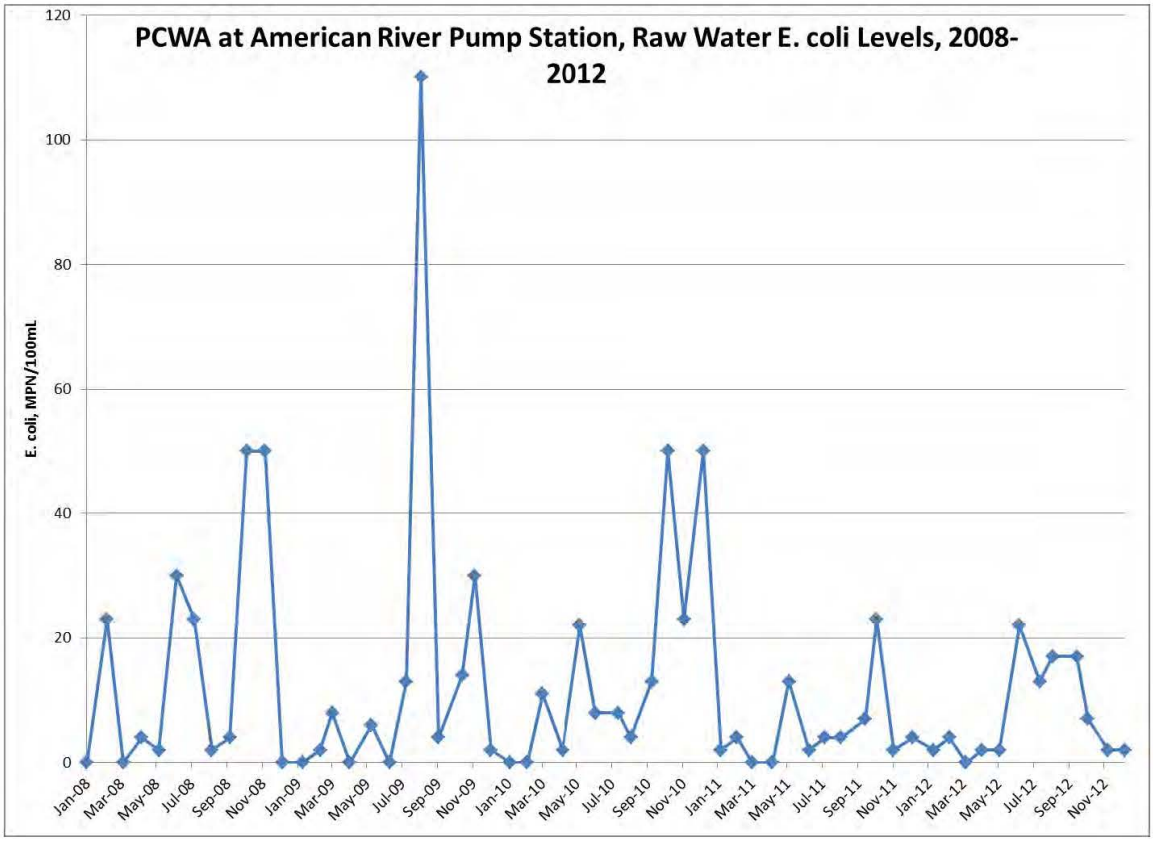
Month: December Calendar Year: 2012

Sample Date	Number of Samples Taken	Average Total Coliform Levels	Average E. Coli Coliform Levels
Jan-12	1	23	2
Feb-12	1	23	4
Mar-12	1	22	0
Apr-12	1	240	2
May-12	1	220	2
Jun-12	1	110	22
Jul-12	1	140	13
Aug-12	1	240	17
Sep-12	1	240	17
Oct-12	1	50	7
Nov-12	1	27	2
Dec-12	1	1600	2
Running Annual Average (RAA):		245	8

Denotes <2
Denotes >1600

Comments:

Signature: Brad Wilkins Date: 1/10/2013


PCWA at American River Pump Station, Raw Water E. coli Levels, 2008-2012
E. coli, MPN/100mL
120
100
80
60
40
20
0
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Nov-10
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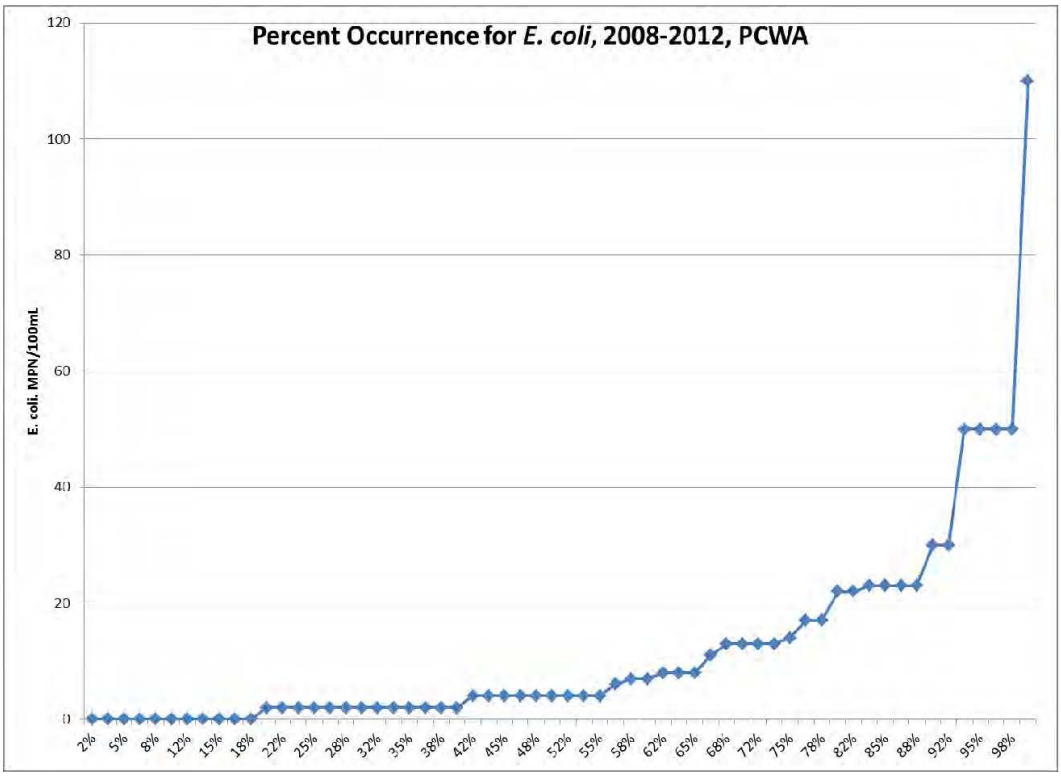
Sep-12
Nov-12


Percent Occurrence for *E. coli*, 2008-2012, PCWA
E. coli. MPN/100mL
120
100
80
60
40
20
0
2%
5%
8%
12%
15%
18%
22%
25%
28%
32%
35%
38%
42%
45%
48%
52%
55%
58%
62%
65%
68%
72%
75%
78%
82%
85%
88%
92%
95%
98%

Month		Sample Date1	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)
Current Yea	1st QTR	2/13/08	44	0.6	NA
	2nd QTR	5/14/08	32	1	NA
	3rd QTR	9/23/08	22	0.93	N/A
	4th QTR	11/12/08	28	1.2	N/A
	1st QTR	2/19/09	32	1.2	NA
	2nd QTR	5/13/09	22	0.98	NA
	3rd QTR	8/13/09	35	1.3	NA
	4th QTR	11/10/09	34	0.77	NA
	1st QTR	2/10/10	29	1	NA
	2nd QTR	5/17/10	38	0.97	NA
	3rd QTR	8/10/10	38	1.2	NA
	4th QTR	11/29/10	28	1.2	NA
	1st QTR	2/15/11	48	0.91	NA
	2nd QTR	5/11/11	30	0.91	NA
	3rd QTR	8/2/11	41	0.87	NA
	4th QTR	11/16/11	41	0.86	NA
	1st QTR	2/16/12	33	0.75	NA
	2nd QTR	5/15/12	44	0.94	NA
	3rd QTR	8/16/12	36	1.1	NA
	4th QTR	11/7/12	36	0.72	NA
			average	0.9705	max
			median	0.955	

RAA

0.9325
1.0825
1.0775
1.17
1.0625
1.0125
1.01
0.985
1.0925
1.07
1.055
0.9725
0.8875
0.8475
0.855
0.9125
0.8775

1.17

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Placer CWA- Foothill System No.: 3110025 Year: 2009 Quarter: 4th

Year:	2005				2006				2007				2008				2009			
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):	2/3	5/11	8/16	11/17	2/22	5/11	8/15	11/8	2/14	5/9	8/15	11/15	2/12	5/13	8/12	11/13	2/11	5/13	8/13	11/10
Site 1	27.5	23.1	29.0	21.5	23.1	25.3	27.3	29.0	22.4	36.8	22.2	41.9	22.9	34.2	35.7	36.0	24.0	37.0	39.0	32.0
Site 2	28.6	27.4	33.1	25.8	25.2	33.6	34.6	28.1	28.7	42.2	21.3	42.1	23.1	42.7	42.0	38.0	25.0	41.0	49.0	40.0
Site 3	34.6	31.4	32.1	27.9	28.4	34.8	30.5	29.3	38.5	40.0	26.4	40.4	26.2	41.8	51.2	62.0	30.0	48.0	44.0	46.0
Site 4	40.9	36.7	44.3	31.2	33.6	39.8	38.6	33.1	34.6	40.2	42.1	42.8	32.5	53.6	61.8	55.0	42.0	64.0	71.0	58.0
Site 5	NA	23.2	30.0	NA	NA	NA	36.5	NA	NA	NA	21.3	NA	NA	NA	35.6	NA	NA	52.0	52.0	NA
Site 6	NA	24.3	36.1	NA	NA	NA	27.3	NA	NA	NA	27.3	NA	NA	NA	37.7	NA	NA	40.0	40.0	NA
Site 7	NA	33.6	34.1	NA	NA	NA	27.3	NA	NA	NA	25.2	NA	NA	NA	38.8	NA	NA	48.0	48.0	NA
Site 8	NA	31.2	33.1	NA	NA	NA	29.3	NA	NA	NA	22.3	NA	NA	NA	33.7	NA	NA	40.0	40.0	NA
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	32.9	28.9	34.0	26.6	27.6	33.4	31.4	29.9	31.1	39.8	26.0	41.8	26.2	43.1	42.1	47.8	30.3	46.3	47.9	44.0
Running Annual Average				30.6	29.3	30.4	29.7	30.6	31.4	33.0	31.7	34.7	33.4	34.3	38.3	39.8	40.8	41.6	43.0	42.1
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	4	8	4	4	4	8	4	4	4	8	4	4	8	8	4

Identify the sample locations in the table below.

Site	Sample Location
1	6205 Arcadia Ave., 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.

Brad Wilkins
Signature

12/4/2009
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.

3/28/92

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Placer CWA- Foothill System No.: 3110025 Year: 2009 Quarter: 4th

Year:	2005				2006				2007				2008				2009			
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):	2/3	5/11	8/16	11/17	2/22	5/11	8/15	11/8	2/14	5/9	8/15	11/15	2/12	5/13	8/12	11/13	2/11	5/13	8/13	11/10
Site 1	20.6	19.5	18.3	14.5	52.0	25.0	34.0	22.0	22.3	36.0	16.0	30.0	20.1	23.0	28.0	16.0	19.0	31.0	26.0	31.0
Site 2	21.0	21.7	14.7	14.0	50.0	27.0	40.0	24.0	41.0	51.0	20.0	40.0	19.4	29.0	32.0	16.0	20.0	29.0	26.0	31.0
Site 3	21.0	24.0	14.8	15.1	46.0	27.0	38.0	24.0	38.0	59.0	18.0	40.0	20.7	27.0	25.0	30.0	22.0	31.0	26.0	32.0
Site 4	18.1	22.6	13.1	14.6	40.0	29.0	35.0	8.2	37.0	45.0	14.0	17.0	16.3	31.0	21.0	21.0	17.0	24.0	21.0	31.0
Site 5	NA	20.1	21.1	NA	NA	NA	44.0	NA	NA	NA	19.0	NA	NA	NA	30.0	NA	NA	43.0	31.0	NA
Site 6	NA	18.3	15.7	NA	NA	NA	35.0	NA	NA	NA	24.0	NA	NA	NA	30.0	NA	NA	40.0	27.0	NA
Site 7	NA	23.0	15.1	NA	NA	NA	35.0	NA	NA	NA	18.0	NA	NA	NA	30.0	NA	NA	37.0	27.0	NA
Site 8	NA	20.3	12.0	NA	NA	NA	31.0	NA	NA	NA	18.0	NA	NA	NA	30.0	NA	NA	43.0	28.0	NA
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	20.2	21.2	15.6	14.6	47.0	27.0	36.5	19.6	34.6	47.8	18.4	31.8	19.1	27.5	28.3	20.8	19.5	34.8	26.5	31.3
Running Annual Average				17.9	24.6	26.0	31.3	32.5	29.4	34.6	30.1	33.1	29.3	24.2	26.7	23.9	24.0	25.8	25.4	28.0
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	4	8	4	4	4	8	4	4	4	8	4	4	8	8	4

Identify the sample locations in the table below.

Site	Sample Location
1	6205 Arcadia Ave., 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	
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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.

Brad Wilkins
Signature

12/4/2009
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 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
Signature

4/4/2012
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.

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)
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5	2210 Taylor Road, Penryn (Sampled when Sunset WTP is operated)
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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.

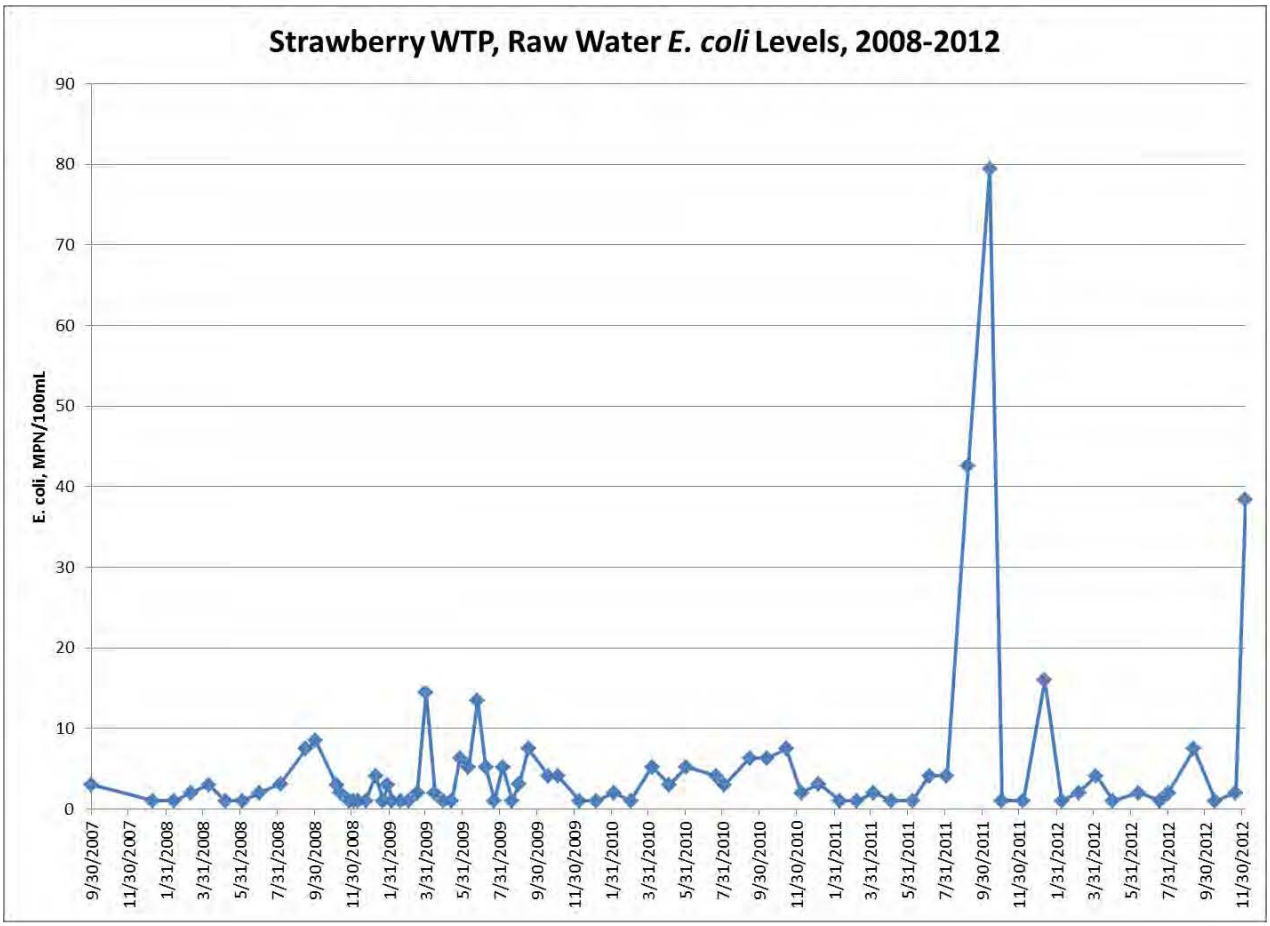
Brad Wilkins
Signature

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.

System Summary, EID - Strawberry

WATER SYSTEM:		
Utility Name		El Dorado Irrigation District
Service Area		El Dorado County
Number Customers - Retail/Wholesale		147
PWSID No.		CA0910001
SOURCE:		
Name		South Fork American River
Entitlement and Amount		15,080 AF/YR -South Fork American River
INTAKE:		
Location and Description		South Fork American at Strawberry
Intake Protection Facilities		Fish Screens
WTP:		
Name		Strawberry WTP
Type of Treatment		Membrane WTP
State Approved Plant Capacity (MGD)		0.144 MG
Capacity Flow Range (MGD)		100 gpm
Average Daily Flow (MGD)	Winter (Oct-Mar)	100 gpm
	Summer (Apr-Sep)	100 gpm
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, Title 22
	Treated Water	Turbidity, Coliform, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Recycle	Amount	<=10% Plant Flow
	Frequency	Intermittent - As Needed
Filtration	No. of Filters	20
	Type of Filter	Microfiltration
	Filtration Rate	100 gpm
	Backwash: Criteria,Rate	Every 45 minutes for 3 minutes
	Filter -to-Waste Facilities	Decant, Pleted Filter
Post-Chlorination	Chemical and Dose	Cl2 - 1.4 mg/L
pH Adjustment	Chemical and Dose	Soda Ash - 0.5 mg/L
Wastewater Handling	Facility	Wastewater Tank
	Sources	Filter Backwash, Filter Waste Washwater
	Decant Recycle Location	To Headworks
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	0.25 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Maria Pang
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart


Strawberry WTP, Raw Water E. coli Levels, 2008-2012
E. coli, MPN/100mL
90
80
70
60
50
40
30
20
10
0
9/30/2007
11/30/2007
1/31/2008
3/31/2008
5/31/2008
7/31/2008
9/30/2008
11/30/2008
1/31/2009
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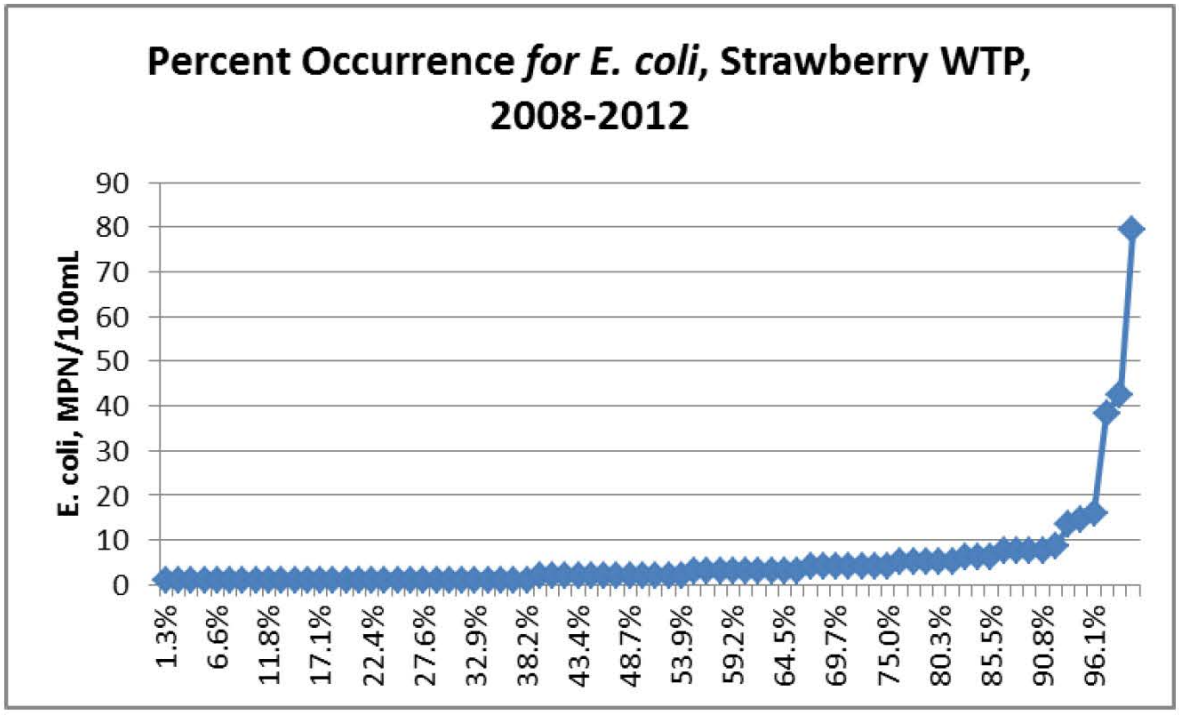

Percent Occurrence for E. coli, Strawberry WTP, 2008-2012
E. coli, MPN/100mL
90
80
70
60
50
40
30
20
10
0
1.3%
6.6%
11.8%
17.1%
22.4%
27.6%
32.9%
38.2%
43.4%
48.7%
53.9%
59.2%
64.5%
69.7%
75.0%
80.3%
85.5%
90.8%
96.1%

Strawberry

Date	Total	E. coli	E. coli
1/9/2008	96	<1	1
2/13/2008	54	<1	1
3/12/2008	61.3	2	2
4/9/2008	45	3	3
5/7/2008	101.7	<1	1
6/4/2008	93.4	1	1
7/2/2008	1410	2	2
8/5/2008	648.8	3.1	3.1
9/16/2008	1299.7	7.5	7.5
10/2/2008	980.4	8.5	8.5
11/5/2008	151.5	3	3
11/12/2008	261.3	2	2
11/26/2008	145	<1	1
12/3/2008	84.2	<1	1
12/10/2008	111.9	1	1
12/23/2008	118.7	1	1
1/8/2009	104.3	4.1	4.1
1/21/2009	50.4	1	1
1/28/2009	111.2	3	3
2/4/2009	43.2	<1	1
2/18/2009	58.3	1	1
3/4/2009	179.3	1	1
3/18/2009	34.5	2	2
4/1/2009	135.4	14.5	14.5
4/15/2009	73.8	2	2
4/29/2009	66.3	<1	1
5/13/2009	44.1	<1	1
5/27/2009	127.4	6.3	6.3
6/10/2009	122.3	5.2	5.2
6/24/2009	248.1	13.5	13.5
7/8/2009	920.8	5.2	5.2
7/22/2009	980.4	1	1
8/5/2009	1299.7	5.2	5.2
8/20/2009	816.4	1	1
9/1/2009	1725	3.1	3.1
9/16/2009	2419.6	7.5	7.5
9/30/2007	727	3	3
10/19/2009	461.1	4.1	4.1
11/3/2009	217.8	4.1	4.1
12/9/2009	123.4	<1	1
1/6/2010	17.5	<1	1
2/3/2010	30.9	2	2
3/3/2010	34.5	<1	1
4/7/2010	34.5	5.2	5.2
5/5/2010	61.3	3	3

6/2/2010	81.3	5.2	5.2
7/21/2010	980.4	4.1	4.1
8/4/2010	920.8	3	3
9/14/2010	2419.6	6.3	6.3
10/13/2010	435.2	6.3	6.3
11/13/2010	193.5	7.5	7.5
12/8/2010	65.7	2	2
1/5/2011	93.4	3.1	3.1
2/9/2011	36.4	1	1
3/9/2011	21.6	<1	1
4/6/2011	36.4	2	2
5/4/2011	42.8	1	1
6/8/2011	39.9	<1	1
7/6/2011	68.2	4.1	4.1
8/3/2011	488.4	4.1	4.1
9/7/2011	1732.9	42.6	42.6
10/13/2011	>2419.6	79.4	79.4
11/2/2011	178.5	1	1
12/7/2011	101.7	<1	1
1/11/2012	41.4	16	16
2/8/2012	28.5	1	1
3/7/2012	21.3	2	2
4/4/2012	30.9	4.1	4.1
5/2/2012	28.8	<1	1
6/13/2012	125.9	2	2
7/18/2012	727	1	1
8/1/2012	1553.1	2	2
9/12/2012	2419.6	7.5	7.5
10/17/2012	461.1	1	1
11/19/2012	201.4	2	2
12/5/2012	1046.2	38.4	38.4

ave	5.221053
median	2

Location: Strawberry WTP

Month	Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	TOC Percent Removal Achieved (%)	TOC Percent Removal Required (%)	Assigned Value [optional; complete box below if used]	TOC Percent Removal Ratio	Lab	TOC Method
January	1/10/2008	5.0	1.3	1.1	15.38		1.00	1.00	EID	SM5310C
February	2/13/2008	5.5	1.4	1.3	7.14		1.00	1.00	EID	SM5310C
March	3/12/2008	6.0	1.6	2.4	-50.00		1.00	1.00	CLS	SM5310B
April	4/9/2008	6.5	2	1.9	5.00		1.00	1.00	EID	SM5310C
May	5/7/2008	3.5	2.5	2.2	12.00	35.0		0.34	EID	SM5310C
June	6/3/2008	4.0	1.9	1.95	-2.63		1.00	1.00	EID	SM5310C
July	7/1/2008	4.0	1.0	1.0	0.00		1.00	1.00	EID	SM5310C
August	8/6/2008	7.5	0.88	1.2	-36.36		1.00	1.00	CLS	SM5310B
September	9/26/2008	5.0	1.7	1.4	17.65		1.00	1.00	EID	SM5310C
October	10/1/2008	5.5	2.8	3.0	-7.14	35.0		-0.20	CLS	SM5310B
November	11/5/2008	4.5	2.0	2.7	-35.00	35.0		-1.00	EID	SM5310C
December	12/3/2008	8.0	1.1	1.3	-18.18		1.00	1.00	EID	SM5310C
January	1/28/2009	5.4	1.8	1.4	22.22		1.00	1.00	CLS	SM5310B
February	2/4/2009	5.8	1.4	1.6					CLS	SM5310B
March	3/4/2009	6.6	2.2	2.5	0.0	35.0		0.0	CLS	SM5310B
April	4/1/2009	9.0	2.1	2.0	4.76	35.0		0.14	CLS	SM5310B
May	5/13/2009	6.2	1.3	0.7	46.15		1.00	1.00	CLS	SM5310B
June	6/24/2009	10	0	0	#DIV/0!		1.00	1.00	CLS	SM5310B
July	7/8/2009	7.4	1.4	1.4	0.00		1.00	1.00	CLS	SM5310B
August	8/5/2009	4.8	1.5	1.2	20.00		1.00	1.00	CLS	SM5310B
September	9/16/2009	7.8	2.1	1.9	9.52		1.00	1.00	CLS	SM5310B
October	10/14/2009	9.4	6.8	5.8	14.71	45.0		0.33	CLS	SM5310B
November	11/3/2009	9.4	1.5	1.2	20.00		1.00	1.00	CLS	SM5310B
December	12/9/2009	9.8	1.4	1.4	0.00		1.00	1.00	CLS	SM5310B
January	1/6/2010	9.0	1.7	1.6	5.88		1.00	1.00	CLS	SM5310B
February	2/3/2010	10	2.3	1.1	52.17	35.0		1.49	CLS	SM5310B
March	3/3/2010	9.4	1.9	1.7	10.53		1.00	1.00	CLS	SM5310B
April	4/7/2010	8.4	2.1	2.1	0.00	35.0		0.00	CLS	SM5310B
May	5/5/2010	6.4	2.4	3.2	0.0	35.0		0.0	CLS	SM5310B
May	5/5/2010		2.37	2.77	0.0	35.0		0.0	SFL	SM5310C
June	6/2/2010	5.6	3.5	3.3	5.71	35.0		0.16	CLS	SM5310B
June	6/2/2010		3.37	3.21	4.75	35.0		0.14	SFL	SM5310C
July	7/21/2010	4	0.953	0.741	22.25		1.00	1.00	SFL	SM5310C
August	8/4/2010	<5.0	0.68	0.83	0.00		1.00	1.00	SFL	SM5310C
September	9/14/2010	8.0	1.44	1.23	14.58		1.00	1.00	SFL	SM5310C
October	10/13/2010	9.0	2.22	1.33	40.09	35.0	1.00	1.00	SFL	SM5310C
November	11/3/2010	8.0	2.30	2.17	5.65	35.0		0.16	SFL	SM5310C
December	12/16/2010	9.0	2.08	2.04	1.92	35.0		0.05	SFL	SM5310C
January	1/5/2011	10.0	1.78	1.92	0.00		1.00	1.00	SFL	SM5310C
February	2/9/2011	10.0	1.81	1.72	4.97		1.00	1.00	SFL	SM5310C
March	3/9/2011	9.0	1.64	1.53	6.71		1.00	1.00	SFL	SM5310C
April	4/6/2011	8.0	2.24	2.14	4.46	35.0		0.13	SFL	SM5310C
May	5/4/2011	6.0	2.37	2.15	9.28	35.0		0.27	SFL	SM5310C
June	6/8/2011	12.0	2.07	1.82	12.08		1.00	1.00	SFL	SM5310C
July	7/6/2011	4.0	1.70	1.58	7.06		1.00	1.00	SFL	SM5310C
August	8/3/2011	<5.0	1.2	1.02	15.00		1.00	1.00	SFL	SM5310C
September	9/7/2011	<5.0	0.95	0.84	11.58		1.00	1.00	SFL	SM5310C
October	10/11/2011	<5.0	3.3	2.2	33.33		1.00	1.00	SFL	SM5310C
November	11/15/2011	7.0	0.85	0.47	44.71		1.00	1.00	SFL	SM5310C
December	12/7/2011	9.0	0.58	0.59	-1.72		1.00	1.00	SFL	SM5310C
January	1/11/2012	13.0	1.00	0.89	11.00		1.00	1.00	SFL	SM5310C
February	2/8/2012	8.0	1.44	1.49	-3.47		1.00	1.00	SFL	SM5310C
March	3/7/2012	10.0	1.87	1.56	16.58		1.00	1.00	SFL	SM5310C

April	4/4/2012	8.0	1.91	1.42	25.65		1.00	1.00	SFL	SM5310C
May	5/2/2012	6.0	2.5	2.28	8.80	35.0		0.25	SFL	SM5310C
June	6/13/2012	8.0	1.56	1.41	9.62		1.00	1.00	SFL	SM5310C
July	7/18/2012	<5.0	1.18	0.77	34.75		1.00	1.00	SFL	SM5310C
August	8/1/2012	<5.0	0.73	0.73	0.00		1.00	1.00	SFL	SM5310C
September	9/12/2012	6.0	1.77	1.54	12.99		1.00	1.00	SFL	SM5310C
October	10/1//12	9.0	0.84	0.81	3.57		1.00	1.00	SFL	SM5310C
November	11/19/2012	6.0	2.7	6.3	-133.33	35.0		-3.81		
December	12/5/2012	5.0	4.9	3.9	20.41		1.00	1.00	SFL	SM5310C
Running Annual Average (RAA) of TOC Percent Removal Ratio:								0.54		

Is the system in compliance? (i.e. RAA ≥ 1.00) ☐ Yes ☐ No

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb) - MCL 80 µg/L

System Name: EID - Strawberry WS System No.: 0910017 Year: 2012 4th

Year:	2004				2005				2006				2007			
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.
Sample Date (month/date):		6/30					8/31				8/25					10/18
Site 1		12.0					1.6				1.2					
Site 2		24.0														
Site 3		43.0					17.0				21.0					
Site 4		**110.0**					18.0				34.0					35.5
Site 5							**170.0**				19.0					
Site 6																
Site 7																
Site 8																
Site 9																
Site 10																
Site 11																
Site 12																
Quarterly Average		47.3					**51.7**				18.8					35.5
Running Annual Average																
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
Number of Samples Taken		4					4				4					1

Year:	2008				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.	1st Qtr.	2nd Qtr.	3rd Qtr.	3rd Qtr.
Sample Date (month/date):			8/13				8/19				8/13				8/10	8/24
Site 1																
Site 2																
Site 3																
Site 4			34.3				20.0				39.0				**87.0**	26.0
Site 5																
Site 6																
Site 7																
Site 8																
Site 9																
Site 10																
Site 11																
Site 12																
Quarterly Average			34.3				20.0				39.0					**56.5**
Running Annual Average				34.3				20.0				39.0				56.5
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 ☐
Number of Samples Taken			1				1				1					2

Year:	2011				2012											
Quarter:	4th Qtr.	4th Qtr.	1st Qtr.	1st Qtr.	1st. Qtr.	2nd Qtr.	2nd Qtr.	2nd Qtr.	2nd Qtr.	3rd Qtr.	3rd Qtr.	3rd Qtr.	4th Qtr.	4th Qtr.	4th Qtr.	4th Qtr.
Sample Date (month/date):	11/2	12/7	2/8	3/14	3/29	5/8	5/30	6/13	6/21	7/18	8/1	9/12	10/17	11/19	12/5	
Site 1																
Site 2																
Site 3																
Site 4	**68.0**	**55.0**	**80.0**	**57.0**	**77.0**	**98.0**	**97.0**	**89.0**	**75.0**	41.0	44.0	**77.0**	39.0	**73.0**	**86.0**	
Site 5																
Site 6																
Site 7																
Site 8																
Site 9																
Site 10																
Site 11																
Site 12																
Quarterly Average		**61.5**			**71.3**				**89.8**			**54.0**			**66.0**	
Running Annual Average		59.0			63.1				69.8			69.1			70.3	
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 ☐	
Number of Samples Taken		2			3				4			3			3	

Identify the sample locations in the table below.

Site	Sample Location
1	Strawberry WTP - Treated Water
2	Strawberry Fire Station
3	20 Strawberry Lane
4	25 Strawberry Lane
5	(Cooks Spur Rd & Margaret Dr)
6	
7	

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.

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb) - MCL 60 µg/L

System Name: EID - Strawberry WS System No.: 0910017 Year: 2012 Quarter: 4th

Year:	2004				2005				2006				2007				2008				2009			
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.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):		6/30					8/31				8/25					10/18			8/13				8/19	
Site 1		19.0					3.0				4.9													
Site 2		44.0																						
Site 3		63.0					19.0				22.0													
Site 4		97.0					20.0				25.0					40.0			35.8				28.2	
Site 5							19.0				21.0													
Site 6																								
Site 7																								
Site 8																								
Site 9																								
Site 10																								
Site 11																								
Site 12																								
Quarterly Average		55.8					15.3				18.2					40.0			35.8				28.2	
Running Annual Average																				35.8				28.2
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 ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Number of Samples Taken		4					4				4					1			1				1	

Year:	2010				2011						2012											
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	3rd Qtr.	4th Qtr.	4th Qtr.	1st Qtr.	1st Qtr.	1st Qtr.	2nd Qtr.	2nd Qtr.	2nd Qtr.	2nd Qtr.	3rd Qtr.	3rd Qtr.	3rd Qtr.	4th Qtr.	4th Qtr.
Sample Date (month/date):			8/13				8/10	8/24	11/2	12/7	2/8	3/14	3/29	5/8	5/30	6/13	6/21	7/18	8/1	9/12	10/17	11/19	12/5
Site 1																							
Site 2																							
Site 3																							
Site 4			35.0				58.0	28.0	57.0	45.0	120.0	66.0	70.0	62.0	77.0	95.0	56.0	21.0	21.0	50.0	39.0	55.0	110.0
Site 5																							
Site 6																							
Site 7																							
Site 8																							
Site 9																							
Site 10																							
Site 11																							
Site 12																							
Quarterly Average			35.0					43.0		51.0			85.3				72.5			30.7			68.0
Running Annual Average				35.0				43.0		47.0			59.8				63.0			59.9			64.1
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 ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☑
Number of Samples Taken			1					2		2			3				4			3			3

Identify the sample locations in the table below.

Site	Sample Location
1	Strawberry WTP - Treated Water
2	Strawberry Fire Station
3	20 Strawberry Lane
4	25 Strawberry Lane
5	Cooks Fire Hydrant (Cooks Spur Rd & Margaret Dr)
6	
7	

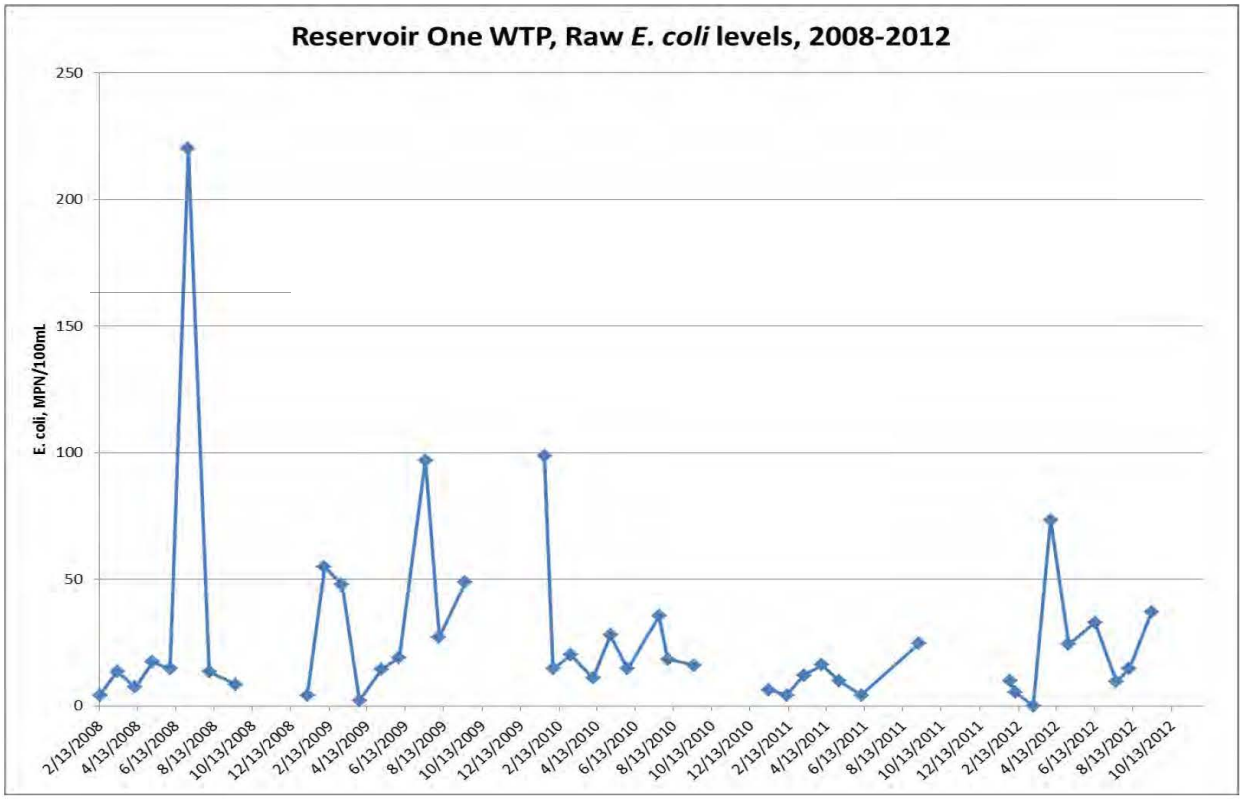
Comments:

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.

System Summary, EID - El Dorado Hills

WATER SYSTEM:		
Utility Name		El Dorado Irrigation District
Service Area		El Dorado County
Number Customers - Retail/Wholesale		38,727/112,937
PWSID No.		CA0910001
SOURCE:		
Name		Main Canal
Entitlement and Amount		15,080 AF/YR - American River Diversion
INTAKE:		
Location and Description		End of Main Canal
Intake Protection Facilities		Automatic bar screen
WTP:		
Name		Forebay (Reserervoir One)
Type of Treatment		Conventional
State Approved Plant Capacity (MGD)		26
Capacity Flow Range (MGD)		0-26
Average Daily Flow (MGD)	Winter (Oct-Mar)	6.0-13.0
	Summer (Apr-Sep)	20.0-26.0
Hours of Operation		0 to 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	NTU, Cl2, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	N/A
pH Adjustment	Chemical and Dose	Hydrated lime or Soda Ash 4 - 8 mg/L
Grit Basin	Volume Basin	n/a
Chemical Addition	Chemical, Purpose & Dose	Alum/PACl, Coagulation, 2-20 mg/l
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Hydraulic Jump
	Mixing Energy (G)	700 Gradient Velocity
Flocculation/Sedimentation	No. of Basins	4
	Volume Basin	1.75 MG
	Surface Load Rate	
	Method of Sludge Removal	Manual
Filtration	No. of Filters	8
	Type of Filter	Dual Media
	Filter Box Volume	1480 sf total filter area
	Underdrain Type	gravel
	Media: Type, Depth, Area	Anthracite (30") and sand (18")
	Filtration Rate	6 gpm/sf
	Backwash: Criteria,Rate	10-15 gpm/sf
	Filter -to-Waste Facilities	yes
Post-Chlorination	Chemical and Dose	chlorine
pH Adjustment	Chemical and Dose	soda ash ~ 6 mg/L
Wastewater Handling	Facility	Wastewater Tank
	Sources	Filter Backwash, Filter Waste Washwater, Upflow Clarifier Blowoff
	Decant Recycle Location	Plant influent
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	7 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Maria Pang
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart


Reservoir One WTP, Raw *E. coli* levels, 2008-2012
E. coli, MPN/100mL
250
200
150
100
50
0
2/13/2008
4/13/2008
6/13/2008
8/13/2008
10/13/2008
12/13/2008
2/13/2009
4/13/2009
6/13/2009
8/13/2009
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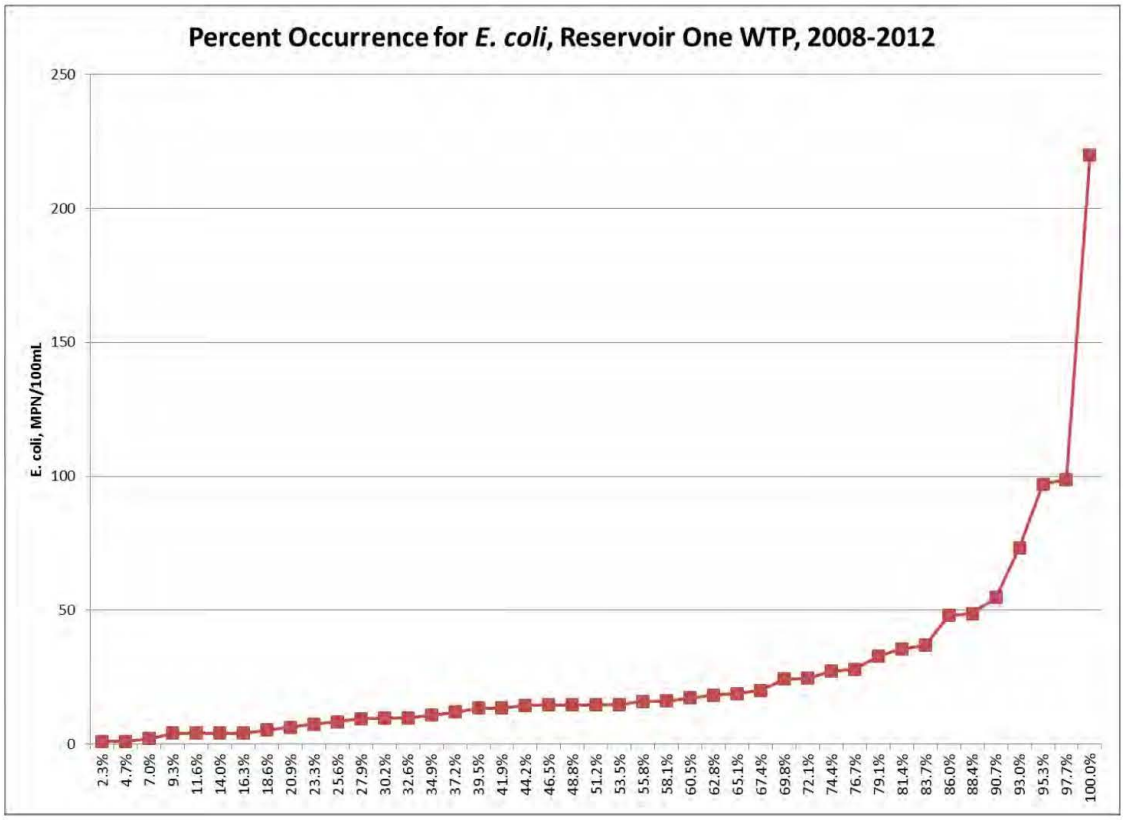
10/13/2012


Percent Occurrence for *E. coli*, Reservoir One WTP, 2008-2012
E. coli, MPN/100mL
250
200
150
100
50
0
2.3%
4.7%
7.0%
9.3%
11.6%
14.0%
16.3%
18.6%
20.9%
23.3%
25.6%
27.9%
30.2%
32.6%
34.9%
37.2%
39.5%
41.9%
44.2%
46.5%
48.8%
51.2%
53.5%
55.8%
58.1%
60.5%
62.8%
65.1%
67.4%
69.8%
72.1%
74.4%
76.7%
79.1%
81.4%
83.7%
86.0%
88.4%
90.7%
93.0%
95.3%
97.7%
100.0%

Reservoir One

Date	Total	E. coli	E. coli
1/9/2008	<1	<1	1
2/13/2008	108	4.1	4.1
3/12/2008	37.9	13.5	13.5
4/9/2008	47	7.4	7.4
5/7/2008	435.2	17.3	17.3
6/4/2008	435.5	14.6	14.6
7/2/2008	5200	220	220
8/5/2008	1553.1	13.4	13.4
9/16/2008	1986.3	8.4	8.4
Oct-08	WTP off		
Nov-08	WTP off		
Dec-08	WTP off		
1/8/2009	116.9	4.1	4.1
2/4/2009	172	54.8	54.8
3/4/2009	365.4	48	48
4/1/2009	52.7	2	2
5/6/2009	178.2	14.5	14.5
6/3/2009	980.4	18.9	18.9
7/15/2009	2247	97	97
8/5/2009	2419.6	27.2	27.2
9/16/2009	4610	48.7	48.7
1-Oct	WTP off		
11/1/2009	WTP off		
12/1/2009	WTP off		
1/20/2010	259.5	98.8	98.8
2/3/2010	52.9	14.6	14.6
3/3/2010	102.2	20.1	20.1
4/7/2010	52.1	10.9	10.9
5/5/2010	191.8	27.9	27.9
6/1/2010	186	14.6	14.6
7/21/2010	816.4	35.5	35.5
8/4/2010	1413.6	18.3	18.3
9/15/2010	579.4	16	16
10/1/2010	WTP off		
11/1/2010	WTP off		
12/1/2010	WTP off		
1/12/2011	48.7	6.3	6.3
2/9/2011	30.9	4.1	4.1
3/9/2011	62.7	12	12
4/6/2011	52.8	16.1	16.1
5/4/2011	96	9.8	9.8
6/8/2011	222.4	4.1	4.1
9/7/2011	1413.6	24.6	24.6
10/1/2011	WTP off		
11/1/2011	WTP off		

12/1/2011	WTP off		
1/30/2012	201.4	9.7	9.7
2/8/2012	40.2	5.2	5.2
3/7/2012	16.1	<1	1
4/4/2012	123.6	73.3	73.3
5/2/2012	198.9	24.3	24.3
6/13/2012	517.2	32.8	32.8
7/17/2012	2419.6	9.5	9.5
8/7/2012	1732.9	14.8	14.8
9/11/2012	1413.6	36.9	36.9
10/1/2012	WTP off		
11/1/2012	WTP off		
12/1/2012	WTP off		
ave			26.88605
median			14.6

Location: Resevoir 1 WTP

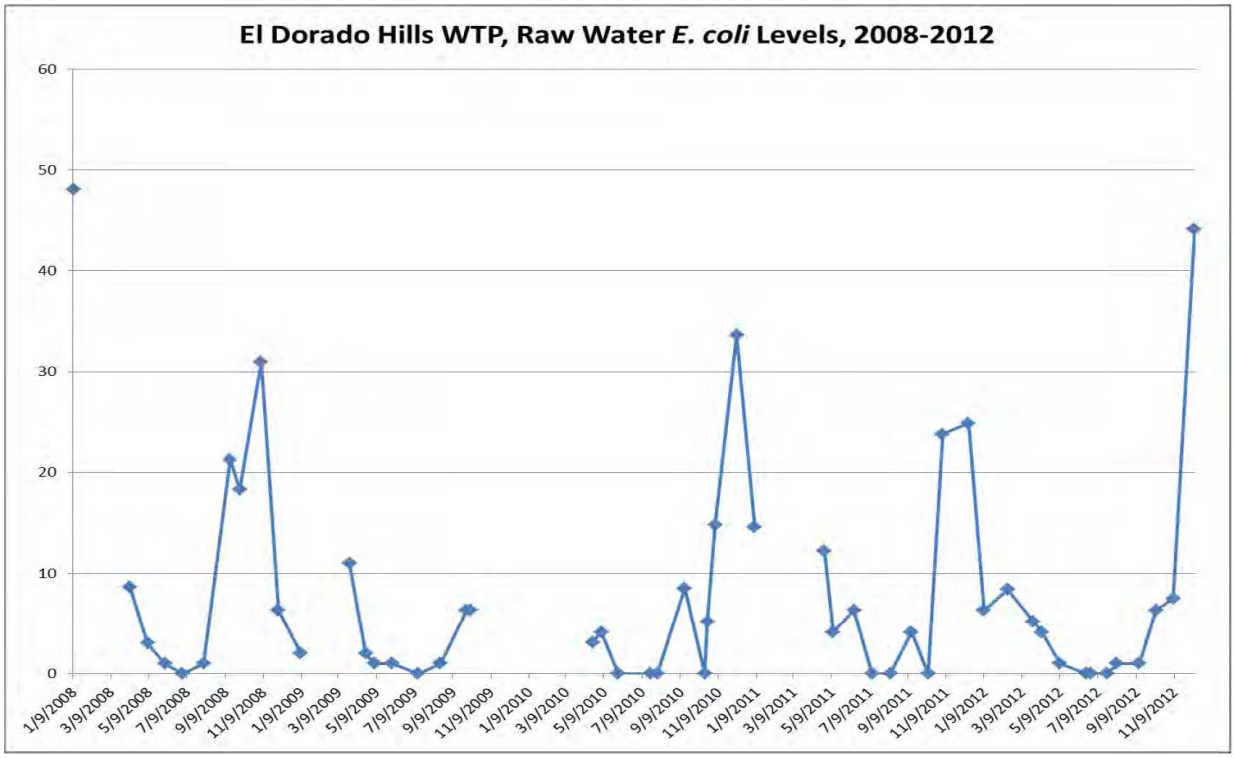
Month	Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	TOC Percent Removal Achieved (%)	TOC Percent Removal Required (%)	Assigned Value [optional; complete box below if used]	TOC Percent Removal Ratio	Lab	TOC Method
January	1/9/2008	14	2	1.2	40.0		1.00	1.00	EID	SM5310C
February	2/13/2008	14	1.2	0.8	33.3		1.00	1.00	EID	SM5310C
March	3/12/2008	14	2.2	1.1	50.0		1.00	1.00	CLS	SM5310B
April	4/9/2008	12	1.9	1.1	42.1		1.00	1.00	EID	SM5310C
May	5/21/2008	7.5	2.1	1.1	47.6		1.00	1.00	EID	SM5310C
June	6/4/2008	10	2.09	1.13	45.9		1.00	1.00	EID	SM5310C
July	7/2/2008	11	1.6	0.94	41.3		1.00	1.00	EID	SM5310C
August	8/4/2008	10	1.4	1.0	28.6		1.00	1.00	EID	SM5310C
September	9/16/2008	11	1.9	0.85	55.3		1.00	1.00	EID	SM5310C
October	Off-line									
November	Off-line									
December	Off-line									
January	1/28/2009	14	2.8	1.5	46.43		1.00	1.00	CLS	SM5310B
February	2/4/2009	14	1.8	1.4	22.22		1.00	1.00	CLS	SM5310B
March	3/4/2009	13	3.1	1.0	67.74		1.00	1.00	CLS	SM5310B
April	4/1/2009	15	2.8	2	28.57	35.0		0.82	CLS	SM5310B
May	5/6/2009	18	3.3	3.4	0.0	35.0		0.0	CLS	SM5310B
June	6/3/2009	10	1	1.6	0.0		1.00	1.00	CLS	SM5310B
July	7/15/2009	15	2.1	1.4	33.33		1.00	1.00	CLS	SM5310B
August	8/6/2009	14	1.5	1.9	0.0		1.00	1.00	CLS	SM5310B
September	9/16/2009	17	1.5	2.9	0.0		1.00	1.00	CLS	SM5310B
October	Off-line				- -			- -		
November	Off-line				- -					
December	Off-line				- -			- -		
January	1/20/2010	13	2.7	1.6	40.74	35.0		1.16	CLS	SM5310B
February	2/3/2010	26	1.4	1.1	21.43		1.00	1.00	CLS	SM5310B
March	3/3/2010	16	2.2	2.1	4.55	35.0		0.13	CLS	SM5310B
April	4/7/2010	14	2.3	2.1	8.70	35.0		0.25	CLS	SM5310B
May	5/5/2010	15	2.2	1.5	31.82		1.00	1.00	CLS	SM5310B
May	5/5/2010	15	2.14	1.4	34.58		1.00	1.00	SFL	SM5310C
June	6/1/2010	13	2.1	3	0.0	35.0		0.0	CLS	SM5310B
July	7/21/2010	12	1.33	0.795	40.23		1.00	1.00	SFL	SM5310C
August	8/4/2010	12	1.42	1.02	28.17		1.00	1.00	SFL	SM5310C
September	9/15/2010	15	1.15	0.75	34.78		1.00	1.00	SFL	SM5310C
October	Off-line				- -			- -		SM5310C
November	Off-line				- -			- -		SM5310C
December	Off-line				- -			- -		SM5310C
January	1/12/2011	17	1.32	0.87	34.09		1.00	1.00	SFL	SM5310C
February	2/9/2011	16	1.58	0.96	39.24		1.00	1.00	SFL	SM5310C
March	3/9/2011	17	1.61	0.87	45.96		1.00	1.00	SFL	SM5310C
April	4/6/2011	16	1.66	1.18	28.92		1.00	1.00	SFL	SM5310C
May	5/4/2011	12	1.78	1.08	39.33		1.00	1.00	SFL	SM5310C
June	6/8/2011	12	1.85	0.99	46.49		1.00	1.00	SFL	SM5310C
July	7/6/2011	10	1.78	0.98	44.94		1.00	1.00	SFL	SM5310C
August	8/3/2011	12	1.32	0.74	43.94		1.00	1.00	SFL	SM5310C
September	9/7/2011	10	0.88	0.60	31.82		1.00	1.00	SFL	SM5310C
October	Off-line									
November	Off-line									
December	Off-line									
January	1/30/2012	12	2.2	1.4	36.36		1.00	1.00	SFL	SM5310C
February	2/8/2012	14	1.44	0.92	36.11		1.00	1.00	SFL	SM5310C
March	3/7/2012	15	1.5	1.06	29.33		1.00	1.00	SFL	SM5310C
April	4/4/2012	15	1.74	1.18	32.18		1.00	1.00	SFL	SM5310C

May	5/2/2012	12	2.25	1.18	47.56		1.00	1.00	SFL	SM5310C
June	6/13/2012	12	1.54	1.00	35.06		1.00	1.00	SFL	SM5310C
July	7/17/2012	12	1.12	0.73	34.82		1.00	1.00	SFL	SM5310C
August	8/7/2012	12	0.91	0.78	14.29		1.00	1.00	SFL	SM5310C
September	9/11/2012	15	1.25	0.86	31.20		1.00	1.00	SFL	SM5310C
October	Off-line									
November	Off-line									
December	Off-line									
Running Annual Average (RAA) of TOC Percent Removal Ratio:								1.00		

Is the system in compliance? (i.e. RAA ≥ 1.00) ☑ Yes ☐ No

System Summary, EID - El Dorado Hills

WATER SYSTEM:		
Utility Name		El Dorado Irrigation District
Service Area		El Dorado County
Number Customers - Retail/Wholesale		38,727/112,937
PWSID No.		CA0910001
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		7,550 AF/YR - Folsom Reservoir
INTAKE:		
Location and Description		Intake at Folsom Reservoir
Intake Protection Facilities		Screens
WTP:		
Name		El Dorado Hills WTP
Type of Treatment		Alternitive Filtration Technology (MicroFloc)
State Approved Plant Capacity (MGD)		19.5
Capacity Flow Range (MGD)		0-19.5
Average Daily Flow (MGD)	Winter (Oct-Mar)	2 - 3 MGD
	Summer (Apr-Sep)	3 - 19.5 MGD
Hours of Operation		0 to 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	NTU, Cl2, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	Cl2 - 2 mg/L
pH Adjustment	Chemical and Dose	Soda Ash ~ 4 mg/L
Grit Basin	Volume Basin	n/a
Chemical Addition	Chemical, Purpose & Dose	PACl, Coagulation, 2-10 mg/l
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Pumped Injection
	Mixing Energy (G)	1000+ Gradient Velocity
Flocculation/Sedimentation	No. of Basins	6
	Volume Basin	
	Surface Load Rate	7.5 - 10 gpm/sf
	Method of Sludge Removal	Back wash
Filtration	No. of Filters	6
	Type of Filter	Dual Media
	Filter Box Volume	1480 sf total filter area
	Underdrain Type	gravel
	Media: Type, Depth, Area	Anthracite (30") and sand (18")
	Filtration Rate	6 gpm/sf
	Backwash: Criteria,Rate	10-15 gpm/sf
	Filter -to-Waste Facilities	yes
Post-Chlorination	Chemical and Dose	chlorine
pH Adjustment	Chemical and Dose	soda ash ~ 6 mg/L
Wastewater Handling	Facility	Wastewater Tank
	Sources	Filter Backwash, Filter Waste Washwater, Upflow Clarifier Blowoff
	Decant Recycle Location	Plant influent
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	7 MGD
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Maria Pang
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart


El Dorado Hills WTP, Raw Water *E. coli* Levels, 2008-2012
60
50
40
30
20
10
0
1/9/2008
3/9/2008
5/9/2008
7/9/2008
9/9/2008
11/9/2008
1/9/2009
3/9/2009
5/9/2009
7/9/2009
9/9/2009
11/9/2009
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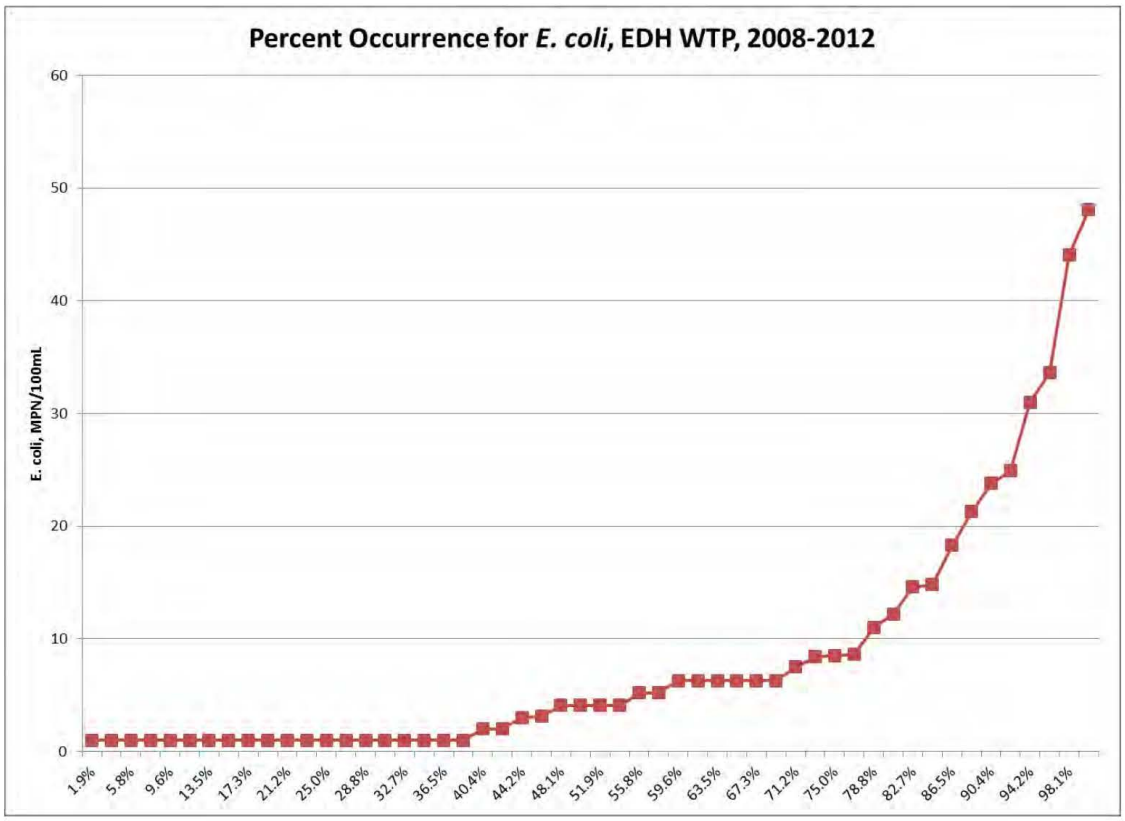
11/9/2012


Percent Occurrence for *E. coli*, EDH WTP, 2008-2012
E. coli, MPN/100mL
60
50
40
30
20
10
0
1.9%
5.8%
9.6%
13.5%
17.3%
21.2%
25.0%
28.8%
32.7%
36.5%
40.4%
44.2%
48.1%
51.9%
55.8%
59.6%
63.5%
67.3%
71.2%
75.0%
78.8%
82.7%
86.5%
90.4%
94.2%
98.1%

EDH

Date	Total	E. coli	E. coli
1/9/2008	1553	48.1	48.1
2/13/2008	WTP off		
3/12/2008	WTP off		
4/9/2008	160	8.6	8.6
5/7/2008	228.2	3	3
6/4/2008	648.8	1	1
7/2/2008	215	<1	1
8/5/2008	37.9	1	1
9/16/2008	547.5	21.3	21.3
10/2/2008	886.4	18.3	18.3
11/5/2008	2187	31	31
12/3/2008	344.8	6.3	6.3
1/8/2009	65	2	2
Feb-09	WTP off		
3/27/2009	344.8	11	11
4/22/2009	218.7	2	2
5/6/2009	122.3	1	1
6/3/2009	209.8	1	1
7/15/2009	238.2	<1	1
8/20/2009	185	1	1
9/30/2009	39.5	6.3	6.3
10/7/2009	579.4	6.3	6.3
Nov-09	WTP off		
Dec-09	WTP off		
Jan-10	WTP off		
Feb-10	WTP off		
Mar-10	WTP off		
4/21/2010	44.1	3.1	3.1
5/5/2010	193.5	4.1	4.1
6/1/2010	1	<1	1
7/23/2010	387.3	<1	1
8/3/2010	129.1	<1	1
9/15/2010	61.3	8.5	8.5
10/18/2010	<1	<1	1
10/22/2010	81.6	5.2	5.2
11/3/2010	108.1	14.8	14.8
12/8/2010	517.2	33.6	33.6
1/5/2011	547.5	14.6	14.6
Feb-11	WTP off		
Mar-11	WTP off		
4/27/2011	325.5	12.2	12.2
5/11/2011	123.6	4.1	4.1
6/14/2011	261.3	6.3	6.3
7/13/2011	228.2	<1	1
8/11/2011	73.3	<1	1

9/14/2011	63.7	4.1	4.1
10/11/2011	272.3	<1	1
11/3/2011	365.4	23.8	23.8
12/14/2011	98.8	24.9	24.9
1/8/2012	96	6.3	6.3
2/15/2012	290.9	8.4	8.4
3/27/2012	275.5	5.2	5.2
4/10/2012	124.6	4.1	4.1
5/9/2012	579.4	1	1
6/21/2012	770.1	<1	1
6/27/2012	>2419.6	<1	1
Jul-12	1046.2	<1	1
8/8/2012	117.4	1	1
9/13/2012	292.4	1	1
10/10/2012	920.8	6.3	6.3
11/7/2012	648.8	7.5	7.5
12/11/2012	629.4	44.1	44.1

aver	8.180769
median	4.1

Location: El Dorado Hills WTP

Month	Sample Date	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	TOC Percent Removal Achieved (%)	TOC Percent Removal Required (%)	Assigned Value [optional; complete box below if used]	TOC Percent Removal Ratio	Lab	TOC Method
January	1/9/08	30	1.7	1.2	29.4		1.00	1.00	EID	SM5310C
February	Off-line				- -			- -		
March	Off-line									
April	4/9/08	32	1.4	1.1	21.4		1.00	1.00	EID	SM5310C
May	5/7/08	30	1.2	0.95	20.8		1.00	1.00	EID	SM5310C
June	6/4/08	30	1.19	1.09	8.4		1.00	1.00	EID	SM5310C
July	7/2/08	28	1.4	1.4	0.0		1.00	1.00	EID	SM5310C
August	8/4/08	22	3.6	0.94	73.9		1.00	1.00	EID	SM5310C
September	9/16/08	16	1.3	1.0	23.1		1.00	1.00	EID	SM5310C
October	10/2/08	16	2.5	2.2	12.0	35.0		0.34	CLS	SM5310B
November	11/5/08	22	1.1	0.89	19.1		1.00	1.00	EID	SM5310C
December	12/3/08	22	1.1	0.96	12.7		1.00	1.00	EID	SM5310C
January	1/8/2009	Not Available	1.6	1.8	0		1.00	1.00	CLS	SM5310B
February	Off-line				- -			- -		
March	3/27/2009	21	2.5	2.1	16.0	35.0		0.46	CLS	SM5310B
April	4/22/2009	22	1.1	1.1	0.0		1.00	1.00	CLS	SM5310B
May	5/6/2009	24	1.1	3.1	0.0		1.00	1.00	CLS	SM5310B
June	6/3/2009	23	2.4	2.5	0.0	35.0		0.0	CLS	SM5310B
July	7/15/2009	22	2.3	2.6	0.0	35.0		0.0	CLS	SM5310B
August	8/20/2009	20	2.7	1.9	29.6		1.00	1.00	CLS	SM5310B
September	9/30/2009	14	1.3	2.1	0.0		1.00	1.00	CLS	SM5310B
October	10/7/2009	20	1.9	1.3	31.6		1.00	1.00	CLS	SM5310B
November	Off-line				- -			- -		
December	Off-line				- -			- -		
January	Off-line				- -			- -		
February	Off-line				- -			- -		
March	Off-line				- -			- -		
April	4/21/2010	32	2.5	1.9	24.0		1.00	1.00	CLS	SM5310B
May	5/5/2010	22	2.1	1.9	9.5		1.00	1.00	CLS	SM5310B
May	5/5/2010		1.89	1.7	10.1		1.00	1.00	SFL	SM5310C
June	6/1/2010	22	1.6	2.2	0.0		1.00	1.00	CLS	SM5310B
July	7/22/2010	20	1.39	1.04	25.2		1.00	1.00	SFL	SM5310C
August	8/3/2010	19	1.37	1.07	21.9		1.00	1.00	SFL	SM5310C
September	9/15/2010	18	1.32	1.04	21.2		1.00	1.00	SFL	SM5310C
October	10/18/2010	18	1.05	0.99	5.7		1.00	1.00	SFL	SM5310C
November	11/3/2010	19	2.32	1.58	31.9		1.00	1.00	SFL	SM5310C
December	12/8/2010	22	1.62	1.26	22.2		1.00	1.00	SFL	SM5310C
January	1/5/2011	24	1.58	1.11	29.7		1.00	1.00	SFL	SM5310C
February	Off-line				- -			- -		
March	Off-line				- -			- -		
April	4/27/2011	12	1.28	1.05	18.0		1.00	1.00	SFL	SM5310C
May	5/11/2011	20	1.59	1.06	33.3		1.00	1.00	SFL	SM5310C
June	6/14/2011	16	1.89	1.05	44.4		1.00	1.00	SFL	SM5310C
July	7/13/2011	18	1.47	1.16	21.1		1.00	1.00	SFL	SM5310C
August	8/11/2011	16	1.56	1.11	28.8		1.00	1.00	SFL	SM5310C
September	9/14/2011	16	1.29	1.03	20.2		1.00	1.00	SFL	SM5310C
October	10/11/2011	14	0.66	0.69	-4.5		1.00	1.00	SFL	SM5310C
November	11/15/2011	14	1.46	0.96	34.2		1.00	1.00	SFL	SM5310C
December	12/14/2011	16	0.86	0.65	24.4		1.00	1.00	SFL	SM5310C
January	1/18/2012	18	1.17	0.78	33.3		1.00	1.00	SFL	SM5310C
February	2/15/2012	22	1.38	1.04	24.6		1.00	1.00	SFL	SM5310C
March	3/27/2012	25	2.49	1.62	34.9		1.00	1.00	SFL	SM5310C
April	4/10/2012	26	1.82	1.33	26.9		1.00	1.00	SFL	SM5310C
May	5/9/2012	24	1.73	1.28	26.0		1.00	1.00	SFL	SM5310C
June	6/21/2012	24	1.69	1.37	18.9		1.00	1.00	SFL	SM5310C
July	7/24/2012	24	1.8	1.2	33.3		1.00	1.00	SFL	SM5310C
August	8/8/2012	22	1.9	1.4	26.3		1.00	1.00	SFL	SM5310C

September	9/13/2012	21	1.57	1.24	21.0		1.00	1.00	SFL	SM5310C
October	10/24/2012	18	1.6	1.3	18.8		1.00	1.00	SFL	SM5310C
November	11/7/2012	19	1.5	1.3	13.3		1.00	1.00	SFL	SM5310C
December	12/11/2012	17	2.7	1.8	33.3		1.00	1.00	SFL	SM5310C
Running Annual Average (RAA) of TOC Percent Removal Ratio:								1.00		

Is the system in compliance? (i.e. RAA ≥ 1.00) ☐ Yes ☐ No

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb) - MCL 80 µg/L

System Name: El Dorado Irrigation District: Main Water System System No.: System No. 0910001 Year: 2012 Quarter: 4th

Year:	2004				2005				2006			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.	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):	3/17	6/30			2/15 16	5/18 23	8/25 26	11/16 18	2/14 16	6/16 15	3	2/14	5/13 15	8/12	11/18 19	2/23	5/19 20	8/12	11/9,10	2/23,24	5/25-27	8/16-18	11/8,9	2/23,24	5/16,18	8/8-10	11/7-9	2/13-14	5/21-23	8/14-15	11/13-16
Site 1	150.0	58.0			22.0	53.0	22.0	35.0	87.0	13.0		26.0	26.0	21.6	54	21	31	23	31	33	39	34	50	45	59	70	36	49	40	38	60
Site 2	34.0	36.0			33.0	28.0	22.0	30.0	70.0	35.0		27.0	28.0	23.9	56	32	33	26	35	51	46	33	38	49	43	37	40	50	37	36	49
Site 3	17.0	34.0			44.0	44.0	25.0	32.0	70.0	33.0		29.0	23.0	23.8	48	25	28	22	29	40	42	43	42	50	50	42	41	43	40	37	46
Site 4	61.0	52.0			59.0	67.0	66.0	30.0	50.0	31.0		26.0	44.0	25.8	52	20	63	29	30	71	84	41	67	68	66	49	62	76	59	49	73
Site 5	36.0	32.0			35.0	50.0	24.0	29.0	72.0	31.0		27.0	30.0	30.1	57	28	40	30	37	49	54	40	42	50	52	42	42	56	47	39	51
Site 6	25.0	20.0			43.0	44.0	25.0	34.0	82.0	2.0		25.0	21.0	15.4	27	59	21	19	24	36	39	30	32	43	47	28	34	43	34	33	45
Site 7	73.0	37.0			87.0	10.0	28.0	24.0	74.0	18.0		30.0	38.0	30.0	40	20	34	28	37	43	54	34	42	43	47	34	43	47	40	41	49
Site 8	24.0	21.0			34.0	77.0	25.0	30.0	50.0	35.0		38.0	29.0	22.8	33	16	29	31	37	43	48	32	36	85	82	82	76	86	79	61	63
Site 9	69.0	42.0			89.0	96.0	59.0	70.0	110.0	44.0		47.0	33.0	55.7	66	42	63	58	50	62	74	39	100	62	60	45	72	74	61	46	77
Site 10	72.0	38.0			48.0	100.0	49.0	28.0	91.0	26.0		37.0	36.0	39.4	65	39	46	35	45	51	61	30	50	60	56	48	61	67	51	40	65
Site 11	36.0	34.0			59.0	61.0	33.0	52.0	84.0	51.0		42.0	43.0	33.3	77	58	55	33	68	72	81	55	67	70	74	53	66	66	54	48	68
Site 12	43.0	36.0			62.0	51.0	38.0	62.0	81.0	43.0		46.0	38.0	44.7	62	47	60	36	58	56	68	60	78	46	55	40	53	61	50	43	65
Quarterly Average	53.3	36.7			51.3	56.8	34.7	38.0	76.8	30.2		33.3	32.4	30.5	53.1	33.9	41.9	30.8	40.1	50.6	57.5	39.3	53.7	55.9	57.6	47.5	52.2	59.8	49.3	42.6	59.3
Running Annual Average								45.2	51.5	44.9					37.3	37.5	39.9	39.9	36.7	40.9	44.8	46.9	50.3	51.6	51.6	53.7	53.3	54.3	52.2	51.0	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	12	12			12	12	12	12	12	12		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Identify the sample locations in the table below.

Site	Sample Location	min	max
1	Hwy 50, Fresh Pond, Site #2730		
2	Reservoir 12 #2150		
3	Rancho Del Sol Tank, Camino #2405		
4	Swansboro Fire Station, Site #16		
5	6583 Richard Ave, Site #105		
6	4563 Mt Aukum Rd, Site #150		
7	3931 Cambridge Rd, Site #170		
8	4771 Sly Park Rd, Site #230	16.0	86.0
9	Hidden Bridge Rd, Site #275		
10	5170 Highcrest Dr, Site #295	30.0	67.0
11	7880 Barite Rd, Site #360		
12	4625 Latrobe Rd, Site #550	36.0	78.0

min	36.7
max	54.3
ave	46.7

Comments:

Nicole Graham

Signature

Environmental Compliance Analyst
El Dorado Irrigation District

1/30/13
Date

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb) - MCL 60 µg/L

System Name: El Dorado Irrigaiton District: Main Water System System No.: 0910001 Year: 2012 Quarter: 4th

Year:	2006				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.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	2/14 16	6/16 15	8/23 25	11/15 17	2/14	5/13 15	8/12	11/18 19	2/9 10	5/19 20	8/12	11/9,10	2/23 24	5/25-27	8/16,18	11/8,9	2/14,15	5/16,18	8/8-10	11/7-9	2/13-14	5/21-23	8/14-15	11/13-16
Site 1	80.0	73.8	42.0	40.0	28.0	34.0	24.3	46.4	34.7	47.1	33.2	27.9	38.7	51.3	12	33	48.0	73.0	56	34	43	42	41	27
Site 2	68.0	45.9	34.0	46.0	23.0	37.0	36.0	44.6	46.4	44.9	35.9	33.1	48.2	52.8	39	39	52.0	51.0	34	39	48	45	38	50
Site 3	69.0	54.9	37.0	45.0	24.0	37.0	30.6	43.4	46.9	44.0	32.4	41.4	45.1	53.6	30	41	58.0	50.0	36	38	54	48	41	50
Site 4	55.0	28.9	24.0	51.0	24.0	36.0	33.4	44.7	34.9	32.5	33.7	28.6	51.0	37.6	42	46	62.0	56.0	40	40	76	51	45	48
Site 5	73.0	26.7	22.0	44.0	24.0	36.0	37.0	44.0	43.1	47.7	43.5	34.3	46.9	51.0	43	44	58.0	60.0	39	39	57	55	36	50
Site 6	73.0	86.1	52.0	58.0	27.0	34.0	28.8	35.1	44.5	37.5	28.7	25.0	42.6	45.3	23	36	45.0	52.0	24	29	38	36	32	41
Site 7	80.0	58.4	41.0	52.0	29.0	40.0	38.8	41.8	40.9	47.8	33.5	27.9	47.3	38.0	40	42	44.0	40.0	34	51	48	38	41	49
Site 8	62.0	52.7	57.0	39.0	23.0	32.0	33.3	39.0	44.0	46.2	34.7	31.1	46.5	48.7	36	38	41.0	67.0	41	28	56	34	20	44
Site 9	115.0	83.3	82.0	73.0	54.0	36.0	45.0	21.8	47.0	34.7	50.1	44.3	39.5	36.9	48	66	39.0	76.0	46	43	76	52	40	36
Site 10	87.0	47.5	31.0	38.0	36.0	39.0	38.3	32.7	46.0	52.3	33.5	43.8	50.6	48.0	39	44	49.0	58.0	42	44	60	35	39	39
Site 11	82.0	63.2	50.0	59.0	30.0	38.0	41.2	43.0	27.0	30.9	41.8	33.4	37.8	39.1	37	43	40.0	44.0	45	39	44	31	48	30
Site 12	82.0	64.7	36.0	52.0	38.0	43.0	42.3	40.2	47.4	34.6	49.2	26.9	50.5	35.7	63	89	51.0	84.0	45	43	65	51	43	39
Quarterly Average	77.2	57.2	42.3	49.8	30.0	36.8	35.8	39.7	41.9	41.7	37.5	33.1	45.4	44.8	37.7	46.8	48.9	59.3	40.2	38.9	55.4	43.2	38.7	41.9
Running Annual Average				56.6				35.6	38.6	39.8	40.2	38.6	39.4	40.2	40.3	43.7	44.5	48.1	48.8	46.8	48.4	44.4	44.0	44.8
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	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Identify the sample locations in the table below.

Site	Sample Location	min	max
1	Hwy 50, Fresh Pond, Site #2730		
2	Reservoir 12 #2150		
3	Rancho Del Sol Tank, Camino #2405		
4	Swansboro Fire Station, Site #16		
5	6583 Richard Ave, Site #105		
6	4563 Mt Aukum Rd, Site #150		
7	3931 Cambridge Rd, Site #170		
8	4771 Sly Park Rd, Site #230	20.0	67.0
9	Hidden Bridge Rd, Site #275		
10	5170 Highcrest Dr, Site #295	32.7	60.0
11	7880 Barite Rd, Site #360		
12	4625 Latrobe Rd, Site #550	26.9	89.0

min	35.6
max	**48.8**
ave	**42.7**

Comments:

Nikole Graham

Environmental Compliance Analyst

1/30/13

Date

State of California
Drinking Water Program

Department of Public Health
Sacramento District

Department of Public Health
Sacramento District

Stage 2 DBP-Quarterly TTHM Report for Disinfection Byproducts Compliance and Operational Evaluation (in µg/L or ppb)

System Name: El Dorado Irrigation District : Main Water System System No.: 0910001 Year: 2012 Quarter: 4th Year: 2012 Quarter: 3rd

Year:	2012								2013				2014				2015				2016			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	3rd Qtr.	3rd Qtr.	4th Qtr.	4th 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):	2/13-14	5/21-23	7/24	/14-15,2	9/19	10/16	11/13-16	12/6																
Site 1: McGuire Ct. & Rock Rd., (ST2-5)	90	68		60			86																	
Site 2: 7944 Crystal Blvd., (ST2-8)	64	52		48			68																	
Site 3: 4801 Luneman Rd., (ST2-11)	50	42		36			49																	
Site 4: Rosado Dr. & Avellano Dr., (ST2-16)	84	69		53	57	68	65	25																
Site 5: 4771 Sly Park Rd., (ST1-230)	86	79		61			63																	
Site 6: Hidden Bridge Rd. & Salmon Falls Rd., (ST1-275)	74	61		46	43	76	77	52																
Site 7: 5170 Highcrest Dr., (ST1-295)	67	51		40			65																	
Site 8: 4625 Latrobe Rd., (ST1-550)	61	50		43			65																	
Site 9: Chateau Montelena Rd. & Salmon Falls Rd., (ST2-13) (Replaced Site #275 October,1 2012)		68			47	76	86	32																
Site 10: 3704 Aliso Dr., EDH (ST2-16) (DPH approved moving ST2-16 from Rosado Dr. & Avellano to 3704 Aliso Dr.		53	45	39	27	44	45	47																
Site 11:																								
Number of Samples Taken	8	10	1	9	4	4	10	4																

Site 1	90	68		60			86																	
Running Annual Average								76																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				70				75																
OEL≤MCL?				Yes				Yes																

Site 2	64	52		48			68																	
Running Annual Average								58																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				53				59																
OEL≤MCL?				Yes				Yes																

Site 3	50	42		36			49																	
Running Annual Average								44																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				41				44																
OEL≤MCL?				Yes				Yes																

Site 4	84.0	69.0		53.0	57.0	68.0	65.0	25.0																
Running Annual Average					66			60																
Meets MCL ?					Yes			Yes																
Operational Evaluation Level OEL					66			57																
OEL≤MCL?					Yes			Yes																

Site 5	86	79		61			63																	
Running Annual Average								72																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				72				67																
OEL≤MCL?				Yes				Yes																

Site 6	74	61		46	43	76	77	52																
Running Annual Average					56			61																
Meets MCL ?					Yes			Yes																
Operational Evaluation Level OEL					56			61																
OEL≤MCL?					Yes			Yes																

Site 7	67	51		40			65																	
Running Annual Average								56																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				50				55																
OEL≤MCL?				Yes				Yes																

Site 8	61	50		43			65																	
Running Annual Average								55																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				49				56																
OEL≤MCL?				Yes				Yes																

Site 9		68			47	76	86	32																
Running Annual Average								62																
Meets MCL ?								Yes																
Operational Evaluation Level OEL								61																
OEL≤MCL?								Yes																

Site 10		53	45	39	27	44	45	47																
Running Annual Average								43																
Meets MCL ?								Yes																
Operational Evaluation Level OEL								45																
OEL≤MCL?								Yes																

Comments:

Nicole Graham ,Environmental Compliance Analyst 1/3/2013

Signature Date

Stage 2 DBP-Quarterly HAA5 Report for Disinfection Byproducts Compliance and Operational Evaluation (in µg/L or ppb)

System Name: El Dorado Irrigation District : Main Water System System No.: 0910001 Year: 2012 Quarter: 4th Quarter: 3rd

Year:	2012								2013				2014				2015				2016			
Quarter:	1st Qtr.	2nd Qtr.	3rd. Qtr.	3rd Qtr.	3rd Qtr.	4th Qtr.	4th 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):	2/13-14	5/21-23	7/24	8/14-15	9/19	10/16	11/13-16	12/6																
Site 1: McGuire Ct. & Rock Rd., (ST2-5)	73	46		36			46																	
Site 2: 7944 Crystal Blvd., (ST2-8)	48	30		46			31																	
Site 3: 4801 Luneman Rd., (ST2-11)	49	42		34			49																	
Site 4: Rosado Dr. & Avellano Dr., (ST2-16)	73	57		54	53	36	39	45																
Site 5: 4771 Sly Park Rd., (ST1-230)	56	34		20			44																	
Site 6: Hidden Bridge Rd. & Salmon Falls Rd., (ST1-275)	76	52		40	42	30	36	27																
Site 7: 5170 Highcrest Dr., (ST1-295)	60	35		39			39																	
Site 8: 4625 Latrobe Rd., (ST1-550)	65	51		43			39																	
Site 9: Chateau Montelena Rd. & Salmon Falls Rd., (ST2-13) (Replaced Site #275 October,1 2012)		37			39	29	26	43																
Site 10: 3704 Aliso Dr., EDH (ST2-16) (DPH approved moving ST2-16 from Rosado Dr. & Avellano to 3704 Aliso Dr.		50	39	41	24	25	21	60																
Site 11:																								
Number of Samples Taken	8	10	1	9	4	4	10	4																
Site 1	73	46		36			46																	
Running Annual Average								50																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				48				44																
OEL≤MCL?				Yes				Yes																
Site 2	48	30		46			31																	
Running Annual Average								39																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				43				35																
OEL≤MCL?				Yes				Yes																
Site 3	49	42		34			49																	
Running Annual Average								44																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				40				44																
OEL≤MCL?				Yes				Yes																
Site 4	73	57		54	53	36	39	45																
Running Annual Average								51																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				60				48																
OEL≤MCL?				Yes				Yes																
Site 5	56	34		20			44																	
Running Annual Average								39																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				33				36																
OEL≤MCL?				Yes				Yes																
Site 6	76	52		40	42	30	36	27																
Running Annual Average								43																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				52				39																
OEL≤MCL?				Yes				Yes																
Site 7	60	35		39			39																	
Running Annual Average								43																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				43				38																
OEL≤MCL?				Yes				Yes																
Site 8	65	51		43			39																	
Running Annual Average								50																
Meets MCL ?								Yes																
Operational Evaluation Level OEL				51				43																
OEL≤MCL?				Yes				Yes																
Site 9		37			39	29	26	43																
Running Annual Average								35																
Meets MCL ?								Yes																
Operational Evaluation Level OEL								35																
OEL≤MCL?								Yes																
Site 10		50	39	41	24	25	21	60																
Running Annual Average								37																
Meets MCL*?								Yes																
Operational Evaluation Level OEL								39																
OEL≤MCL?								Yes																

Comments:

Nicole Graham ,Environmental Compliance Analyst 1/3/2013
Signature Date

System Summary, Folsom

WATER SYSTEM:		
Utility Name		City of Folsom
Service Area		Folsom
Number Customers - Retail/Wholesale		Approx. 17,000 Retail accounts
PWSID No.		CA 3410014
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		27,000 AF/Yr (Water rights -Co-TenancyAgreement with ACWS), 7,000 AF/Yr PL 101-514 by sub-constract with Sac. County Water Agency
INTAKE:		
Location and Description		Shared Diversion Facilities at Folsom Dam
Intake Protection Facilities		Fish Screens/Temperature Control Device
WTP:		
Name		Folsom Water Treatment Plant
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		40 MGD
Capacity Flow Range (MGD)		0 - 50 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	14 MGD
	Summer (Apr-Sep)	32 MGD
Hours of Operation		24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	Turbidity, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Recycle Water	Flow	<10% Plant Flow
	Turbidity	< 2 NTU
	Frequency	Continuous
Pre-Chlorination	Chemical and Dose	Sodium hypochlorite (1.5 mg/L)
pH Adjustment	Chemical and Dose	Hydrated Lime (2.5 mg/l)
Chemical Addition	Chemical, Purpose & Dose	Polyaluminum chloride - coagulant (2.5 mg/L) Anionic Polymer - coagulant aid (0.30 mg/L)
Rapid Mix		Static mixer
	Type of Mixing	Hydraulic
Actiflo Pretreatment	Design Flow	2 @ 20 MGD
	Stages	Coagulation, sand injection, maturation, settling
	Sedimetation Stage Rise Rate	20 gpm/ft^2
Flocculation	No. of Basins	3 @ 3 stage
	Total Volume of Basins	0.12 MG
	Type of Flocculators	Mechanical - Vertical
	Mixing Energy	Varies
Sedimentation	No. of Basins	1
	Volume Basin	0.97 MG
	Surface Load Rate	1.08 gpm/ft^2
	Method of Sludge Removal	Chain and Flight
Chemical Addition	Chemical, Purpose & Dose	Non-ionic - filter aid (0.010 mg/L)
Filtration	No. of Filters	10
	Type of Filter	Dual Media
	Underdrain Type	Leopold
	Media: Type, Depth, Area	Filters #1 - 4 - 30 inches of 1.2 mm anthracite over 8 inches of 0.5 mm sand - 600 ft^2. Filters #5 - 10 - 33 inches of 1.2 mm anthracite over 10 inches of 0.5 mm sand - 600 ft^2
	Filtration Rate	5.6 gpm/ft^2
	Backwash: Criteria,Rate	Time Based - Daily Summer, Every 3 Days Winter
	Filter-to-Waste: Time	Yes - 1 minute
Post-Chlorination	Chemical and Dose	Sodium hypochlorite (1.5 mg/L)
Chlorine Contact	Facility	Contact Contact Tank
pH Adjustment	Chemical and Dose	Hydrated Lime (2.5 mg/l)
Wastewater Handling	Facility	Return Backwash Water Pond

System Summary, Folsom

	Sources	Conventional Filter Backwash, Filter Waste Washwater, Sedimentation Basin Sludge, Sludge Lagoon Decant
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Return Backwash Water Pond
Sludge Handling	Sources	Sludge Drying Beds/Sludge Thickeners
	Decant Recycle Location	Return Backwash Water Pond
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	34.5 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Mike Tolin
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

City of Folsom Raw Water Coliform Monitoring

	January					Febuary				March					April				
2008	**2**	**7**	**15**	**22**	**28**	**5**	**12**	**19**	**26**	**4**	**11**	**18**	**25**		**1**	**8**	**15**	**22**	**29**
Total Coliform	49	540	49	46	33	140	27	1.8	13	7.8	17	49	49		17	13	17	11	33
Fecal Coliform	NR	49	23	46	23	6.8	9.3	<1.8	4.5	13	6.8	22	49		17	13	17	4.5	17
E. Coli	NR	33	23	46	13	6.8	9.3	<1.8	4.5	7.8	6.8	17	17		17	13	17	4.5	11
2009	**6**	**13**	**20**	**27**		**3**	**10**	**18**	**24**	**2**	**10**	**17**	**24**	**31**	**7**	**14**	**21**	**28**	
Total Coliform	6.8	94	79	49		9.3	23	49	79	70	94	6.8	7.8	110	4.5	4.5	2	7.8	
Fecal Coliform	4.5	94	49	33		6.8	7.8	33	79	21	6.8	4	2	2	<1.8	2	<1.8	2	
E. Coli	4.5	26	23	17		6.8	4.5	33	33	21	6.8	4	2	2	<1.8	2	<1.8	2	
2010	**5**	**11**	**21**	**26**		**1**	**10**	**16**	**22**	**1**	**9**	**16**	**23**	**29**	**6**	**13**	**19**	**26**	
Total Coliform	49	23	140	33		49	23	11	7.8	1600	32	33	17	6.8	11	7.8	17	2	
Fecal Coliform	23	13	22	23		7.8	23	4.5	<1.8	170	7.8	17	7.8	6.8	2	2	17	<1.8	
E. Coli	23	7.8	9.3	13		4.5	13	2	<1.8	170	7.8	11	7.8	6.8	<1.8	2	13	<1.8	
2011	**4**	**10**	**18**	**25**		**1**	**8**	**15**	**22**	**1**	**8**	**14**	**22**	**29**	**5**	**12**	**19**	**26**	
Total Coliform	9.3	23	79	33		7.8	13	6.8	2	6.8	94	17	170	33	11	13	11	4.5	
Fecal Coliform	4	13	22	11		<1.8	2	4	<1.8	4	63	4.5	46	7.8	7.8	7.8	4	4.5	
E. Coli	4	13	14	6.8		<1.8	2	4	<1.8	4	63	2	21	4.5	7.8	4.5	2	4.5	
2012	**3**	**10**	**17**	**24**	**31**	**6**	**14**	**21**	**28**	**5**	**12**	**20**	**26**		**3**	**9**	**17**	**24**	
Total Coliform	17	49	33	13	4.5	17	2	2	<1.8	13	7.8	31	220		7.8	4.5	22	9.2	
Fecal Coliform	11	33	4.5	7.8	<1.8	13	<1.8	<1.8	<1.8	7.8	4.5	13	23		2	<1.8	6.8	6.8	
E. Coli	11	33	4.5	7.8	<1.8	6.8	<1.8	<1.8	<1.8	4.5	2	4.5	23		<1.8	<1.8	6.8	6.8	

NR = Non Reportable

ND = Analyte NOT DETECTED at or above the reporting limit

City of Folsom Raw Water Coliform Monitoring

	May					June					July					August				
2008	**6**	**13**	**20**	**27**		**3**	**10**	**17**	**24**		**1**	**8**	**15**	**22**	**29**	**5**	**12**	**19**	**26**	
Total Coliform	2	7.8	7.8	6.1		4.5	2	23	2		<1.8	2	<1.8	<1.8	7.8	2	2	17	4.5	

Fecal Coliform	<1.8	<1.8	2	1.8		1.8	<1.8	13	<1.8		<1.8	2	<1.8	<1.8	2	2	<1.8	7.8	<1.8	
E. Coli	<1.8	<1.8	2	1.8		<1.8	<1.8	13	<1.8		<1.8	<1.8	<1.8	<1.8	2	<1.8	<1.8	7.8	<1.8	
2009	**5**	**12**	**19**	**26**		**2**	**9**	**16**	**23**	**30**	**7**	**14**	**21**	**28**		**4**	**11**	**18**	**25**	
Total Coliform	7.8	4.5	2	2		17	<1.8	2	2	<1.8	4	2	6.8	2		4.5	1.8	2	2	
Fecal Coliform	<1.8	<1.8	2	<1.8		<1.8	<1.8	2	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		<1.8	1.8	<1.8	<1.8	
E. Coli	<1.8	<1.8	2	<1.8		<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		<1.8	1.8	<1.8	<1.8	
2010	**4**	**11**	**18**	**24**		**1**	**8**	**15**	**22**	**29**	**7**	**13**	**20**	**27**		**3**	**10**	**17**	**24**	**31**
Total Coliform	23	6.8	6.8	4.5		22	33	7.8	2	7.8	<1.8	<1.8	7.8	1.8		<1.8	2	2	6.8	2
Fecal Coliform	<1.8	<1.8	<1.8	<1.8		<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	4.5	<1.8		<1.8	2	2	2	2
E. Coli	<1.8	<1.8	<1.8	<1.8		<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	4.5	<1.8		<1.8	2	2	2	<1.8
2011	**3**	**10**	**16**	**24**	**31**	**7**	**14**	**21**	**27**		**5**	**12**	**19**	**26**		**2**	**9**	**16**	**23**	**30**
Total Coliform	4.5	2	7.8	2	1.8	4.5	33	12	6.8		12	4.5	1.8	17		2	4	6.8	<1.8	<1.8
Fecal Coliform	2	2	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		<1.8	<1.8	<1.8	2		<1.8	<1.8	<1.8	<1.8	<1.8
E. Coli	2	2	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		2	<1.8	<1.8	2		<1.8	<1.8	<1.8	<1.8	<1.8
2012	**1**	**8**	**15**	**22**	**29**	**5**	**12**	**19**	**26**		**3**	**10**	**17**	**24**	**31**	**7**	**14**	**21**	**28**	
Total Coliform	6.1	27	22	23	22	17	21	17	4.5		33	540	350	49	11	4	<1.8	13	<1.8	
Fecal Coliform	1.8	1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		<1.8	<1.8	<1.8	<1.8	<1.8	1.8	<1.8	<1.8	<1.8	
E. Coli	1.8	1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		<1.8	<1.8	<1.8	<1.8	<1.8	1.8	<1.8	<1.8	<1.8	

NR = Non Reportable

ND = Analyte NOT DETECTED at or above the reporting limit

City of Folsom Raw Water Coliform Monitoring

	September					**October**					**November**					**December**				
2008	**2**	**9**	**16**	**23**	**30**	**7**	**14**	**21**	**28**		**4**	**12**	**18**	**24**		**2**	**9**	**16**	**23**	**29**
Total Coliform	11	2	7.8	9.3	2	7.8	1.8	<1.8	17		46	49	350	33		79	33	130	70	13
Fecal Coliform	<1.8	<1.8	<1.8	4	2	4.5	<1.8	<1.8	17		31	7.8	13	33		49	23	27	14	23
E. Coli	<1.8	<1.8	<1.8	4	2	4.5	<1.8	<1.8	13		31	6.8	13	33		22	13	49	9.2	23
2009	**1**	**8**	**15**	**22**	**29**	**6**	**12**	**20**	**27**		**3**	**10**	**17**	**24**		**1**	**8**	**14**	**22**	**29**

Total Coliform	2	2	2	17	4.5	31	<1.8	13	4		23	43	4.5	17		17	220	220	14	4.5
Fecal Coliform	<1.8	<1.8	<1.8	ND	2	3.8	<1.8	4.5	<1.8		4.5	33	4.5	11		7.8	14	23	4	4.5
E. Coli	<1.8	<1.8	<1.8	ND	<1.8	3.8	<1.8	4.5	<1.8		4.5	33	4.5	7.8		4.5	14	23	4	4.5
2010	**8**	**14**	**21**	**28**		**5**	**12**	**19**	**26**		**2**	**9**	**16**	**24**	**30**	**7**	**13**	**20**	**27**	
Total Coliform	4.5	<1.8	1.8	17		7.8	2	17	21		33	9.3	27	33	17	47	49	49	13	
Fecal Coliform	<1.8	<1.8	<1.8	4.5		2	2	2	11		13	1.8	2	17	2	13	33	6.8	13	
E. Coli	<1.8	<1.8	<1.8	2		2	2	2	6.8		13	1.8	2	13	2	13	33	6.8	13	
2011	**6**	**13**	**20**	**27**		**3**	**11**	**18**	**25**		**1**	**8**	**15**	**22**	**29**	**6**	**13**	**20**	**27**	
Total Coliform	<1.8	<1.8	<1.8	7.8		13	7.8	9.3	11		13	13	4.5	4.5	23	17	46	22	13	
Fecal Coliform	<1.8	<1.8	<1.8	<1.8		<1.8	7.8	<1.8	4		2	4.5	4.5	2	23	11	14	22	7.8	
E. Coli	<1.8	<1.8	<1.8	<1.8		<1.8	4.5	<1.8	4		2	4.5	2	2	23	11	14	6.8	7.8	
2012	**4**	**11**	**18**	**25**		**2**	**9**	**16**	**25**	**30**	**6**	**13**	**20**	**27**		**4**	**11**	**18**	**26**	
Total Coliform	6.8	2	6.8	6.8		4.5	2	4.5	46	23	13	7.8	13	25		240	17	31	11	
Fecal Coliform	<1.8	<1.8	2	2		<1.8	<1.8	<1.8	13	4.5	7.8	4.5	13	21		33	7.8	13	4.5	
E. Coli	<1.8	<1.8	2	<1.8		<1.8	<1.8	<1.8	4.5	4.5	7.8	2	7.8	11		23	7.8	4.5	2	

NR = Non Reportable

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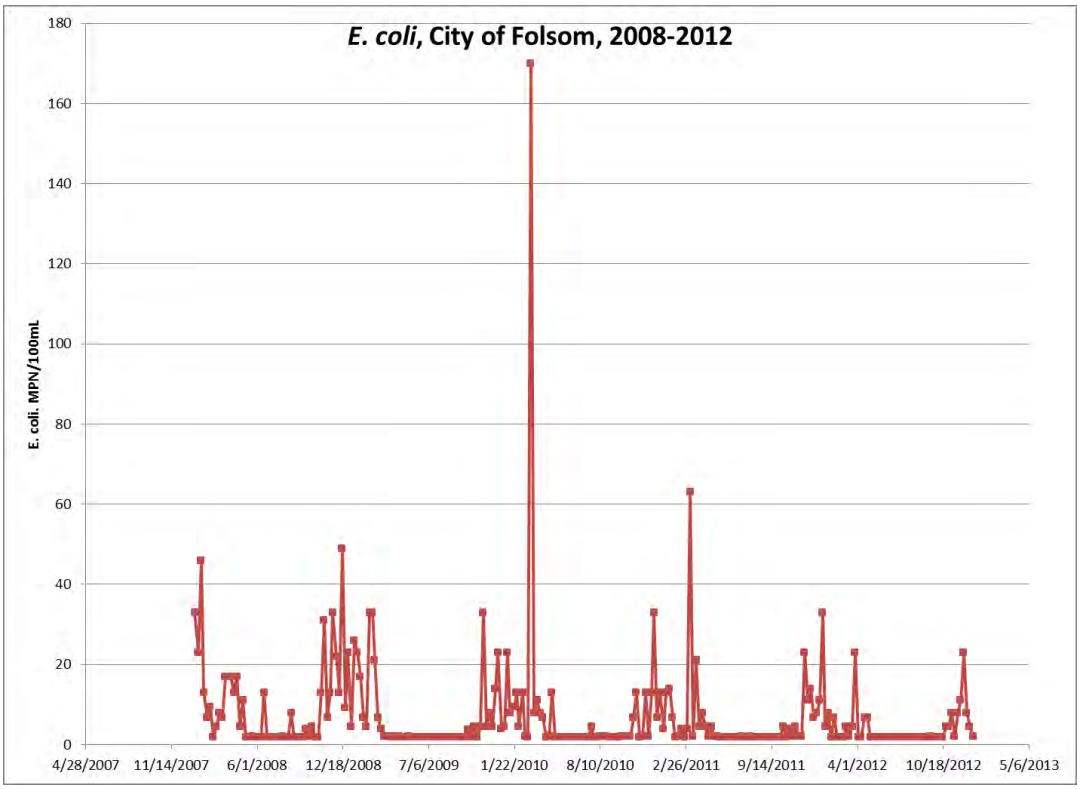
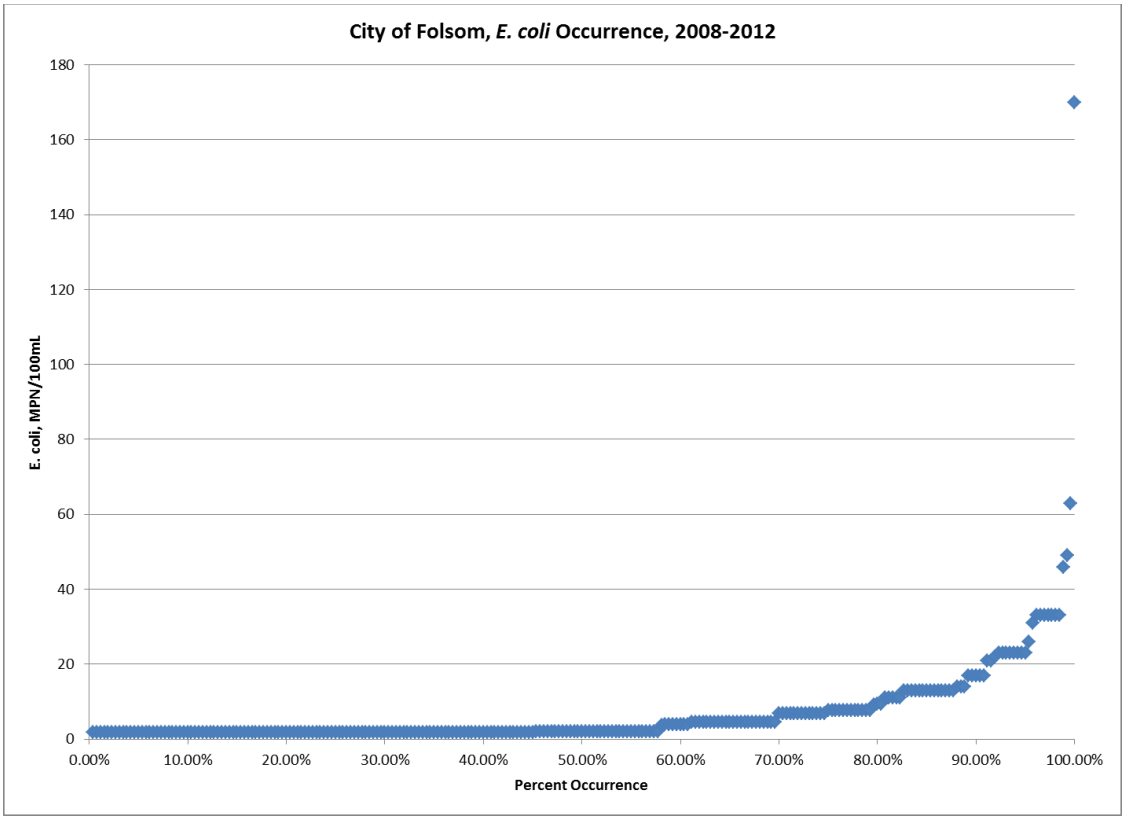

E. coli, City of Folsom, 2008-2012
E. coli. MPN/100mL
180
160
140
120
100
80
60
40
20
0
4/28/2007
11/14/2007
6/1/2008
12/18/2008
7/6/2009
1/22/2010
8/10/2010
2/26/2011
9/14/2011
4/1/2012
10/18/2012
5/6/2013


City of Folsom, E. coli Occurrence, 2008-2012
E. coli, MPN/100mL
180
160
140
120
100
80
60
40
20
0
0.00%
10.00%
20.00%
30.00%
40.00%
50.00%
60.00%
70.00%
80.00%
90.00%
100.00%
Percent Occurrence

TOC Data for City of Folsom

Sample Date	Source Water Alkalinity-mg/L	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
1/15/08	27	2.5	2.1	16.0%
2/19/08	34	1.2	0.9	25.0%
3/18/08	31	1.2	0.95	20.8%
4/15/08	29	1.1	0.83	24.5%
5/13/08	29	1	0.84	16.0%
6/17/08	23	1.4	0.88	37.1%
7/15/08	23	1	0.79	21.0%
8/19/08	22	0.86	0.6	30.2%
9/16/08	20	1.3	1	23.1%
10/16/08	23	1.2	1	16.7%
11/17/08	22	1.1	0.91	17.3%
12/16/08	24	1.6	0.76	52.5%
1/20/09	26	1.3	0.83	36.2%
2/18/09	26	1.5	0.97	35.3%
3/17/09	27	1.4	1	28.6%
4/15/09	28	1.4	1.1	21.4%
5/19/09	22	1.7	1.1	35.3%
6/16/09	26	1.6	1.1	31.3%
7/17/09	25	1.5	0.91	39.3%
8/18/09	22	1.4	1	28.6%
9/15/09	22	1.3	0.96	26.2%
10/20/09	22	1.6	1.1	31.3%
11/17/09	18	1.5	1.1	26.7%
12/14/09	23	1.6	1.2	25.0%
1/19/10	29	1.4	1	28.6%
2/16/10	30	1.5	0.95	36.7%
3/16/10	34	1.4	0.99	29.3%
4/19/10	31	1.3	1	23.1%
5/18/10	37	1.2	0.94	21.7%
6/15/10	27	1.3	0.99	23.8%
7/20/10	25	1.3	1	23.1%
8/17/10	24	1.5	1.1	26.7%
9/21/10	22	1.3	0.85	34.6%
10/19/10	23	1.4	0.83	40.7%
11/16/10	23	1.4	1.4	0.0%
12/20/10	24	2.1	1.7	19.0%

Sample Date	Source Water Alkalinity-mg/L	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	Percent Removal
01/18/11	26	1.5	1.3	13.3%
02/15/11	27	1.7	1	41.2%
03/14/11	39	1.4	1.4	0.0%
04/19/11	35	1.4	1.4	0.0%
05/16/11	25	1.2	0.86	28.3%
06/21/11	14	1.4	1.2	14.3%
07/19/11	15	1.4	0.98	30.0%
08/16/11	17	1.4	0.98	30.0%
09/20/11	21	1.1	1.5	-36.4%
10/18/11	16	1.2	0.79	34.2%
11/15/11	21	1.2	0.88	26.7%
12/20/11	21	1.1	0.81	26.4%
01/17/12	23	1.3	1	23.1%
02/16/12	23	1.2	0.94	21.7%
03/20/12	29	1.2	0.97	19.2%
04/14/12	28	1.4	0.98	30.0%
05/15/12	26	1.4	1.1	21.4%
06/19/12	25	1.7	1.3	23.5%
07/17/12	25	1.3	1	23.1%
08/21/12	27	1.4	0.82	41.4%
09/18/12	21	1.2	1.2	0.0%
10/16/12	16	1.3	1	23.1%
11/14/12	23	1.4	1.1	21.4%
12/18/12	22	2.1	1.3	38.1%

Average	1.39	1.04	24.4%
Median	1.40	1.00	

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Quarterly TTHM Report for disinfection Byproducts Compliance (in ppb)

vstem Nan **City of Folsom - Main** **System Number: 3410014**

Stage 1 Stage 2 Stage 1 and Stage 2

Year	2008				2009				2010						2011								2012							
ample Dat	*1/9*	*4/9*	*7/9*	*10/8*	*1/7*	*4/8*	*7/8*	*10/7*	*1/13*	*4/7*	*7/14*	*7/21*	*10/13*	*10/20*	*1/10*	*1/19*	*4/13*	*4/20*	*7/13*	*7/20*	*10/11*	*10/19*	*1/11*	*1/18*	*4/10*	*4/18*	*7/11*	*7/18*	*10/10*	*10/17*
F01-2	19.0	19.0	21.0	14.0	11.0	30.0	27.0	23.0	36.0	28.0																				
F02-3											34.0		15.0		29.0		25.0		27.0		30.0		18.0		30.0		34.0		18.0	
F02-4	19.0	19.0	27.0	22.0	12.0	24.0	28.0	25.0	43.0	24.0																				
F02-7																														
F02-8												23.0		26.0		42.0		57.0		23.0		37.0		68.0		65.0		53.0		29.0
F03-4											17.0		21.0		30.0		32.0		41.0		40.0		27.0		27.0		43.0		25.0	
F03-6												30.0		23.0		31.0		37.0		23.0		24.0		35.0		35.0		53.0		34.0
F04-2											51.0		35.0		50.0		53.0		56.0		55.0		35.0		41.0		69.0		35.0	
F04-3																														
F06-2											30.0		28.0		49.0		50.0		50.0		48.0		46.0		41.0		80.0		42.0	
F1A-1	22.0	21.0	25.0	20.0	12.0	27.0	26.0	26.0	31.0	26.0		21.0		25.0		47.0		37.0		20.0		32.0		30.0		34.0		34.0		26.0
F1A-2																														
Alhambra																														
P EFF. CO	16.0	18.0	22.0	16.0	6.0	19.0	19.0	18.0	20.0	18.0		15.0		19.0		30.0		27.0		19.0		24.0		21.0		24.0		30.0		23.0
'QSS-FRW-1																														
Quarter	1st Qtr 2008	2nd Qtr 2008	3rd Qtr 2008	4th Qtr 2008	1st Qtr 2009	2nd Qtr 2009	3rd Qtr 2009	4th Qtr 2009	1st Qtr 2010	2nd Qtr 2010		3rdQtr 2010		4th Qtr 2010		1st Qtr 2011		2nd Qtr 2011		3rd Qtr 2011		4th Qtr 2011		1st Qtr 2012		2nd Qtr 2012		3rd Qtr 2012		4th Qtr 2012
rtly Averag	19.0	19.3	23.8	18.0	10.3	25.0	25.0	23.0	32.5	24.0	#REF!		#REF!		#REF!		#REF!		#REF!		27.6		24.0		38.5		39.75		32.38	
RAA TTHM				20.0	17.8	19.3	19.6	20.8	26.4	26.1	#REF!		#REF!		#REF!		31.3		#REF!		#REF!		#REF!		38.5		39.1		36.9	
ets Standa	Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y	
mber of Sam	8		8		8		8		8		8		8		8		8		8		8		8		8		8		8	

Quarterly HAA5 Report for disinfection Byproducts Compliance (in ppb)

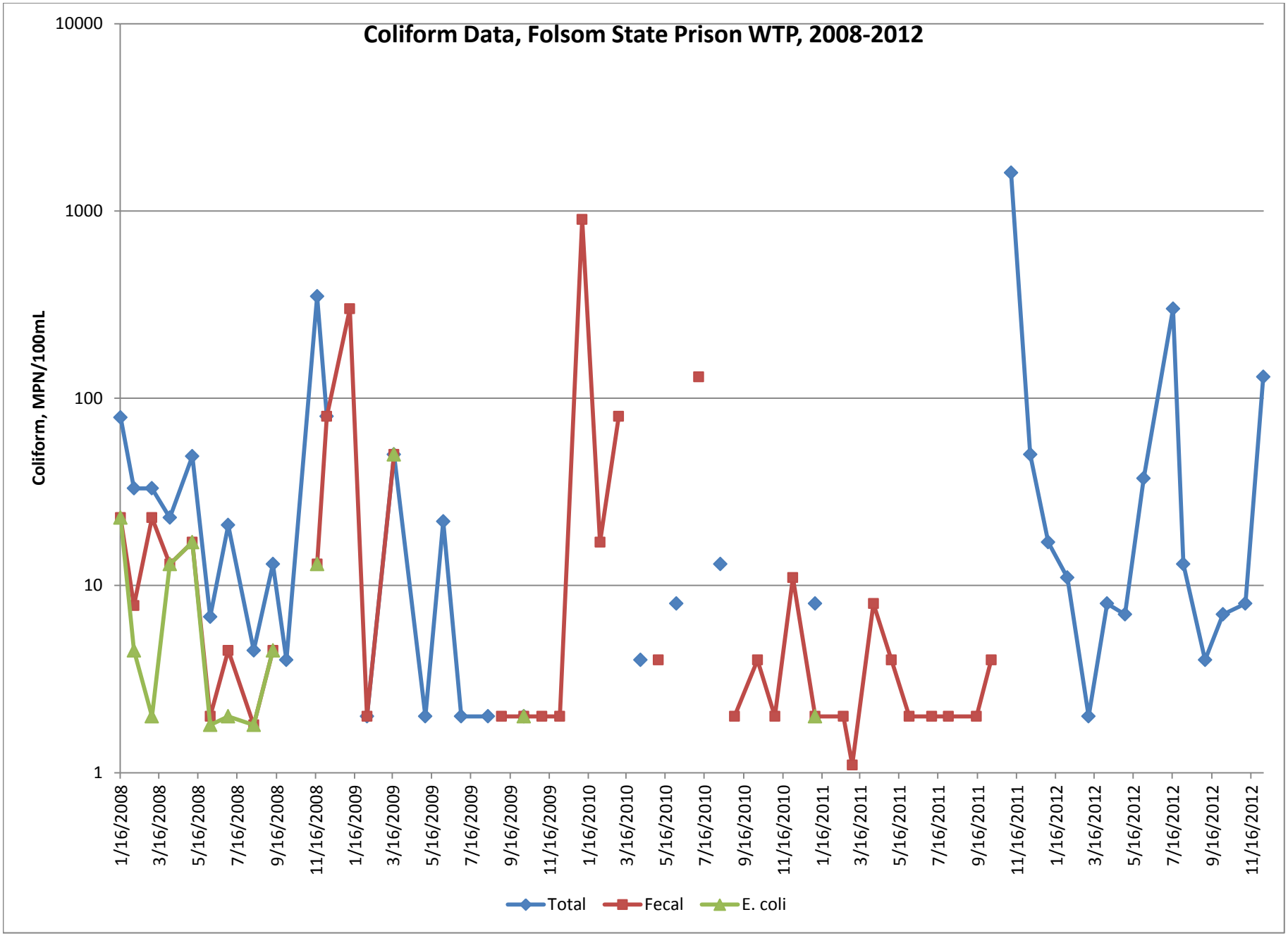
vstem Nan City of Folsom - Main **System Number: 3410014** **Stage 1** Stage 2 Stage 1 and Stage 2

Year	2008				2009				2010						2011								2012							
ample Dat	*1/9*	*4/9*	*7/9*	*10/8*	*1/7*	*4/8*	*7/8*	*10/7*	*1/13*	*4/7*	*7/14*	*7/21*	*10/13*	*10/20*	*1/10*	*1/19*	*4/13*	*4/20*	*7/13*	*7/20*	*10/11*	*10/19*	*1/11*	*1/18*	*4/10*	*4/18*	*7/11*	*7/18*	*10/10*	*10/17*
F01-2	21	14	23	15	10	21	26.0	19	19.0	13.0																				
F02-3											13.0		11.0		31.0		14.0		29.0		26.0		16.0		36.0		26.0		19.0	
F02-4	19	15	23	19	11	20	23	28	26.0	13.0																				
F02-7																														
F02-8												17.0		13.0		42.0		51.0		39.0		33.0		46.0		47.0		49.0		29.0
F03-4											20.0		15.0		26.0		43.0		44.0		37.0		22.0		34.0		35.0		28.0	
F03-6												23.0		11.0		29.0		40.0		29.0		22.0		31.0		39.0		46.0		28.0
F04-2											28.0		28.0		48.0		60.0		52.0		50.0		28.0		46.0		52.0		41.0	
F04-3																														
F06-2											27.0		19.0		50.0		62.0		41.0		36.0		24.0		43.0		33.0		24.0	
F1A-1	21	16	24	18	10	21	22	25	20.0	14.0		16.0		11.0		47.0		40.0		35.0		27.0		26.0		37.0		32.0		23.0
F1A-2																														
Alhambra																														
P EFF. CC	16.0	14.0	20.0	15.0	8.0	14.0	14.0	14.0	12.0	9.0		11.0		6.0		25.0		27.0		25.0		20.0		17.0		26.0		25.0		19.0
Quarter	1st Qtr 2008	2nd Qtr 2008	3rd Qtr 2008	4th Qtr 2008	1st Qtr 2009	2nd Qtr 2009	3rd Qtr 2009	4th Qtr 2009	1st Qtr 2010	2nd Qtr 2010																				
rtly Averag	19.25	14.75	22.5	16.75	9.75	19	21.25	21.5	19.25	12.25	#REF!		#REF!		#REF!		#REF!		#REF!											
RAA HAA5				18.3125	15.9	17.0	16.7	17.9	20.3	18.6	#REF!		#REF!		#REF!		20.41		#REF!		#REF!		#REF!				#DIV/0!		#DIV/0!	
ets Standa	Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y	
mber of Samp	8		8		8		8		8		8		8		8		8		8		8		8		8		8		8	

Folsom Prison Coliform Data

Date	Total	Fecal	E. coli
1/16/2008	79	23	23
2/6/2008	33	7.8	4.5
3/5/2008	33	23	2
4/2/2008	23	13	13
5/7/2008	49	17	17
6/4/2008	6.8	2	<1.8
7/2/2008	21	4.5	2
8/11/2008	4.5	<1.8	<1.8
9/10/2008	13	4.5	4.5
10/1/2008	4		
11/18/2008	350	13	13
12/3/2008	80	80	
1/8/2009		300	
2/4/2009	<2	<2	
3/18/2009	50	50	50
5/6/2009	<2		
6/3/2009	22		
7/1/2009	<2		
8/12/2009	<2		
9/2/2009		<2	
10/7/2009	2	<2	<2
11/4/2009		<2	
12/2/2009		<2	
1/6/2010		900	
2/3/2010		17	
3/4/2010		80	
4/7/2010	4		
5/5/2010		4	
6/2/2010	8		
7/7/2010		130	
8/10/2010	13		
9/1/2010		2	
10/7/2010		4	
11/3/2010		2	
12/1/2010		11	
1/5/2011	8	2	2
2/18/2011		<2	
3/4/2011		<1.1	
4/6/2011		8	
5/4/2011		4	
6/1/2011		2	
7/6/2011		<2	

8/1/2011		<2	
9/14/2011		<2	
10/7/2011		4	
11/7/2011	1600		
12/7/2011	50		
1/4/2012	17		
2/3/2012	11		
3/7/2012	2		
4/5/2012	8		
5/3/2012	7		
6/1/2012	37.3		
7/17/2012	300		
8/2/2012	13		
9/5/2012	4		
10/3/2012	7		
11/7/2012	8		
12/5/2012	130		


Coliform Data, Folsom State Prison WTP, 2008-2012
Coliform, MPN/100mL
10000
1000
100
10
1
1/16/2008
3/16/2008
5/16/2008
7/16/2008
9/16/2008
11/16/2008
1/16/2009
3/16/2009
5/16/2009
7/16/2009
9/16/2009
11/16/2009
1/16/2010
3/16/2010
5/16/2010
7/16/2010
9/16/2010
11/16/2010
1/16/2011
3/16/2011
5/16/2011
7/16/2011
9/16/2011
11/16/2011
1/16/2012
3/16/2012
5/16/2012
7/16/2012
9/16/2012
11/16/2012
Total
Fecal
E. coli

Folsom Prison TOC Data

Date	Raw TOC	Finished TOC
1/16/2008	2.2	1.8
2/6/2008	3.3	2.2
3/5/2008	3	1.8
4/2/2008	2	1.5
5/7/2008	<1	<1
6/4/2008	2.6	<1
7/2/2008	2.2	1.5
8/11/2008	1.1	ND
9/10/2008	1.9	1.4
10/1/2008	2	<1
11/19/2008	1.1	<1
12/3/2008	1.1	0.96
1/8/2009	<1	0.89
2/4/2009	1.2	0.95
3/18/2009	<1	1.3
4/1/2009	2.6	0.64
5/6/2009	2.7	0.94
6/2/2009	1.6	1
7/7/2009	1.1	0.99
8/12/2009	1	1.1
9/11/2009	1.6	<1
10/14/2009	1.7	1.2
11/4/2009	1.8	0.95
12/7/2009	1.9	1.1
1/8/2010	2	1
2/3/2010	1.6	0.97
3/4/2010	<1	0.98
4/14/2010	<1	0.9
5/5/2010	<1	0.89
6/7/2010	<1	0.87
7/12/2010	1.2	1
8/10/2010	ND	ND
9/8/2010	<1	0.72
10/12/2010	2	0.92
11/3/2010	1.5	0.87
12/1/2010	<1	0.88
1/19/2011	0.9	1.4
2/15/2011	1.4	0.9
3/9/2011	1.79	1.27
4/26/2011	2.61	1.08
May-11	1.68	0.911
6/6/2011	1.14	0.975
7/6/2011	1.79	0.819

8/1/2011	1.79	0.819
9/14/2011	1.64	1.12
10/7/2011	1.42	1.03
11/7/2011	1.46	0.992
12/7/2011	1.08	1
1/4/2012	1.27	1.01
2/3/2012	1.3	1.05
3/7/2012	1.54	1.12
4/5/2012	2.22	0.99
5/3/2012	1.46	1.42
6/29/2012	2.2	1.21
7/17/2012	2.31	1.20
8/2/2012	5.15	1.57
9/5/2012	2.24	2.05
10/1/2012	2.41	<1
11/1/2012	4.94	2.11
12/6/2012	3.59	3.40

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: FOLSOM STATE PRISON WATER PLANT System No.: 3410032 Year: 2008/2011 Quarter: 1,2,3,4

Year:	2007				2008				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.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):																				
Site 1	33.0	39.0	31.0	23.0	19.0	24.0	36.0	30.0	20.0	36.0	42.0	50.0	43.0	39.0	58.0	38.0	32.3	27.3	27.7	28.1
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	33.0	39.0	31.0	23.0	19.0	24.0	36.0	30.0	20.0	36.0	42.0	50.0	43.0	39.0	58.0	38.0	32.3	27.3	27.7	28.1
Running Annual Average				31.5	28.0	24.3	25.5	27.3		28.0	33.0	37.0		41.0	47.0	44.5		29.8	29.1	28.9
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	2	2	2	2	2	2	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	SINK AT SEWAGE GRINDING STATION - FURTHEST LOCATION
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.

3/28/02

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: FOLSOM STATE PRISON WATER PLANT System No.: 3410032 Year: 2009 Quarter: 3RD

Year:	2007				2008				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.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):				11/7			8/20				8/19				8/11				8/17	
Site 1				16.5			19.5				28.0				17.0				17.7	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average				16.5			19.5				28.0				17.0				17.7	
Running Annual Average																				
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	

Identify the sample locations in the table below.

Site	Sample Location
1	SINK LOCATED AT SEWAGE GRINDING STATION
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments: Granted an annual waiver from HAA5 testing on May 11th, 2006

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

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: FOLSOM STATE PRISON WATER PLANT System No.: 3410032 Year: 2012/2016 Quarter: 1,2,3,4

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/date):	1/20	4/11																		
Site 1	27.3	38.9	34.9	35.2	50.0															
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	27.3	38.9	34.9	35.2	50.0															
Running Annual Average		33.1		34.1	39.8															
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	2	2	2	2	2	2														

Identify the sample locations in the table below.

Site	Sample Location
1	SINK AT GRINDING STATION - FURTHEST LOCATION
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.

3/28/02

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: FOLSOM STATE PRISON WATER PLANT System No.: 3410032 Year: 2012/2016 Quarter: 3RD

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/date):			8/8																	
Site 1 GRINDER			18.1																	
Site 2																				
Site 3																				
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average			18.1																	
Running Annual Average																				
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																	

Identify the sample locations in the table below.

Site	Sample Location
1	SINK LOCATED AT GRINDING STATION
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Comments: Granted an annual waiver from HAA5 testing on May 11th, 2006

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

System Summary, SJWD

WATER SYSTEM:		
Utility Name		San Juan Water District
Service Area		Citrus Heights, Fair Oaks, North Folsom, Granite Bay, Orange Vale & SSWD
Number Customers - Retail/Wholesale		approx 33,000 - Retail & 232,000 - Wholesale
PWSID No.		CA 3410021
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		82,200 AF/YR (Water Rights and Contracts - USBR, CVP, and PCWA)
INTAKE:		
Location and Description		Shared Diversion Facilities at Folsom Dam
Intake Protection Facilities		Fish Screens and Temperature Control Device
WTP:		
Name		Sidney N. Peterson WTP
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		120 MGD
Capacity Flow Range (MGD)		20-120 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	29 MGD
	Summer (Apr-Sep)	73 MGD
Hours of Operation		24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	Turbidity, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	Chlorine Gas (1.5 mg/L)
Chemical Addition	Chemical, Purpose & Dose	Alum/2% Cationic Blend-Coagulant (5.5 mg/L), Polymer-Coagulant (0.03 mg/L)
Rapid Mix	Volume Basin	0.0586 MG each (2)
	Type of Mixing	Mechanical
	Mixing Energy (G)	300 (1/s)
Recycle	Amount	< 10% Plant Flow
	Frequency	Intermittent - As Needed
Flocculation	No. of Basins	2 - (3 stages)
	Volume Basin	1.582 MG each
	Type of Flocculators	Mechanical - Horizontal
	Mixing Energy	75,55,20 (1/s)
Sedimentation	No. of Basins	2
	Volume Basin	2.505 MG each
	Method of Sludge Removal	Vacuum
Chemical Addition	Chemical, Purpose & Dose	Polymer-Filter Aid (0.02 mg/L)
Filtration	No. of Filters	24
	Type of Filter	Gravity Dual Media
	Filter Box Volume	0.833 MG each (2)
	Underdrain Type	Stainless Steel Plate with Nozzles
	Media: Type, Depth, Area	Sand- inches, Anthracite- inches, Gravel- inches 15,360 sf total
	Filtration Rate	< 6 gpm/sf
	Backwash: Criteria,Rate	Time Based, Turbidity and Headloss Backup
	Filter -to-Waste Facilities	NO
Post-Chlorination	Chemical and Dose	Chlorine Gas (0.5 -0.7 mg/L)
pH Adjustment	Chemical and Dose	Calcium Hydroxide (8.6 mg/L)
Wastewater Handling	Facility	Wastewater Basin
	Sources	Filter Backwash, Sedimentation Basin Sludge
	Decant Recycle Location	To Process Upstream of Floc/Sed Basins
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	68 MG / 16 AC
Floating Covers	(Volume(MG)/Area(AC))	66.5 MG / 14 AC
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Ali Rezvani
	Other WTP's	See American River Watershed Technical CommitteeNotification Chart
	City/County/ State/Federal	See American River Watershed Technical CommitteeNotification Chart

San Juan Water District
Raw Water - Folsom Lake - Bacteriological Report

Date	E. Coli	Fecal Coliforms, MPN/100mL	Total Coliforms MPN/100mL
12/20/2011	13	13	13
12/6/2011	11	33	49
11/22/2011	11	11	17
11/8/2011	4.5	8	11
10/25/2011	2	2	33
10/11/2011	4	4	7
9/27/2011	ND	ND	5
9/13/2011	ND	ND	2
8/30/2011	ND	ND	6
8/16/2011	ND	ND	ND
8/2/2011	ND	ND	4.0
7/19/2011	ND	ND	4.5
7/6/2011	2	2	23
6/21/2011	ND	ND	70
6/7/2011	ND	ND	8
5/24/2011	ND	ND	ND
5/10/2011	ND	ND	2
4/26/2011	4.5	5	13
4/12/2011	4.5	8	49
3/29/2011	49	79	130
3/15/2011	17	23	33
3/1/2011	7.8	13	46
2/15/2011	11	11	33
2/1/2011	7.8	7.8	13
1/18/2011	49	49	79
1/4/2011	4.5	7.8	23
12/21/2010	110	110	920
12/7/2010	13	13	63
11/23/2010	13	22	79
11/10/2010	6.8	6.8	17

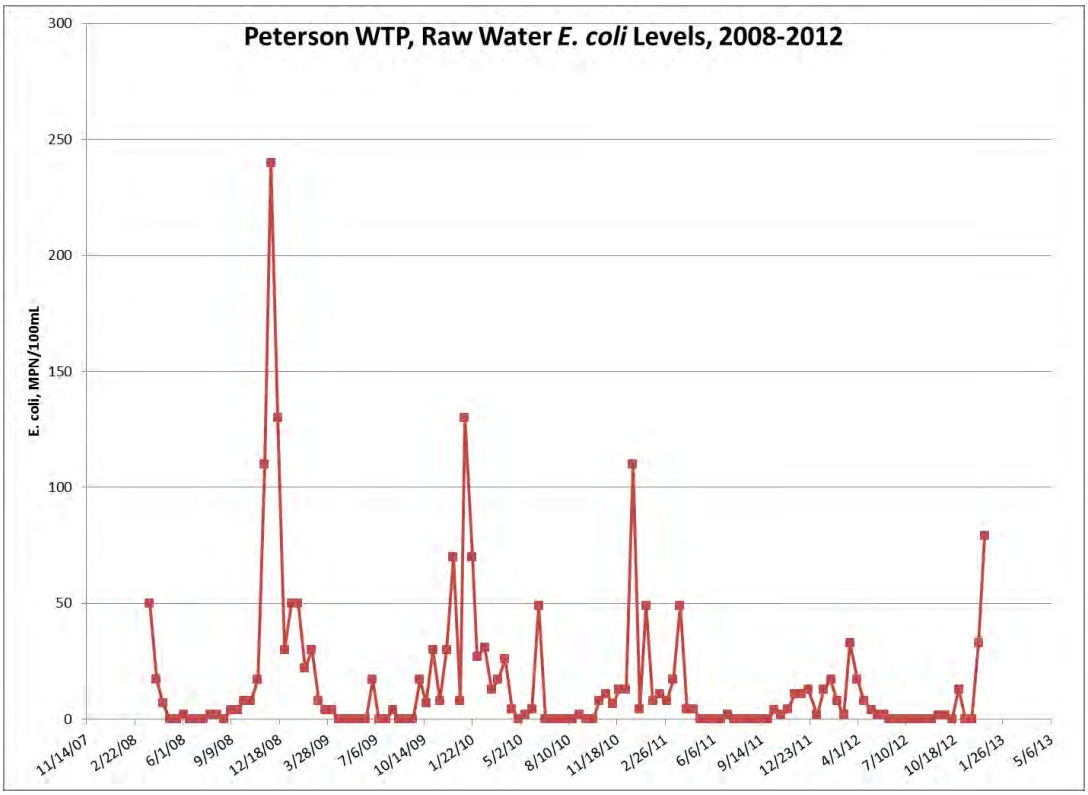
10/27/2010	11	21	27
10/13/2010	7.8	11	17
9/29/2010	ND	ND	2
9/15/2010	ND	ND	2
9/2/2010	2	ND	4
8/18/2010	ND	ND	8
8/4/2010	ND	5	17
7/21/2010	ND	ND	ND
7/7/2010	ND	4	10
6/23/2010	ND	ND	4
6/9/2010	49	ND	ND
5/26/2010	4.5	2	13
5/12/2010	2	2	33
4/28/2010	ND	ND	11
4/14/2010	4.5	5	17
3/31/2010	26	33	33
3/17/2010	17	79	79
3/3/2010	13	13	22
2/17/2010	31	31	31
2/1/2010	27	79	130
1/22/2010	70	70	70
1/6/2010	130	130	130

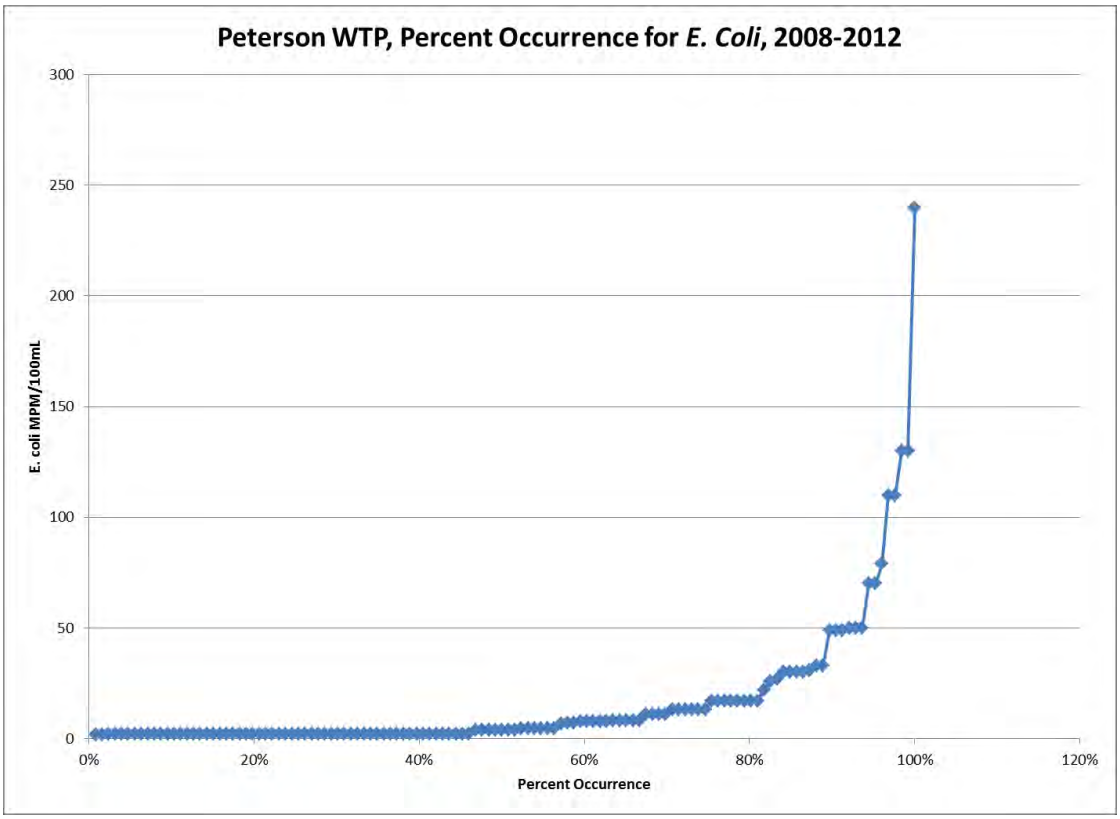
Switched From BSK ↓↓ to MWH Labs ↑↑

12/28/2009	8	8	13
12/14/2009	70	70	90
11/30/2009	30	30	50
11/16/2009	8	8	13
11/2/2009	30	30	30
10/19/2009	7	11	17
10/5/2009	17	17	17
9/21/2009	< 2	< 2	2
9/8/2009	< 2	< 2	4
8/24/2009	< 2	< 2	< 2
8/10/2009	4	4	8
7/27/2009	< 2	< 2	2

7/13/2009	< 2	< 2	< 2
6/29/2009	17	17	17
6/15/2009	< 2	< 2	< 2
6/1/2009	< 2	< 2	< 2
5/18/2009	< 2	< 2	13
5/4/2009	< 2	< 2	< 2
4/20/2009	< 2	< 2	< 2
4/6/2009	4	4	17
3/23/2009	4	4	8
3/9/2009	8	13	50
2/23/2009	30	30	50
2/9/2009	22	50	50
1/26/2009	50	50	50
1/12/2009	50	50	80
12/29/2008	30	30	50
12/15/2008	130	130	130
12/1/2008	240	240	240
11/17/2008	110	110	110
11/3/2008	17	17	17
10/20/2008	8	8	8
10/6/2008	8	8	8
9/22/2008	4	4	4
9/8/2008	4	4	4
8/25/2008	< 2	< 2	2
8/11/2008	2	2	2
7/28/2008	2	2	2
7/14/2008	< 2	< 2	< 2
6/30/2008	< 2	< 2	< 2
6/23/2008	< 2	< 2	< 2
6/16/2008	< 2	< 2	< 2
6/2/2008	2	2	2
5/19/2008	< 2	< 2	< 2
5/5/2008	< 2	< 2	2
4/21/2008	7	7	7
4/7/2008	17	17	17
3/24/2008	50	50	50
3/10/2008	Started	30	30

2/25/2008	30	*	80	*
2/11/2008	30	*	30	*
1/28/2008	50	*	130	*
1/7/2008	90	*	90	*


Peterson WTP, Raw Water E. coli Levels, 2008-2012
E. coli, MPN/100mL
300
250
200
150
100
50
0
11/14/07
2/22/08
6/1/08
9/9/08
12/18/08
3/28/09
7/6/09
10/14/09
1/22/10
5/2/10
8/10/10
11/18/10
2/26/11
6/6/11
9/14/11
12/23/11
4/1/12
7/10/12
10/18/12
1/26/13
5/6/13


Peterson WTP, Percent Occurrence for E. Coli, 2008-2012
E. coli MPM/100mL
300
250
200
150
100
50
0
0%
20%
40%
60%
80%
100%
120%
Percent Occurrence

TOC	Total Organic	Total Organic Carbon
EPA	415.1	415.1
Sample Site	Raw Water TC	Treated Water TOC
12/1/2012	2.4	1.4
11/19/2012	1.6	1.1
10/16/2012	1.8	1.1
9/18/2012	1.4	1.1
8/21/2012	1.9	1.0
7/18/2012	1.7	1.2
6/12/2012	1.7	1.2
5/15/2012	1.7	1.2
4/17/2012	1.6	1.2
3/13/2012	1.4	1.0
2/14/2012	1.4	1.1
1/17/2012	1.4	1.0
12/20/2011	1.4	1.1
11/15/2011	1.4	1.0
10/18/2011	1.5	1.0
9/20/2011	1.3	1.0
8/16/2011	1.6	1.0
7/19/2011	1.4	0.9
6/14/2011	1.2	0.8
5/17/2011	1.2	0.8
4/19/2011	1.5	0.9
3/15/2011	1.5	0.9
2/15/2011	1.5	1.1
1/18/2011	1.7	1.0
12/7/2010	1.6	1.1
11/4/2010	1.8	1.3
10/6/2010	1.4	0.9
9/2/2010	1.4	0.9
8/4/2010	1.7	0.8
7/7/2010	1.6	0.9
6/11/2010	1.4	0.9
5/12/2010	1.3	0.8
4/14/2010	1.4	0.9
3/4/2010	1.4	0.9
2/3/2010	1.7	1.0
1/7/2010	1.4	0.9
12/10/2009	1.4	0.88
11/12/2009	1.5	1
10/7/2009	1.5	0.88
9/10/2009	1.5	0.88
8/13/2009	1.4	0.94
7/9/2009	1.7	0.98
6/11/2009	1.7	1.0
5/14/2009	1.5	0.9
4/9/2009	1.6	1
3/13/2009	1.4	1.1
2/12/2009	1.7	1.4
1/15/2009	1.4	0.98
12/11/2008	1.3	0.82
11/17/2009	1.3	0.84
10/27/2008	1.4	0.90
9/11/2008	1.3	0.80
8/14/2008	1.4	0.96
7/10/2008	1.5	0.87
6/12/2008	1.4	1.1
5/15/2008	1.6	1.0
4/10/2008	1.6	1.3
3/13/2008	1.4	1.0
2/12/2008	1.8	1.2
1/8/2008	1.3	0.9

Drinking Water Program

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: San Juan System No.: 3410014 Year: 2003 Quarter: 4th

Year:		2008			2009				2010				2011				2012			
Quarter:	1st Qtr. '08	2nd Qtr. '08	3rd Qtr. '08	4th Qtr. '08	1st Qtr. '09	2nd Qtr. '09	3rd Qtr. '09	4th Qtr. '09	1st Qtr. '10	2nd Qtr. '10	3rd Qtr. '10	4th Qtr. '10	1st Qtr. '11	2nd Qtr. '11	3rd Qtr. '11	4th Qtr. '11	1st Qtr. '12	2nd Qtr. '12	3rd Qtr. '12	4th Qtr. '12
Sample Date (month/date):	1/22	4/24	7/24	10/21	1/15	4/9	7/9	10/7	1/7	4/7	7/7	10/6	1/1	4/17	7/19	10/18	1/18	4/17	7/24	10/16
Site 1 - 9660 Snowberry	30	27.0	34.0	33.0	26.0	44.0	38.0	36.0	30.0	44.0	38.0	36.0	37.0	59.0	44.0	46.0	24.0	44.0	41.0	43.0
Site 2-8025 Ramsgate	39	31.0	34.0	37.0	32.0	52.0	38.0	39.0	39.0	53.0	38.0	36.0	58.0	63.0	45.0	52.0	31.0	56.0	41.0	44.0
Site 3 - Petite Creek Way	31	27.0	31.0	33.0	28.0	42.0	31.0	31.0	30.0	39.0	35.0	31.0								
Site 4 - East Hidden Lakes	36	27.0	27.0	37.0	31.0	53.0	38.0	34.0	29.0	48.0	27.0	23.0								
Site 5 - 4680 Lawrence													64.0	71.0	49.0	50.0	34.0	54.0	40.0	46.0
Site 6 - 501 Fort Rock													30.0	57.0	41.0	41.0	24.0	37.0	38.0	40.0
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	34.0	28.0	31.5	35.0	29.3	47.8	36.3	35.0	32.0	46.0	34.5	31.5	47.3	62.5	44.8	47.3	28.3	47.8	40.0	43.3
RAA TTHM				32.1	30.9	35.9	37.1	37.1	37.8	37.3	36.9	36.0	39.8	43.9	46.5	50.4	45.7	42.0	40.8	39.8
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 ☐
Number of Samples Taken		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Drinking Water Program

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: San Juan System No.: 3410014 Year: 2003 Quarter: 4th

Year:		2008			2009				2010				2011				2012			
Quarter:	1st Qtr. '08	2nd Qtr. '08	3rd Qtr. '08	4th Qtr. '08	1st Qtr. '09	2nd Qtr. '09	3rd Qtr. '09	4th Qtr. '09	1st Qtr. '10	2nd Qtr. '10	3rd Qtr. '10	4th Qtr. '10	1st Qtr. '11	2nd Qtr. '11	3rd Qtr. '11	4th Qtr. '11	1st Qtr. '12	2nd Qtr. '12	3rd Qtr. '12	4th Qtr. '12
Sample Date (month/date):	1/22	4/24	7/24	10/21	1/15	4/9	7/9	10/7	1/7	4/7	7/7	10/6	1/1	4/17	7/19	10/18	1/18	4/17	7/24	10/16
Site 1 - 9660 Snowberry	24	19.0	11.0	13.0	15.0	22.0	28.0	27.0	23.0	33.0	32.0	26.0	39.0	32.0	35.0	30.0	25.0	41.0	25.0	26.0
Site 2-8025 Ramsgate	18	16.0	11.0	11.0	13.0	18.0	29.0	28.0	19.0	35.0	28.0	21.0	22.0	28.0	32.0	27.0	22.0	36.0	23.0	24.0
Site 3 - Petite Creek Way	22	20.0	9.4	12.0	15.0	17.0	28.0	26.0	26.0	33.0	29.0	24.0								
Site 4 - East Hidden Lakes	14	15.0	9.5	9.1	12.0	14.0	20.0	25.0	20.0	19.0	15.0	20.0								
Site 5 - 4680 Lawrence													24.0	26.0	28.0	26.0	21.0	33.0	21.0	22.0
Site 6 - 501 Fort Rock													34.0	32.0	37.0	29.0	26.0	41.0	24.0	29.0
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	19.5	17.5	10.2	11.3	13.8	17.8	26.3	26.5	22.0	30.0	26.0	22.8	29.8	29.5	33.0	28.0	23.5	37.8	23.3	25.3
RAA TTHM				14.6	13.2	13.3	17.3	21.1	23.1	26.2	26.1	25.2	27.1	27.0	28.8	30.1	28.5	30.6	28.1	27.4
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 ☐
Number of Samples Taken		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

System Summary, Roseville

WATER SYSTEM:		
Utility Name		City of Roseville
Service Area		Roseville
Number Customers - Retail/Wholesale		106,255/0
PWSID No.		CA3110008
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		62,800 AF/YR (Contracts - USBR, PCWA, and SJWD)
INTAKE:		
Location and Description		Shared Diversion Facilities at Folsom Dam
Intake Protection Facilities		Fish Screens and Temperature Control Device
WTP:		
Name		Roseville WTP
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		100 MGD
Operating Flow Range (MGD)		13 - 60 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	16 MGD
	Summer (Apr-Sep)	36 MGD
Hours of Operation		24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	Turbidity, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	Chlorine (0.5 mg/L)
pH Adjustment	Chemical and Dose	Sodium Hydroxide (As needed)
Chemical Addition	Chemical, Purpose & Dose	Alum-Coagulant (7-14 mg/L), Polymer-Coagulant Aid (0.2 mg/L)
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Headloss at Inlet Control Valve
Recycle	Amount	< 10% Plant Flow
	Frequency	Intermittent - As Needed
Flocculation	No. of Basins	Reactor Chambers in 3 Clarifiers, 4 stage flocculation in floc/sed basin
	Volume Basin	450,000 gallon Flocculation Basin
	Type of Flocculators	Clarifier Turbines, Flocculator Vertical Shaft mixers
	Mixing Energy	Unknown, Variable
Sedimentation	No. of Basins	3- Upflow Circular Clarifiers, 3 - Gravity Basin
	Volume Basin	2 - 750,000 gallon and 1 - 1,400,000 gallon Clarifier, 1 - 2,100,000 gallon Sedimenation Basin
	Surface Load Rate	1.5 gpm/sf
	Method of Sludge Removal	Clarifier Rotating Rake, Sedimentation Basin Chain and Flight
Chemical Addition	Chemical, Purpose & Dose	Non-Ionic Polymer (5-20 ug/L) - Filter Aid
Filtration	No. of Filters	12
	Type of Filter	Gravity Dual Media
	Filter Box Volume	Cast in Place Concrete
	Underdrain Type	Leopold Superblock II with IMS Cap
	Media: Type, Depth, Area	Sand, 12 inches; Anthracite, 30inches; 1152 sf/filter
	Filtration Rate	6 gpm/sf
	Backwash: Criteria,Rate	Time Based with Turbidity Level Backup, 18.5 gpm/sf
	Filter-to-Waste	Yes - 3-5 minutes
Post-Chlorination	Chemical and Dose	Sodium Hypochlorite (0.8 mg/L)
Fluoridation	Chemical and Dose	Hydrofluosilic Acid (0.8 mg/L)
pH Adjustment	Chemical and Dose	Calcium Oxide or Sodium Hydroxide (pH 8.6-8.8)
Wastewater Handling	Facility	Reclamations Basins
	Sources	Filter Backwash, Filter-to-Waste Water, Sludge Lagoon Decant
	Decant Recycle Location	To Process Upstream of Floc/Sed Basins or Clarification Basin
	Facility	Centrifuge, Sludge Lagoons
	Sources	Clarifier Blowoff, Floc/Sedimentation Basin Sludge
	Decant Recycle Location	To Reclamation Basins
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	22 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Mike McNamara, Lassen District, Redding, CA
	Other WTP's	See American River Watershed Technical CommitteeNotification Chart
	City/County/ State/Federal	See American River Watershed Technical CommitteeNotification Chart

Roseville Coliforms

Date	Total coliform
1/9/2008	80
2/13/2008	2
3/5/2008	21
4/9/2008	8
5/7/2008	2
6/12/2008	6
7/9/2008	17
8/12/2008	4
9/10/2008	8
10/8/2008	4
Nov-08	0
12/3/2008	70
1/7/2009	8
2/2/2009	13
3/4/2009	80
4/7/2009	13
5/4/2009	7
6/2/2009	2
Jul-09	no data could be found in their files
8/5/2009	2
9/2/2009	2
10/6/2009	2
11/5/2009	2
12/9/2009	4
1/6/2010	4
2/3/2010	13
3/4/2010	24
4/7/2010	11
5/5/2010	2
6/2/2010	17
7/6/2010	2
8/3/2010	8
9/8/2010	2
10/5/2010	2
11/9/2010	4
12/7/2010	13
1/18/2011	17
Feb-11	13
3/8/2011	30
4/12/2011	11
5/17/2011	4
6/2/2011	0
Jul-11	0
8/9/2011	2

Sep-11	2
10/11/2011	4
Nov-11	2
Dec-11	17
Jan-12	13
Feb-12	7
Mar-12	13
Apr-12	30
May-12	7
Jun-12	12
Jul-12	2
Aug-12	2
Sep-12	8
Oct-12	23
Nov-12	11
Dec-12	500

ave	20.15254
median	7
min	0
max	500

CITY OF ROSEVILLE MONITORING
Monitoring For TOC/Alkalinity Monitoring (Enhanced Coagulation)

Sample Date	TOC (raw) Raw Water Tap (mg/L)	Alkalinity (raw) Raw Water Tap (mg/L)	TOC (filtered) Filtered Water Sample Sink (mg/L)	Lab Report (raw)	Lab Report (filtered)
05/26/04	0.7	22	1.0	2405270221-127880	2405270222-127880
06/23/04	1.4	22	1.1	2406230041-129324	A4F2345
07/28/04	1.3	20	0.9	2407280068-131603	2407280069-131603
08/19/04	1.2	25	0.9	2408190114-133061	2408190117-133061
09/20/04	1.1	15	0.8	2409200020-134865	2409200021-134865
10/20/04	1.3	21	1.0	2410200099-136758	2410200098-136758
11/18/04	1.2	24	1.0	2411190160-138664	2411190159-138664
12/21/05	1.4	27	1.1	2412210032-140126	2412210033-140126
01/18/05	2.2	29	1.4	2501180107-141297	2501180125-141297
02/22/05	1.4	28	0.9	2502220110-143317	2502220112-143317
03/22/05	1.4	27	1.1	2503220184-145016	2503220185-145016
04/19/05	1.6	41	1.0	2504190043-146590	2504190044-146590
05/17/05	1.4	25	0.9	2505180021-148395	2505180022-148395
06/17/05	1.7	17	1.0	2506210042-150504	2506210043-150504
07/19/05	1.5	16	1.0	2507190005-152315	2507190006-152315
08/16/05	1.6	16	1.1	2508160113-154589	2508160114-154589
09/19/05	1.5	17	1.1	2509200104-156950	2509200105-156950
10/18/05	1.5	17	1.2	2510180067-159114	2510180068-159114
11/18/05	1.6	21	1.0	2511220229-161994	2511220230-161994
12/19/06	1.5	21	1.1	2512200078-163909	2512200078-163909
01/17/06	2.2	21	1.3	2601170116-165480	2601170116-165480
02/20/06	1.9	23	1.2	2602200070-167900	2602200069-167900
03/14/06	1.6	25	1.1	2603210049-170001	2603210050-170001
04/17/06	1.3	24	0.87	2604180164-172161	2604180163-172161
05/15/06	1.3	16	0.82	2605160081-174244	2605160081-174244
06/12/06	1.5	14	0.90	2606200029-176865	2606200027-176865
07/17/06	1.4	14	0.97	2607180076-179141	2607180075-179141
08/15/06	1.7	13	1.00	2608150372-181378	2608150370-181378
09/19/06	1.3	16	0.92	2609190369-184392	2609190369-184392
10/17/06	1.3	16	0.79	2610180428-186830	2610180429-186830
11/14/06	1.3	20	1.00	2611150113-188907	2611150114-188907
12/18/06	1.4	21	0.95	2612200069-191536	2612200070-191536
01/16/07	1.3	23	0.96	2701180354-193682	2701180355-193682
02/20/07	1.4	21	1.00	2702220189-196856	2702220190-196856
03/20/07	1.5	25	0.97	2703220227-199390	2703220229-199390
04/17/07	1.4	26	1.00	2704180183-201952	2704180185-201952
05/15/07	3.1	25	2.50	2705160560-204778	2705160561-204778
06/12/07	1.4	23	0.95	2706130039-207303	2706130040-207303
07/10/07	1.3	27	0.90	2707110531-209935	2707110532-209935
08/14/07	1.3	20	0.89	2708160034-213382	2708160035-213382
09/11/07	1.4	21	0.91	2709120232-216026	2709120233-216026
10/09/07	1.4	23	1.10	2710100321-219023	2710100322-219023
11/14/07	1.3	23	1.10	2711140740-222472	2711140741-222472
12/11/07	1.3	28	0.90	2712120210-224791	27121120211-224791
01/08/08	1.2	33	0.90	2801090653-227011	2801090654-227011
02/12/08	1.6	29	1.4	2802130273-230465	2802130274-230465
03/13/08	1.4	33	1.2	2803140305-234004	2803140306-234004
04/11/08	1.6	24	1.3	2804110149-237079	2804110150-237079
05/08/08	1.6	25	1.3	2805160286-241232	2805160288-241232
06/12/08	1.7	23	1.1	2806130200-244155	2806130201-244155
07/10/08	1.5	25	0.9	2807110567-247254	2807110582-247254
08/14/08	1.5	33	0.8	2808140390-250775	2808140391-250775
09/11/08	1.2	26	0.8	2809120031-253806	2809120032-253806
10/09/08	1.6	23	0.9	2810130052-256410	2810130054-256410
11/13/08	1.4	27	1.1	2811140182-259155	2811140183-259155
12/11/08	1.3	22	1.1	2812130036-261237	2812130037-261237
01/15/09	1.3	27	1.1	200901200001-302887	200901200002-302887
02/12/09	1.3	31	1.1	200902140063-303500	200902140064-303500
03/12/09	1.7	29	1.2	200903120026-304162	200903120027-304162
04/09/09	1.9	26	1.1	200904090114-304878	200904090115-304878
May					
06/11/09	1.6	18	1.0	200906110035-307861	200906110036-307861

CITY OF ROSEVILLE MONITORING
Monitoring For TOC/Alkalinity Monitoring (Enhanced Coagulation)

07/09/09	1.5	18	1.1	200907090352-309347	200907090353-309347
08/13/09	1.4	19	0.9	200908140504-312212	200908140505-312212
09/10/09	1.7	19	0.9	200909100222-314088	200909100223-314088
10/07/09	1.4	17	1.0	200910070642-316263	200910070642-316263
11/23/09	1.3	28	1.0	200911230080-319989	200911230080-319989
12/29/09	1.1	23	0.9	ISL2918-01	ISL2918-02
01/26/10	1.4	22	0.7	ITA2334-01	ITA2334-02
02/24/10	1.4	26	0.9	ITB2592-01	ITB2592-02
03/31/10	1.3	24	0.9	ITD0038-01	ITD0038-02
04/29/10	1.2	28	0.9	ITD2858-01	ITD2858-02
05/26/10	1.2	23	0.9	ITE26201/ITE2620-03	ITE2620-02
06/30/10	1.3	19	0.9	ITG0050-01	ITG0050-02
07/28/10	1.3	19	0.7	ITG2612-01	ITG2612-02
08/25/10	1.4	20	1.0	ITH2344-01	ITH2344-02
09/01/10	1.2	20	1.0	ITI0737-01/ITI0737-03	ITI0737-03
10/20/10	1.2	18	0.8	ITJ2134-01	ITJ2134-02
11/09/10	1.2	20	0.8	ITK1264-01	ITK1264-02
12/07/10	1.4	56	1.1	ITL0930-01	ITL0930-02
01/10/11	1.6	24	1.1	IUA1277-01/IUA1277-03	IUA1277-02
02/09/11	1.4	26	1.0	IUB1171-01	IUB1171-02
03/09/11	1.4	30	1.0	IUC1286-01	IUA1286-02
04/12/11	1.3	30	0.9	IUD1402-01/IUD1402-03	IUD1402-02
05/10/11	1.1	21	0.7	IUE1302-01	IUE1302-02
06/07/11	1.0	18	0.7	IUF0935-01	IUF0935-02
07/13/11	1.3	ND	0.7	IUG1492-01/IUG1492-03	IUG1492-02
08/09/11	1.2	16	0.8	IUH1432-01/IUH1432-03	IUH1432-02
09/13/11	1.4	16	1.0	IUI1418-01	IUI1418-02
10/12/11	1.1	18	1.0	IUJ1673-01/IUJ1673-03	IUJ1673-02
11/08/12	1.5	17	1.2	IUK1418-01	IUK1418-02
12/14/11	2.0	20	1.9	IUL1706-01	IUL1706-02
01/10/12	1.5	22	1.3	IVA1360-01/IVA1360-03	IVA1360-02
02/16/12	1.7	16	1.3	440-3071-1/440-3071-3	440-3071-2
03/14/12	1.6	24	1.2	440-5720-1	440-5720-2
04/18/12	2.1	16	1.9	440-9382-1	440-9382-2
05/16/12	1.8	28	1.4	440-12283-1	440-12283-2
06/13/12	1.7	20	1.2	440-14750-1	440-14750-2
07/12/12	2.5	16	1.2	440-17383-1/440-17383-3	440-17383-2
08/09/12	1.7	20	1.3	440-20035-1/440-20035-3	440-20035-2
09/13/12	1.5	16	1.1	440-23494-1	440-23494-2
10/10/12	1.5	20	1.1	440-26192-1	440-26192-2
11/14/12	1.5	20	1.2	440-30101-1/440-30101-3	440-30101-2
12/13/12	2.6	20	1.6	440-32875-1	440-32875-2
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
2012 AVERAGE:	#DIV/0!	#DIV/0!	#DIV/0!		
2012 MINIMUM:	0.0	0.0	0.0		
2012 MAXIMUM:	0.0	0.0	0.0		
AVERAGE:	1.5	22.6	1.0		
MINIMUM:	0.7	13.0	0.7		
MAXIMUM:	3.1	56.0	2.5		

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Roseville System No.: 3410014 Year: 2003 Quarter: 4th

Year:		2008			2009				2010				2011				2012			
Quarter:	1st Qtr. '08	2nd Qtr. '08	3rd Qtr. '08	4th Qtr. '08	1st Qtr. '09	2nd Qtr. '09	3rd Qtr. '09	4th Qtr. '09	1st Qtr. '10	2nd Qtr. '10	3rd Qtr. '10	4th Qtr. '10	1st Qtr. '11	2nd Qtr. '11	3rd Qtr. '11	4th Qtr. '11	1st Qtr. '12	2nd Qtr. '12	3rd Qtr. '12	4th Qtr. '12
Sample Date (month/date):	1/1	4/1	7/1	10/1	1/14	4/7	7/8	10/6	1/6	4/7	7/13	10/26	1/10	4/13	7/12	10/11	1/12	4/9	7/10	10/10
Site 1 - WTP Finished Water					13.0	28.0	40.0	36.0	18.0	26.0	22.0	25.0								
Site 2-JR Raquet Club	19	21.0	24.0	24.0	19.0	39.0	38.0	44.0	16.0	41.0	25.0	26.0								
Site 3 - Washington Square	24	25.0	32.0	38.0	27.0	47.0	44.0	62.0	24.0	42.0	35.0	44.0	41.0	39.0	39.0	45.0	34.0	42.0	41.0	32.0
Site 4 - Press Tribune	29	29.0	39.0	51.0	27.0	55.0	53.0	56.0	25.0	46.0	40.0	34.0	31.0	37.0	42.0	44.0	36.0	49.0	41.0	28.0
Site 5 - Schoolhouse Lane	7.5	41.0	57.0	58.0	37.0	63.0	64.0	63.0	30.0	46.0	47.0	48.0								
Site 6 - 118 Wills Road													64.0	66.0	91.0	62.0	73.0	66.0	81.0	58.0
Site 7 - 2005 Hilltop Circle													52.0	43.0	60.0	45.0	36.0	44.0	47.0	38.0
Site 8 - 6817 Maple Creek													62.0	37.0	59.0	47.0	34.0	47.0	45.0	36.0
Site 9 - Kinko's													38.0	29.0	36.0	37.0	27.0	41.0	37.0	25.0
Site 10 - Olympus Europa													46.0	35.0	67.0	38.0	40.0	47.0	58.0	38.0
Site 11 - Pleasant Grove WWTP													62.0	63.0	94.0	56.0	63.0	60.0	80.0	48.0
Quarterly Average	19.9	29.0	38.0	42.8	24.6	46.4	47.8	52.2	22.6	40.2	33.8	35.4	49.5	43.6	61.0	46.8	42.9	49.5	53.8	37.9
0				32.4	33.6	37.9	40.4	42.8	42.3	40.7	37.2	33.0	39.7	40.6	47.4	50.2	48.6	50.0	48.2	46.0
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 ☐
Number of Samples Taken		4	4	4	5	5	5	5	5	5	5	5	8	8	8	8	8	8	8	8

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Roseville System No.: 3410014 Year: 2003 Quarter: 4th

Year:		2008			2009				2010				2011				2012			
Quarter:	1st Qtr. '08	2nd Qtr. '08	3rd Qtr. '08	4th Qtr. '08	1st Qtr. '09	2nd Qtr. '09	3rd Qtr. '09	4th Qtr. '09	1st Qtr. '10	2nd Qtr. '10	3rd Qtr. '10	4th Qtr. '10	1st Qtr. '11	2nd Qtr. '11	3rd Qtr. '11	4th Qtr. '11	1st Qtr. '12	2nd Qtr. '12	3rd Qtr. '12	4th Qtr. '12
Sample Date (month/date):	1/1	4/1	7/1	10/1	1/14	4/7	7/8	10/6	1/6	4/7	7/13	10/26	1/10	4/13	7/12	10/11	1/12	4/9	7/10	10/10
Site 1 - WTP Finished Water					15.0	34.0	42.0	27.0	24.0	25.0	15.0	17.0								
Site 2-JR Raquet Club	12	24.0	21.0	18.0	17.0	31.0	42.0	25.0	21.0	27.0	18.0	20.0								
Site 3 - Washington Square	13	31.0	20.0	17.0	19.0	41.0	40.0	27.0	24.0	30.0	25.0	18.0	27.0	29.0	34.0	33.0	21.0	33.0	33.0	29.0
Site 4 - Press Tribune	15	34.0	18.0	18.0	18.0	39.0	52.0	28.0	23.0	36.0	26.0	23.0	28.0	29.0	32.0	33.0	22.0	34.0	33.0	29.0
Site 5 - Schoolhouse Lane	0	30.0	24.0	18.0	19.0	33.0	35.0	25.0	20.0	28.0	20.0	19.0								
Site 6 - 118 Wills Road													21.0	31.0	28.0	26.0	18.0	23.0	11.0	20.0
Site 7 - 2005 Hilltop Circle													25.0	32.0	45.0	26.0	21.0	23.0	32.0	34.0
Site 8 - 6817 Maple Creek													22.0	34.0	40.0	37.0	20.0	38.0	37.0	35.0
Site 9 - Kinko's													26.0	21.0	27.0	31.0	20.0	39.0	32.0	28.0
Site 10 - Olympus Europa													24.0	30.0	35.0	36.0	18.0	31.0	29.0	19.0
Site 11 - Pleasant Grove WWTP													25.0	33.0	27.0	23.0	20.0	30.0	24.0	20.0
Quarterly Average	10.0	29.8	20.8	17.8	17.6	35.6	42.2	26.4	22.4	29.2	20.8	19.4	24.8	29.9	33.5	30.6	20.0	31.4	28.9	26.8
0				19.6	21.5	22.9	28.3	30.5	31.7	30.1	24.7	23.0	23.5	23.7	26.9	29.7	28.5	28.9	27.7	26.8
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 ☐
Number of Samples Taken		4	4	4	5	5	5	5	5	5	5	5	8	8	8	8	8	8	8	8

System Summary, GSWC

WATER SYSTEM:		
Utility Name		Golden State Water Company
Service Area		Rancho Cordova
Number Customers - Retail/Wholesale		14,557 active connections as of 12/31/11
PWSID No.		CA3410015
SOURCE:		
Name		Folsom South Canal/American River Diversion
Entitlement and Amount		10,000 AF/YR (of which 5,000 AF/YR are leased to the City of Folsom). Additionally, GSWC has a short term reallocation of surface water rights (5,000 AF/YR) from the City of Folsom.
INTAKE:		
Location and Description		Intake Facilities on Folsom South Canal
Intake Protection Facilities		Fish Screens
WTP:		
Name		Coloma WTP / Pyrites WTP
Type of Treatment		Alternative WTP (per CDPH)
State Approved Plant Capacity (MGD)		15.7 MGD (includes Pyrites WTP)
Capacity Flow Range (MGD)		0 - 15.7 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	5.3 MGD (includes Pyrites WTP)
	Summer (Apr-Sep)	11.5 MGD (includes Pyrites WTP)
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22, Giardia/Crypto
	Treated Water	Turbidity, Coliform, TOC, DBPs, Lead/Copper, Title 22
UNIT PROCESSES:		
Pre-Oxidation	Chemical and Dose	Potassium Permanganate, 0.1 - 0.3 mg/L
Recycle	Amount	250 gpm
	Frequency	8 hours/day
Basin 1 (Coloma)		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer-Coagulant (4 - 7 mg/L)
	Chemical, Purpose & Dose	Nonionic Polymer - Coagulant Aid (0.03 - 0.05 mg/l)
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Static Mixer
Flocculation	No. of Basins	1
	Volume Basin	15260 gallons
	Type of Flocculators	Vertical paddle
	Mixing Energy	60g
Sedimentation	No. of Basins	1
	Volume Basin	73,603 gallons
	Surface Load Rate	maximum - 1.5 gal/ft2
	Method of Sludge Removal	Mechanical Sludge Flights
Basin 2 (Coloma)		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer-Coagulant (4 - 6 mg/L)
	Chemical, Purpose & Dose	Nonionic Polymer - Coagulant Aid (0.03 - 0.05 mg/l)
Rapid Mix	Volume Basin	8,616 gallons
	Type of Mixing	Hydraulic (Mixers under low flow conditions)
Flocculation	No. of Basins	2
	Volume Basin	53,856 gallons (both stages)
	Type of Flocculators	Vertical paddle
	Mixing Energy	1st Stage - 80g, 2nd Stage - 40g
Sedimentation	No. of Basins	1
	Volume Basin	224,400 gallons
	Surface Load Rate	maximum - 2.0 gals/ft2
	Method of Sludge Removal	Mechanical Sludge Flights
Filtration (Coloma)		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer-Filter Aid (0.1 - 0.4 mg/L)
Filtration	No. of Filters	10
	Type of Filter	Dual Media Pressure Filters Constant Rate Control
	Underdrain Type	Johnson Screen
	Media: Type, Depth, Area	Anthracite(18"),Sand,Garnet(28"),Total Area = 2560 sf
	Filtration Rate	2 - 3 gpm/sf
	Backwash: Criteria,Rate	Filter run time (24 hrs) or turbidity >0.2 NTU; 15 gpm/sf
	Filter -to-Waste	Yes - 10 minutes
Actifloc (Pyrites)		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer - Coagulant (3 - 6 mg/L)
Flash Mix	Type of Mixing	In-line mechanical mixer (16" diameter)
Actifloc Packaged Treatment System		
	No. of Units	2
Clarification	Type of Treatment	4-stage microsand enhanced flocculation and settling
Chemical Addition	Chemical, Purpose & Dose	Microsand - Flocculant Aid, 3 to 5 g/L
Chemical Addition	Chemical, Purpose & Dose	Nonionic Polymer - Flocculant Aid (0.1 - 0.2 mg/l)
	Surface Load Rate	28 gpm/ft^2 through inclined tube settlers
	Method of Sludge Removal	Microsand-sludge separation via hydrocyclone (4 ea.)
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer - Filter Aid (0.1 - 0.2 mg/L)
Filtration	No. of Filters	2
	Type of Filter	Gravity Flow Multi Media Rapid Sand Filter Constant Rate Control
	Underdrain Type	Multiblock
	Media: Type, Depth, Area	Anthracite(18"),Silica Sand(9"),Garnet Sand(3") Total Surface Area = 700 sf
	Filtration Rate	5 gpm/sf
	Backwash: Criteria,Rate	Filter run time (24 to 48 hrs) or headloss; 15 gpm/sf
	Filter -to-Waste	Yes - 5 minutes
Post-Chlorination	Chemical and Dose	Chlorine Gas (1-3 mg/L)
Wastewater Handling	Facility	Upflow Clarifier/Holding Pond/County Sewer
	Sources	Filter Backwash, Filter Waste Washwater
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	14.5 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Mike Tolin
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

Facility:	00 Coloma Plant; 01 Coloma Surface Water Treatment Plant
Sampling Point:	01 Coloma & Pyrites SWTP (Raw) (3-4-SR, FB55)

Escherichia coli / E. coli (MPN / PA)

03/04/2008 13:01	16	MPN/100mL
03/11/2008 10:20	7.5	MPN/100mL
03/18/2008 10:10	5.2	MPN/100mL
03/25/2008 09:50	6.3	MPN/100mL
04/01/2008 08:50	9.7	MPN/100mL
04/08/2008 12:15	2	MPN/100mL
04/15/2008 09:16	8.5	MPN/100mL
04/22/2008 09:23	65.7	MPN/100mL
04/29/2008 09:00	34.5	MPN/100mL
05/06/2008 08:50	22.6	MPN/100mL
05/13/2008 08:30	81.6	MPN/100mL
05/20/2008 08:40	38.8	MPN/100mL
05/27/2008 08:35	140.1	MPN/100mL
06/03/2008 08:30	38.9	MPN/100mL
06/10/2008 08:30	23.1	MPN/100mL
06/17/2008 08:45	16.1	MPN/100mL
06/24/2008 08:50	23.5	MPN/100mL
07/01/2008 08:30	12.2	MPN/100mL
07/08/2008 08:30	2.0	MPN/100mL
07/15/2008 08:30	6.3	MPN/100mL
07/22/2008 09:20	15.8	MPN/100mL
07/29/2008 08:30	13.4	MPN/100mL
08/05/2008 08:30	7.4	MPN/100mL
08/11/2008 09:15	7.4	MPN/100mL
08/12/2008 10:05	5.2	MPN/100mL
08/19/2008 09:08	10.9	MPN/100mL
08/26/2008 09:15	3.1	MPN/100mL
09/02/2008 00:00	11.9	MPN/100mL
09/09/2008 00:00	8.4	MPN/100mL
09/16/2008 00:00	14.6	MPN/100mL
09/23/2008 00:00	25.00	MPN/100mL
09/30/2008 00:00	33.00	MPN/100mL
10/07/2008 00:00	16.00	MPN/100mL
10/14/2008 00:00	8.5	MPN/100mL
10/21/2008 00:00	7.4	MPN/100mL
10/28/2008 00:00	16.00	MPN/100mL
11/04/2008 00:00	23.00	MPN/100mL
11/12/2008 00:00	26.00	MPN/100mL
11/18/2008 00:00	26.00	MPN/100mL
11/25/2008 00:00	16.00	MPN/100mL
11/26/2008 10:00	14.5	MPN/100mL
12/02/2008 00:00	31.5	MPN/100mL
12/09/2008 00:00	11.0	MPN/100mL
12/16/2008 00:00	13.4	MPN/100mL
12/23/2008 00:00	14.5	MPN/100mL
01/06/2009 00:00	0	MPN/100mL
02/10/2009 00:00	0	MPN/100mL

02/18/2009 00:00	27.5	MPN/100mL
02/24/2009 00:00	14.8	MPN/100mL
03/24/2009 00:00	7.5	MPN/100mL
04/14/2009 00:00	9.7	MPN/100mL
04/21/2009 00:00	23.5	MPN/100mL
04/28/2009 00:00	46.00	MPN/100mL
05/05/2009 00:00	39.00	MPN/100mL
05/12/2009 00:00	21.00	MPN/100mL
05/26/2009 00:00	1,000	MPN/100mL
06/09/2009 00:00	30	MPN/100mL
06/23/2009 00:00	48	MPN/100mL
06/30/2009 00:00	9	MPN/100mL
07/07/2009 14:00	0	MPN/100mL
07/14/2009 11:30	2	MPN/100mL
07/21/2009 14:10	8.5	MPN/100mL
07/28/2009 13:45	0	MPN/100mL
07/30/2009 10:30	3.1	MPN/100mL
08/04/2009 14:10	0	MPN/100mL
08/11/2009 10:20	0	MPN/100mL
08/18/2009 13:40	0	MPN/100mL
08/25/2009 13:15	0	MPN/100mL
09/01/2009 13:20	4.1	MPN/100mL
09/08/2009 13:35	4.1	MPN/100mL
09/15/2009 13:15	3.1	MPN/100mL
09/22/2009 09:00	9.8	MPN/100mL
09/29/2009 13:40	10.9	MPN/100mL
10/06/2009 14:45	6.3	MPN/100mL
10/14/2009 13:45	42.6	MPN/100mL
10/20/2009 11:00	10.9	MPN/100mL
10/27/2009 13:50	8.6	MPN/100mL
11/03/2009 13:45	9.7	MPN/100mL
11/10/2009 11:05	22.6	MPN/100mL
11/17/2009 11:55	14.5	MPN/100mL
11/24/2009 13:20	4.1	MPN/100mL
12/01/2009 13:20	2	MPN/100mL
12/08/2009 13:55	5.2	MPN/100mL
12/15/2009 13:25	14.8	MPN/100mL
12/21/2009 12:15	1	MPN/100mL
12/28/2009 12:25	0	MPN/100mL
01/05/2010 13:30	0	MPN/100mL
01/14/2010 13:40	5.2	MPN/100mL
01/21/2010 11:25	11	MPN/100mL
01/26/2010 13:40	42	MPN/100mL
02/02/2010 13:30	0	MPN/100mL
02/11/2010 14:00	6.3	MPN/100mL
02/16/2010 14:00	0	MPN/100mL
02/23/2010 13:58	4.1	MPN/100mL
03/02/2010 13:50	3.1	MPN/100mL
03/09/2010 13:45	8.6	MPN/100mL
03/16/2010 13:30	5.2	MPN/100mL
03/23/2010 12:45	6.3	MPN/100mL
03/30/2010 12:50	8.4	MPN/100mL
04/06/2010 12:50	13.5	MPN/100mL
04/13/2010 12:39	11	MPN/100mL

04/22/2010 13:40	23.1	MPN/100mL
04/29/2010 12:17	17.1	MPN/100mL
05/04/2010 12:55	37.9	MPN/100mL
05/11/2010 12:44	36.4	MPN/100mL
05/18/2010 12:47	71.2	MPN/100mL
05/25/2010 13:23	27.9	MPN/100mL
06/01/2010 13:25	27.8	MPN/100mL
06/08/2010 13:05	65.7	MPN/100mL
06/15/2010 13:00	18	MPN/100mL
06/22/2010 13:15	41	MPN/100mL
06/29/2010 13:16	14	MPN/100mL
07/07/2010 11:00	8	MPN/100mL
07/13/2010 11:48	17	MPN/100mL
07/20/2010 13:08	14	MPN/100mL
07/27/2010 11:39	5	MPN/100mL
08/03/2010 12:25	8	MPN/100mL
08/10/2010 12:10	2	MPN/100mL
08/17/2010 13:55	2	MPN/100mL
08/24/2010 13:00	2	MPN/100mL
08/31/2010 12:40	2	MPN/100mL
09/08/2010 12:15	2	MPN/100mL
09/14/2010 12:35	7	MPN/100mL
09/21/2010 12:38	11	MPN/100mL
09/28/2010 12:45	2	MPN/100mL
10/05/2010 12:10	8	MPN/100mL
10/12/2010 12:40	5	MPN/100mL
10/19/2010 12:27	2	MPN/100mL
10/26/2010 12:47	180	MPN/100mL
11/02/2010 11:57	8	MPN/100mL
11/09/2010 11:35	18	MPN/100mL
11/16/2010 12:24	7	MPN/100mL
11/24/2010 11:27	30.1	MPN/100mL
11/30/2010 12:00	2	MPN/100mL
12/07/2010 12:45	17.5	MPN/100mL
01/11/2011 11:38	2	MPN/100mL
01/18/2011 12:59	5.2	MPN/100mL
01/25/2011 12:15	0	MPN/100mL
02/02/2011 10:13	8.6	MPN/100mL
02/08/2011 10:00	3.1	MPN/100mL
02/15/2011 13:20	0	MPN/100mL
02/22/2011 12:12	4.1	MPN/100mL
03/01/2011 13:15	45.5	MPN/100mL
03/08/2011 12:15	1	MPN/100mL
03/15/2011 12:15	12.2	MPN/100mL
03/22/2011 12:30	4.1	MPN/100mL
03/29/2011 13:00	12.2	MPN/100mL
04/05/2011 12:34	3.1	MPN/100mL
04/12/2011 13:13	3.1	MPN/100mL
04/19/2011 12:20	9.8	MPN/100mL
04/26/2011 12:20	4.1	MPN/100mL
05/03/2011 12:35	7.3	MPN/100mL
05/10/2011 12:22	30.5	MPN/100mL
05/17/2011 12:01	45.7	MPN/100mL
05/24/2011 13:10	63.1	MPN/100mL

05/31/2011 12:35	16	MPN/100mL
06/07/2011 12:25	18.5	MPN/100mL
06/14/2011 12:35	14.6	MPN/100mL
06/21/2011 11:55	32.3	MPN/100mL
06/28/2011 11:50	12.2	MPN/100mL
07/05/2011 11:56	16.1	MPN/100mL
07/12/2011 13:15	6.3	MPN/100mL
07/19/2011 11:50	3.1	MPN/100mL
07/26/2011 11:45	3.1	MPN/100mL
08/02/2011 13:10	1	MPN/100mL
08/09/2011 13:10	1	MPN/100mL
08/16/2011 13:20	1	MPN/100mL
08/23/2011 13:15	2	MPN/100mL
08/30/2011 12:45	2	MPN/100mL
09/06/2011 13:00	3.1	MPN/100mL
09/13/2011 13:02	1	MPN/100mL
09/20/2011 12:45	1	MPN/100mL
09/27/2011 13:20	8.6	MPN/100mL
10/04/2011 13:11	7.4	MPN/100mL
10/11/2011 12:40	17.3	MPN/100mL
10/18/2011 12:19	11	MPN/100mL
10/25/2011 13:00	8.6	MPN/100mL
11/01/2011 13:20	4.1	MPN/100mL
11/08/2011 12:15	1	MPN/100mL
11/15/2011 12:30	3.1	MPN/100mL
11/22/2011 12:30	7.5	MPN/100mL
11/29/2011 12:30	3.1	MPN/100mL
12/06/2011 12:20	5.2	MPN/100mL
12/13/2011 12:35	2	MPN/100mL
12/20/2011 13:00	12	MPN/100mL
12/27/2011 13:15	0	MPN/100mL
01/03/2012 12:20	1	MPN/100mL
01/10/2012 12:20	0	MPN/100mL
01/17/2012 12:40	1	MPN/100mL
01/24/2012 13:20	19.5	MPN/100mL
01/31/2012 12:30	0	MPN/100mL
02/07/2012 12:15	7.4	MPN/100mL
02/14/2012 12:35	11	MPN/100mL
02/21/2012 12:40	1	MPN/100mL
02/28/2012 13:10	0	MPN/100mL
03/06/2012 12:00	4.1	MPN/100mL
03/13/2012 12:30	10.8	MPN/100mL
03/20/2012 13:05	21.1	MPN/100mL
03/27/2012 12:11	10.8	MPN/100mL
04/03/2012 12:45	3.1	MPN/100mL
04/10/2012 12:20	2	MPN/100mL
04/17/2012 13:10	10.9	MPN/100mL
04/24/2012 12:55	7.5	MPN/100mL
05/01/2012 13:05	20.4	MPN/100mL
05/08/2012 13:30	16.1	MPN/100mL
05/15/2012 12:15	50.4	MPN/100mL
05/22/2012 12:35	86	MPN/100mL
05/29/2012 12:25	42	MPN/100mL
06/05/2012 12:25	18.7	MPN/100mL

06/12/2012 12:40	12.1	MPN/100mL
06/12/2012 12:45	16.1	MPN/100mL
06/19/2012 12:50	4.1	MPN/100mL
06/26/2012 12:10	9.8	MPN/100mL
07/03/2012 12:40	10.9	MPN/100mL
07/10/2012 10:30	8.6	MPN/100mL
07/10/2012 12:45	16.1	MPN/100mL
07/17/2012 13:50	0	MPN/100mL
07/24/2012 13:45	9.8	MPN/100mL
07/31/2012 12:15	7.4	MPN/100mL
08/07/2012 09:38	13.5	MPN/100mL
08/07/2012 13:00	6.3	MPN/100mL
08/14/2012 13:15	12.1	MPN/100mL
08/21/2012 09:45	11	MPN/100mL
08/28/2012 11:20	12	MPN/100mL
09/04/2012 09:50	7.4	MPN/100mL
09/11/2012 14:20	3.1	MPN/100mL
09/18/2012 13:30	3.1	MPN/100mL
09/25/2012 08:30	6.3	MPN/100mL
10/02/2012 13:30	7.4	MPN/100mL
10/09/2012 11:10	11.9	MPN/100mL
10/16/2012 08:50	13.4	MPN/100mL
10/23/2012 12:25	20.1	MPN/100mL
10/30/2012 12:45	20.3	MPN/100mL
11/06/2012 11:15	5.2	MPN/100mL
11/13/2012 12:40	5.2	MPN/100mL
11/20/2012 10:11	10.9	MPN/100mL
11/27/2012 13:15	11	MPN/100mL
12/04/2012 11:40	3.1	MPN/100mL

Total coliforms (MPN / PA)

03/04/2008 13:01	980.4	MPN/100mL
03/11/2008 10:20	365.4	MPN/100mL
03/18/2008 10:10	686.7	MPN/100mL
03/25/2008 09:50	410.6	MPN/100mL
04/01/2008 08:50	461.1	MPN/100mL
04/08/2008 12:15	48	MPN/100mL
04/15/2008 09:16	285.1	MPN/100mL
04/22/2008 09:23	1,046.2	MPN/100mL
04/29/2008 09:00	648.8	MPN/100mL
05/06/2008 08:50	816.4	MPN/100mL
05/13/2008 08:30	686.7	MPN/100mL
05/20/2008 08:40	579.4	MPN/100mL
05/27/2008 08:35	517.2	MPN/100mL
06/03/2008 08:30	203.5	MPN/100mL
06/10/2008 08:30	365.4	MPN/100mL
06/17/2008 08:45	410.6	MPN/100mL
06/24/2008 08:50	189.2	MPN/100mL
07/01/2008 08:30	980.4	MPN/100mL
07/08/2008 08:30	2,419.6	MPN/100mL
07/15/2008 08:30	648.8	MPN/100mL
07/22/2008 09:20	1,046.2	MPN/100mL

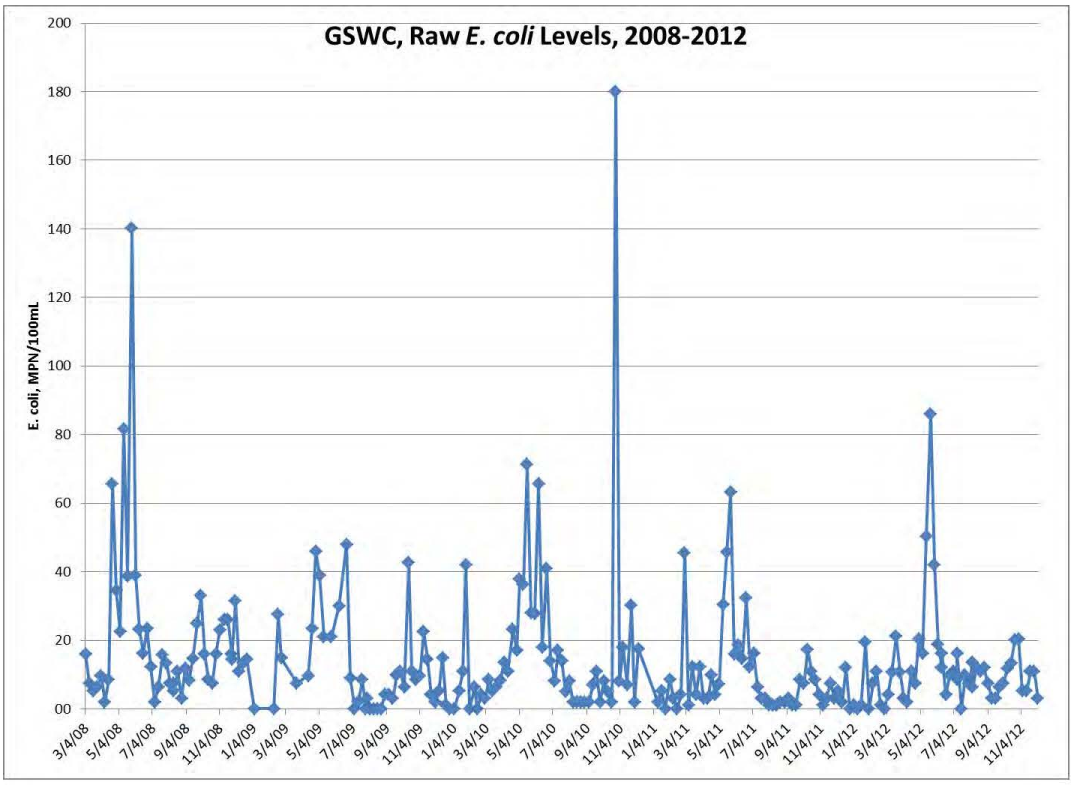
07/29/2008 08:30	770.1	MPN/100mL
08/05/2008 08:30	1,553.1	MPN/100mL
08/11/2008 09:15	770.1	MPN/100mL
08/12/2008 10:05	1,119.9	MPN/100mL
08/19/2008 09:08	1,553.1	MPN/100mL
08/26/2008 09:15	134	MPN/100mL
09/02/2008 00:00	1,046.2	MPN/100mL
09/09/2008 00:00	791.5	MPN/100mL
09/16/2008 00:00	1,046.2	MPN/100mL
09/23/2008 00:00	> 2,419.6	MPN/100mL
09/30/2008 00:00	> 2,419.6	MPN/100mL
10/07/2008 00:00	2,000.00	MPN/100mL
10/14/2008 00:00	2,000.00	MPN/100mL
10/21/2008 00:00	2,400.00	MPN/100mL
10/28/2008 00:00	> 2,419.6	MPN/100mL
11/04/2008 00:00	> 2,419.6	MPN/100mL
11/12/2008 00:00	1,000.00	MPN/100mL
11/18/2008 00:00	580.00	MPN/100mL
11/25/2008 00:00	610.00	MPN/100mL
11/26/2008 10:00	1,203.3	MPN/100mL
12/02/2008 00:00	1,046.2	MPN/100mL
12/09/2008 00:00	579.4	MPN/100mL
12/16/2008 00:00	648.8	MPN/100mL
12/23/2008 00:00	435.2	MPN/100mL
01/06/2009 00:00	4.1	MPN/100mL
02/10/2009 00:00	129.1	MPN/100mL
02/18/2009 00:00	1,732.9	MPN/100mL
02/24/2009 00:00	770.1	MPN/100mL
03/17/2009 00:00	648.8	MPN/100mL
03/31/2009 00:00	1,119.9	MPN/100mL
04/07/2009 00:00	816.4	MPN/100mL
04/14/2009 00:00	980.4	MPN/100mL
04/21/2009 00:00	517.2	MPN/100mL
04/28/2009 00:00	727.00	MPN/100mL
05/05/2009 00:00	686.00	MPN/100mL
05/12/2009 00:00	1,553.00	MPN/100mL
05/19/2009 00:00	2,400	MPN/100mL
06/02/2009 00:00	2,400	MPN/100mL
06/09/2009 00:00	1,400	MPN/100mL
06/16/2009 00:00	1,600	MPN/100mL
06/23/2009 00:00	1,400	MPN/100mL
06/30/2009 00:00	1,400	MPN/100mL
07/07/2009 14:00	816.4	MPN/100mL
07/14/2009 11:30	1,119.9	MPN/100mL
07/21/2009 14:10	1,986.3	MPN/100mL
07/28/2009 13:45	2,419.6	MPN/100mL
07/30/2009 10:30	2,419.6	MPN/100mL
08/04/2009 14:10	2,419.6	MPN/100mL
08/11/2009 10:20	1,732.9	MPN/100mL
08/18/2009 13:40	2,419.6	MPN/100mL
08/25/2009 13:15	2,419.6	MPN/100mL
09/01/2009 13:20	2,419.6	MPN/100mL
09/08/2009 13:35	2,419.6	MPN/100mL
09/15/2009 13:15	2,419.6	MPN/100mL

09/22/2009 09:00	2,419.6	MPN/100mL
09/29/2009 13:40	1,986.3	MPN/100mL
10/06/2009 14:45	1,986.3	MPN/100mL
10/14/2009 13:45	2,419.6	MPN/100mL
10/20/2009 11:00	1,732.9	MPN/100mL
10/27/2009 13:50	2,419.6	MPN/100mL
11/03/2009 13:45	2,419.6	MPN/100mL
11/10/2009 11:05	2,419.6	MPN/100mL
11/17/2009 11:55	2,419.6	MPN/100mL
11/24/2009 13:20	1,299.7	MPN/100mL
12/01/2009 13:20	1,553.1	MPN/100mL
12/08/2009 13:55	2,419.6	MPN/100mL
12/15/2009 13:25	727	MPN/100mL
12/21/2009 12:15	816.4	MPN/100mL
12/28/2009 12:25	980.4	MPN/100mL
01/05/2010 13:30	488.4	MPN/100mL
01/14/2010 13:40	2,419.6	MPN/100mL
01/21/2010 11:25	579.4	MPN/100mL
01/26/2010 13:40	980.4	MPN/100mL
02/02/2010 13:30	2,419.6	MPN/100mL
02/11/2010 14:00	2,419.6	MPN/100mL
02/16/2010 14:00	344.8	MPN/100mL
02/23/2010 13:58	435.2	MPN/100mL
03/02/2010 13:50	186	MPN/100mL
03/09/2010 13:45	461.1	MPN/100mL
03/16/2010 13:30	435.2	MPN/100mL
03/23/2010 12:45	325.5	MPN/100mL
03/30/2010 12:50	2,419.6	MPN/100mL
04/06/2010 12:50	920.8	MPN/100mL
04/13/2010 12:39	866.4	MPN/100mL
04/22/2010 13:40	816.4	MPN/100mL
04/29/2010 12:17	1,203.3	MPN/100mL
05/04/2010 12:55	686.7	MPN/100mL
05/11/2010 12:44	1,046.2	MPN/100mL
05/18/2010 12:47	727	MPN/100mL
05/25/2010 13:23	770.1	MPN/100mL
06/01/2010 13:25	1,553.1	MPN/100mL
06/08/2010 13:05	1,986.3	MPN/100mL
06/15/2010 13:00	110	MPN/100mL
06/22/2010 13:15	41	MPN/100mL
06/29/2010 13:16	20	MPN/100mL
07/07/2010 11:00	140	MPN/100mL
07/13/2010 11:48	220	MPN/100mL
07/20/2010 13:08	270	MPN/100mL
07/27/2010 11:39	540	MPN/100mL
08/03/2010 12:25	180	MPN/100mL
08/10/2010 12:10	81	MPN/100mL
08/17/2010 13:55	18	MPN/100mL
08/24/2010 13:00	27	MPN/100mL
08/31/2010 12:40	6	MPN/100mL
09/08/2010 12:15	760	MPN/100mL
09/14/2010 12:35	540	MPN/100mL
09/21/2010 12:38	46	MPN/100mL
09/28/2010 12:45	240	MPN/100mL

10/05/2010 12:10	240	MPN/100mL
10/12/2010 12:40	17	MPN/100mL
10/19/2010 12:27	11	MPN/100mL
10/26/2010 12:47	540	MPN/100mL
11/02/2010 11:57	240	MPN/100mL
11/09/2010 11:35	140	MPN/100mL
11/16/2010 12:24	20	MPN/100mL
11/24/2010 11:27	1,732.9	MPN/100mL
11/30/2010 12:00	613.1	MPN/100mL
12/07/2010 12:45	866.4	MPN/100mL
01/11/2011 11:38	613.1	MPN/100mL
01/18/2011 12:59	365.4	MPN/100mL
01/25/2011 12:15	325.5	MPN/100mL
02/02/2011 10:13	410.6	MPN/100mL
02/08/2011 10:00	387.3	MPN/100mL
02/15/2011 13:20	461.1	MPN/100mL
02/22/2011 12:12	488.4	MPN/100mL
03/01/2011 13:15	517.2	MPN/100mL
03/08/2011 12:15	290.9	MPN/100mL
03/15/2011 12:15	> 2,419.6	MPN/100mL
03/22/2011 12:30	172.2	MPN/100mL
03/29/2011 13:00	290.9	MPN/100mL
04/05/2011 12:34	228.2	MPN/100mL
04/12/2011 13:13	365.4	MPN/100mL
04/19/2011 12:20	1,119.9	MPN/100mL
04/26/2011 12:20	1,046.2	MPN/100mL
05/03/2011 12:35	258.4	MPN/100mL
05/10/2011 12:22	> 2,419.6	MPN/100mL
05/17/2011 12:01	1,986.3	MPN/100mL
05/24/2011 13:10	1,732.9	MPN/100mL
05/31/2011 12:35	1,553.1	MPN/100mL
06/07/2011 12:25	1,986.3	MPN/100mL
06/14/2011 12:35	> 2,419.6	MPN/100mL
06/21/2011 11:55	616.7	MPN/100mL
06/28/2011 11:50	1,413.6	MPN/100mL
07/05/2011 11:56	1,986.3	MPN/100mL
07/12/2011 13:15	1,203.3	MPN/100mL
07/19/2011 11:50	1,299.7	MPN/100mL
07/26/2011 11:45	> 2,419.6	MPN/100mL
08/02/2011 13:10	1,732.9	MPN/100mL
08/09/2011 13:10	> 2,419.6	MPN/100mL
08/16/2011 13:20	> 2,419.6	MPN/100mL
08/23/2011 13:15	> 2,419.6	MPN/100mL
08/30/2011 12:45	> 2,419.6	MPN/100mL
09/06/2011 13:00	> 2,419.6	MPN/100mL
09/13/2011 13:02	1,299.7	MPN/100mL
09/20/2011 12:45	> 2,419.6	MPN/100mL
09/27/2011 13:20	> 2,419.6	MPN/100mL
10/04/2011 13:11	1,986.3	MPN/100mL
10/11/2011 12:40	1,203.3	MPN/100mL
10/18/2011 12:19	> 2,419.6	MPN/100mL
10/25/2011 13:00	> 2,419.6	MPN/100mL
11/01/2011 13:20	> 2,419.6	MPN/100mL
11/08/2011 12:15	1,119.9	MPN/100mL

11/15/2011 12:30	> 2,419.6	MPN/100mL
11/22/2011 12:30	1,986.3	MPN/100mL
11/29/2011 12:30	1,553.1	MPN/100mL
12/06/2011 12:20	816.4	MPN/100mL
12/13/2011 12:35	325.5	MPN/100mL
12/20/2011 13:00	461.1	MPN/100mL
12/27/2011 13:15	686.7	MPN/100mL
01/03/2012 12:20	686.7	MPN/100mL
01/10/2012 12:20	> 2,419.6	MPN/100mL
01/17/2012 12:40	387.3	MPN/100mL
01/24/2012 13:20	517.2	MPN/100mL
01/31/2012 12:30	436	MPN/100mL
02/07/2012 12:15	396.8	MPN/100mL
02/14/2012 12:35	547.5	MPN/100mL
02/21/2012 12:40	770.1	MPN/100mL
02/28/2012 13:10	> 2,419.6	MPN/100mL
03/06/2012 12:00	1,046.2	MPN/100mL
03/13/2012 12:30	579.4	MPN/100mL
03/20/2012 13:05	1,119.9	MPN/100mL
03/27/2012 12:11	1,413.6	MPN/100mL
04/03/2012 12:45	755.6	MPN/100mL
04/10/2012 12:20	517.2	MPN/100mL
04/17/2012 13:10	770.1	MPN/100mL
04/24/2012 12:55	980.4	MPN/100mL
05/01/2012 13:05	> 2,419.6	MPN/100mL
05/08/2012 13:30	601.5	MPN/100mL
05/15/2012 12:15	1,732.9	MPN/100mL
05/22/2012 12:35	2,419.6	MPN/100mL
05/29/2012 12:25	1,413.6	MPN/100mL
06/05/2012 12:25	791.5	MPN/100mL
06/12/2012 12:40	1,732.9	MPN/100mL
06/12/2012 12:45	980.4	MPN/100mL
06/19/2012 12:50	2,419.6	MPN/100mL
06/26/2012 12:10	2,419.6	MPN/100mL
07/03/2012 12:40	1,732.9	MPN/100mL
07/10/2012 10:30	> 2,419.6	MPN/100mL
07/10/2012 12:45	1,732.9	MPN/100mL
07/17/2012 13:50	0	MPN/100mL
07/24/2012 13:45	> 2,419.6	MPN/100mL
07/31/2012 12:15	1,203.3	MPN/100mL
08/07/2012 09:38	1,203.3	MPN/100mL
08/07/2012 13:00	> 2,419.6	MPN/100mL
08/14/2012 13:15	2,419.6	MPN/100mL
08/21/2012 09:45	920.8	MPN/100mL
08/28/2012 11:20	1,732.9	MPN/100mL
09/04/2012 09:50	1,986.3	MPN/100mL
09/11/2012 14:20	816.4	MPN/100mL
09/18/2012 13:30	686.7	MPN/100mL
09/25/2012 08:30	1,299.7	MPN/100mL
10/02/2012 13:30	629.4	MPN/100mL
10/09/2012 11:10	686.7	MPN/100mL
10/16/2012 08:50	547.5	MPN/100mL
10/23/2012 12:25	435.2	MPN/100mL
10/30/2012 12:45	648.8	MPN/100mL

11/06/2012 11:15	686.7	MPN/100mL
11/13/2012 12:40	727	MPN/100mL
11/20/2012 10:11	686.7	MPN/100mL
11/27/2012 13:15	579.4	MPN/100mL
12/04/2012 11:40	290.9	MPN/100mL


GSWC, Raw *E. coli* Levels, 2008-2012
E. coli, MPN/100mL
200
180
160
140
120
100
80
60
40
20
00
3/4/08
5/4/08
7/4/08
9/4/08
11/4/08
1/4/09
3/4/09
5/4/09
7/4/09
9/4/09
11/4/09
1/4/10
3/4/10
5/4/10
7/4/10
9/4/10
11/4/10
1/4/11
3/4/11
5/4/11
7/4/11
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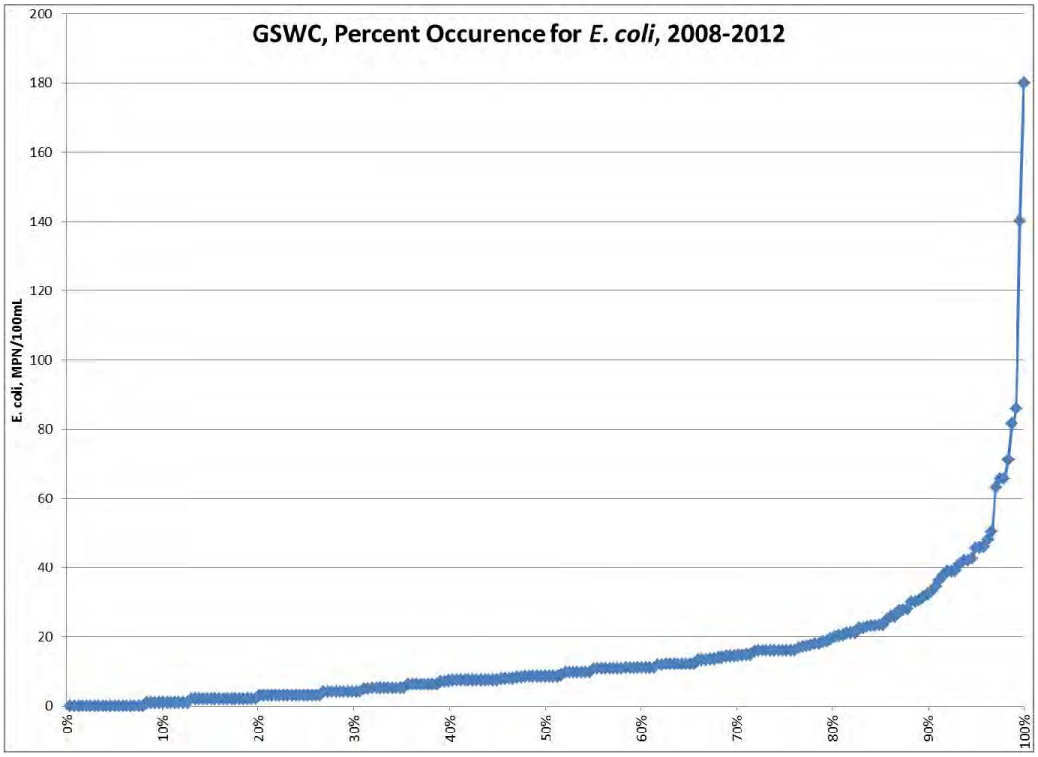
9/4/12
11/4/12


GSWC, Percent Occurence for *E. coli*, 2008-2012
E. coli, MPN/100mL
200
180
160
140
120
100
80
60
40
20
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

Facility:	00 Coloma Plant; 01 Coloma Surface Water Treatment Plant
Sampling Point:	01 Coloma & Pyrites SWTP (Raw) (3-4-SR, FB55)

Total Organic Carbon / TOC

02/19/2008 13:00	2.4	mg/L
03/11/2008 10:05	1.3	mg/L
04/22/2008 09:38	1.5	mg/L
5/6/2008	1.4	mg/L
06/03/2008 10:10	1.4	mg/L
07/16/2008 11:32	1.4	mg/L
08/26/2008 10:10	1.4	mg/L
09/16/2008 00:00	1.5	mg/L
10/07/2008 00:00	1.8	mg/L
11/19/2008 00:00	1.6	mg/L
02/24/2009 00:00	2.1	mg/L
03/17/2009 00:00	1.8	mg/L
04/21/2009 00:00	2.1	mg/L
05/27/2009 00:00	1.8	mg/L
06/02/2009 00:00	1.8	mg/L
07/14/2009 11:30	1.7	mg/L
08/11/2009 10:20	1.7	mg/L
09/22/2009 09:00	1.6	mg/L
10/20/2009 11:00	1.7	mg/L
11/10/2009 11:05	1.6	mg/L
02/23/2010 12:10	1.5	mg/L
03/16/2010 12:04	1.5	mg/L
04/06/2010 12:50	1.3	mg/L
05/04/2010 13:10	1.3	mg/L
06/15/2010 10:31	1.5	mg/L
07/07/2010 11:00	1.4	mg/L
08/24/2010 12:20	1.4	mg/L
10/19/2010 11:00	1.5	mg/L
11/16/2010 11:20	1.6	mg/L
12/07/2010 13:10	1.7	mg/L

01/25/2011 09:45	1.6	mg/L
02/02/2011 11:15	2.3	mg/L
04/19/2011 12:20	1.4	mg/L
07/19/2011 13:20	1.1	mg/L
10/11/2011 12:30	1.6	mg/L
01/24/2012 13:30	1.6	mg/L
04/10/2012 10:30	1.4	mg/L
07/10/2012 10:30	1.5	mg/L
10/09/2012 11:10	1.3	mg/L

Facility: 00 Coloma Plant; 01 Coloma Surface Water Treatment Plant
Sampling Point: 02 Coloma SWTP (Filtered/PreCl2) (3-1-IT, FB57)

Total Organic Carbon / TOC **Criteria**

04/22/2008 08:54	1.2	mg/L
05/06/2008 10:15	0.97	mg/L
05/06/2008 10:15	0.92	mg/L
06/03/2008 09:30	0.96	mg/L
07/16/2008 13:00	0.77	mg/L
08/26/2008 09:30	0.84	mg/L
08/27/2008 10:50	0.85	mg/L
09/16/2008 00:00	0.79	mg/L
10/07/2008 00:00	0.88	mg/L
11/19/2008 00:00	0.80	mg/L
12/02/2008 00:00	0.77	mg/L
02/24/2009 00:00	1.6	mg/L
03/17/2009 00:00	1.2	mg/L
04/21/2009 00:00	1.1	mg/L
05/19/2009 00:00	0.99	mg/L
06/02/2009 00:00	1.1	mg/L
07/14/2009 11:45	1.0	mg/L
08/11/2009 11:35	0.99	mg/L
09/01/2009 10:45	0.90	mg/L
10/06/2009 11:45	0.88	mg/L
11/10/2009 10:15	0.94	mg/L
02/23/2010 12:00	0.99	mg/L
03/16/2010 10:12	1.1	mg/L
04/22/2010 11:45	0.77	mg/L
05/04/2010 11:55	0.78	mg/L

06/15/2010 11:00	0.89	mg/L
07/13/2010 14:05	0.85	mg/L
08/03/2010 13:25	0.86	mg/L
09/14/2010 13:10	0.98	mg/L
10/19/2010 10:00	0.86	mg/L
11/16/2010 11:45	0.93	mg/L
12/07/2010 13:05	1.2	mg/L
01/25/2011 11:55	1.1	mg/L
04/19/2011 09:55	0.82	mg/L
07/19/2011 10:50	0.74	mg/L
10/11/2011 12:30	1.1	mg/L
04/17/2012 09:20	1.5	mg/L
07/10/2012 12:50	0.99	mg/L
10/09/2012 11:46	0.90	mg/L

Facility: 00 Coloma Plant; 01 Coloma Surface Water Treatment Plant
Sampling Point: 03 Pyrites SWTP (Filtered/PreCl2) (3-2-IT, FB59)

Total Organic Carbon / TOC **Criteria**

03/11/2008 09:05	1.8	mg/L
04/22/2008 09:02	0.94	mg/L
06/03/2008 09:45	0.88	mg/L
07/16/2008 13:15	0.96	mg/L
09/16/2008 00:00	0.87	mg/L
10/07/2008 00:00	1.0	mg/L
11/19/2008 00:00	1.8	mg/L
12/02/2008 00:00	1.5	mg/L
02/24/2009 00:00	1.6	mg/L
03/17/2009 00:00	1.6	mg/L
04/21/2009 00:00	1.3	mg/L
05/19/2009 00:00	1.1	mg/L
06/02/2009 00:00	1.1	mg/L
07/14/2009 11:55	1.1	mg/L
08/11/2009 11:50	1.0	mg/L
09/01/2009 11:10	1.0	mg/L
10/06/2009 12:00	0.93	mg/L
11/10/2009 13:25	0.98	mg/L
03/16/2010 10:34	1.2	mg/L
04/22/2010 11:55	0.87	mg/L

05/04/2010 12:05	0.83	mg/L
06/15/2010 11:00	1.0	mg/L
07/13/2010 14:00	0.95	mg/L
08/03/2010 13:30	0.86	mg/L
09/14/2010 13:20	0.94	mg/L
10/19/2010 10:10	0.95	mg/L
11/16/2010 12:00	0.92	mg/L
12/07/2010 13:15	1.2	mg/L
01/25/2011 12:05	0.94	mg/L
04/19/2011 10:15	0.84	mg/L
07/19/2011 10:55	0.81	mg/L
10/11/2011 12:30	1.1	mg/L
01/24/2012 13:15	1.3	mg/L
04/24/2012 08:30	1.4	mg/L
07/10/2012 13:10	1.0	mg/L
10/09/2012 12:00	0.95	mg/L

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Golden State Water Company - Cordova System No.: 3410015 Year: 2012 Quarter: 4

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):	1/29	4/30	7/22	11/4	2/10	4/14	7/7	10/6	1/26	4/28	7/7	10/12	1/18	4/12	7/12	10/11	2/7	4/10	7/17	10/30
Site 1	0.0	12.0	14.0	11.0	0.0	17.0	17.0	13.0	1.4	15.0	16.0	13.0	13.0	5.5	9.6	9.1	8.5	29.0	15.0	4.8
Site 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 3	0.0	8.7	6.6	7.6	0.0	9.6	12.0	11.0	0.0	13.0	11.0	14.0	12.0	11.0	14.0	11.0	12.0	16.0	14.0	10.0
Site 4	0.0	7.8	4.9	4.0	0.0	3.0	6.7	12.0	0.0	15.0	7.2	10.0	7.8	7.1	13.0	9.1	12.0	23.0	2.6	9.3
Site 5	0.0	10.0	9.4	11.0	0.0	15.0	19.0	12.0	0.0	7.9	14.0	14.0	14.0	11.0	7.6	11.0	11.0	21.0	13.0	0.0
Site 6	0.0	9.7	9.3	7.2	0.0	6.4	20.0	12.0	0.0	13.0	8.6	10.0	9.0	6.2	9.0	7.3	15.0	22.0	8.5	20.0
Site 7	0.0	12.0	1.3	18.0	1.7	19.0	35.0	20.0	1.3	19.0	1.0	18.0	0.0	16.0	23.0	19.0	20.0	31.0	0.0	20.0
Site 8	0.0	8.1	8.6	7.8	0.0	11.0	20.0	10.0	0.0	13.0	8.6	7.2	10.0	5.3	13.0	6.0	14.0	15.0	15.0	9.9
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	0.0	8.5	6.8	8.3	0.2	10.1	16.2	12.2	0.3	12.0	8.3	10.8	9.3	7.8	11.2	9.1	11.6	19.6	8.5	9.3
Running Annual Average	4.5	4.4	4.1	5.9	6.0	6.4	8.7	9.7	9.7	10.2	8.2	7.9	10.1	9.0	9.8	9.3	9.9	12.9	12.2	12.2
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	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Identify the sample locations in the table below.

Site	Sample Location
1	Sample Station #2, 12121 Gold Point Lane
2	Sample Station #3, 11375 Sutter Fort Way
3	Sample Station #5, 2240 Forestlake Drive
4	Sample Station #6, 2512 Don Juan Drive
5	Sample Station #7, 10455 Investment Circle
6	Sample Station #8, 2984 Kachina Way
7	Sample Station #9, 10671 Basie Way
8	Sample Station #10, 3065 Gold Camp Drive
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.

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Golden State Water Company - Cordova System No.: 3410015 Year: 2012 Quarter: 4

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):	1/29	4/30	7/22	11/4	2/10	4/14	7/7	10/6	1/26	4/28	7/7	10/12	1/18	4/12	7/12	10/11	2/7	4/10	7/17	10/30
Site 1	0.0	7.0	6.6	8.7	0.0	14.0	11.0	12.0	0.0	8.1	8.8	6.7	9.3	2.2	4.2	6.0	3.4	20.0	10.0	5.8
Site 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 3	0.0	5.1	4.3	7.2	0.0	8.8	12.0	9.1	0.0	9.6	6.4	7.7	9.0	5.9	6.6	8.2	9.7	24.0	11.0	11.0
Site 4	0.0	4.4	3.1	3.5	0.0	2.5	8.5	11.0	0.0	11.0	4.8	5.0	4.7	4.1	5.7	4.9	6.0	20.0	11.0	11.0
Site 5	0.0	5.0	4.7	7.6	0.0	12.0	13.0	8.1	0.0	4.5	9.2	5.8	10.0	8.2	3.5	8.7	5.8	23.0	0.0	1.3
Site 6	0.0	5.8	5.9	32.0	0.0	5.1	16.0	6.8	0.0	10.0	5.8	5.7	6.0	3.9	6.4	5.9	7.4	22.0	6.4	2.3
Site 7	0.0	6.5	0.0	28.0	0.0	15.0	34.0	14.0	0.0	12.0	0.0	11.0	0.0	12.0	12.0	16.0	20.0	24.0	0.0	20.0
Site 8	0.0	4.6	5.7	33.0	0.0	9.8	16.0	7.6	0.0	9.9	5.8	5.1	7.5	4.4	5.9	4.9	7.1	17.0	7.9	10.0
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	0.0	4.8	3.8	15.0	0.0	8.4	13.8	9.4	0.0	8.1	5.1	5.9	6.6	5.1	5.5	6.8	7.4	18.8	5.8	7.7
Running Annual Average	4.3	5.8	5.6	5.9	5.9	6.8	9.3	7.9	7.9	7.8	5.7	4.8	6.4	5.7	5.8	6.0	6.2	9.6	9.7	9.9
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	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Identify the sample locations in the table below.

Site	Sample Location
1	Sample Station #2, 12121 Gold Point Lane
2	Sample Station #3, 11375 Sutter Fort Way
3	Sample Station #5, 2240 Forestlake Drive
4	Sample Station #6, 2512 Don Juan Drive
5	Sample Station #7, 10455 Investment Circle
6	Sample Station #8, 2984 Kachina Way
7	Sample Station #9, 10671 Basie Way
8	Sample Station #10, 3065 Gold Camp Drive
9	
10	
11	
12	

Comments:

min 4.8

max 9.9

ave 7.1

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.

System Summary, CWD

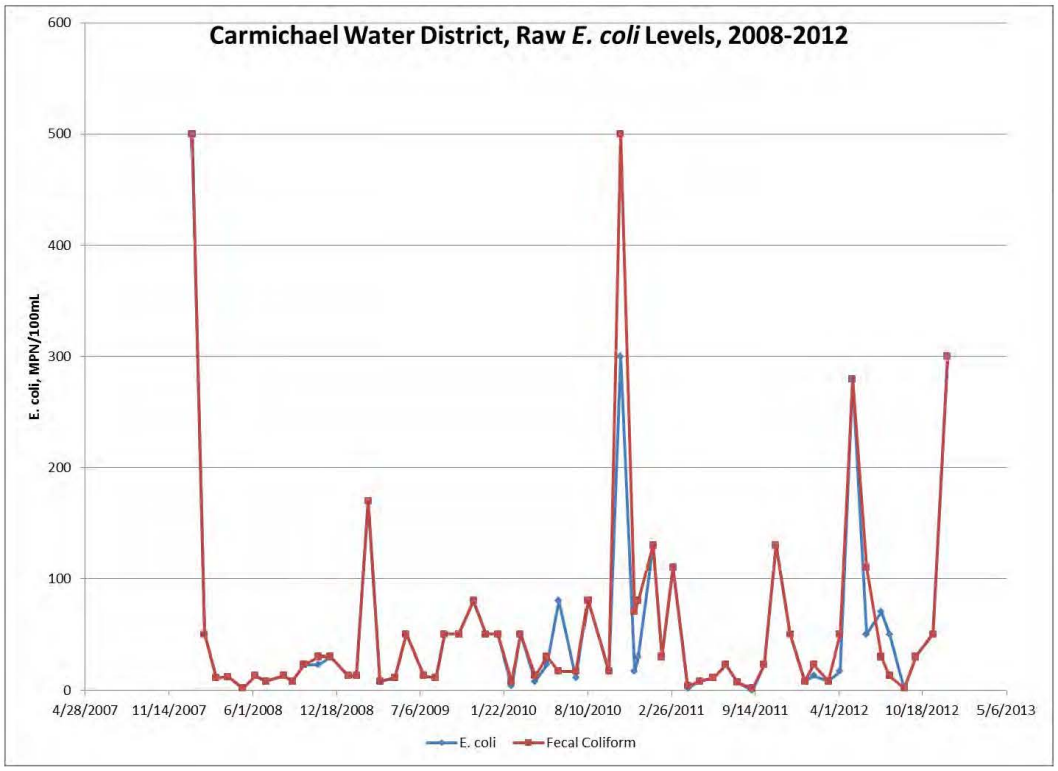
WATER SYSTEM:		
Utility Name		Carmichael Water District
Service Area		Carmichael
Number Customers - Retail/Wholesale		40,500 Population/Retail
PWSID No.		CA3410004
SOURCE:		
Name		Lower American River
Entitlement and Amount		32,600 AF/YR (Water Rights)
INTAKE:		
Location and Description		Three Ranney Collectors at Rossmoor Bar
Intake Protection Facilities		Ranney Collector Subsurface Laterals
WTP:		
Name		Carmichael WTP
Type of Treatment		Membrane WTP
State Approved Plant Capacity (MGD)		22 MGD
Capacity Flow Range (MGD)		0 - 22 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	4.833 mgd
	Summer (Apr-Sep)	12.017 mgd
Hours of Operation		24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, Title 22, Giardia/Crypto, pH, Temp
	Treated Water	Turbidity, Coliform, Title 22, Lead/Copper, DBPs, pH, Cl2
UNIT PROCESSES:		
Recycle	Amount	<10% Plant Flow
	Frequency	Intermittent - As Needed
Filtration	No. of Filters	4-16
	Type of Filter	Microfiltration
	Filtration Rate	225 gpm (min) to 925 gpm (max)
	Backwash: Criteria,Rate	Flow, Pressure Gradient or Time
	Filter -to-Waste Facilities	No
Post-Chlorination	Chemical and Dose	Sodium Hypochlorite
pH Adjustment	Chemical and Dose	25% Sodium Hydroxide
Wastewater Handling	Facility	Sec. and Tert. Membrane (Final waste to sewer)
	Sources	Filter Backwash
	Decant Recycle Location	To Headworks
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	6 MG / 2 AC
EMERGENCY RESPONSE TO WATERSHED DISASTERS:		
Notification	DPH Engineer	Salvador Turrubiartes
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

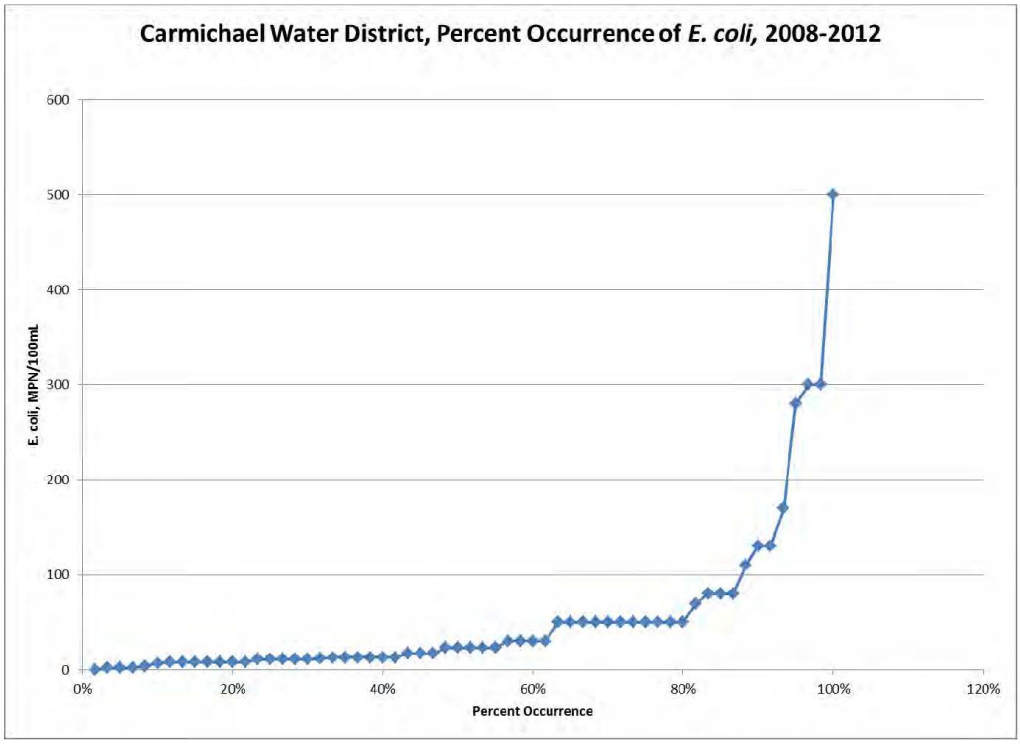
Carmichael WD Coliform Data 2008-2012

Date	*E. coli*	Fecal Coliform	Total Coliform
1/8/2008	500	500	1600
2/6/2008	50	50	50
3/5/2008	11	11	22
4/2/2008	12	12	130
5/7/2008	2	2	8
6/6/2008	13	13	13
7/2/2008	8	8	50
8/13/2008	13	13	30
9/3/2008	8	8	23
10/1/2008	23	23	170
11/5/2008	23	30	80
12/3/2008	30	30	130
1/15/2009	13	13	50
2/4/2009	13	13	23
3/4/2009	170	170	170
4/1/2009	8	8	50
5/6/2009	11	11	220
6/3/2009	50	50	50
7/15/2009	13	13	70
8/12/2009	11	11	50
9/2/2009	50	50	170
10/7/2009	50	50	50
11/11/2009	80	80	80
12/10/2009	50	50	50
1/8/2010	50	50	140
2/10/2010	4	8	30
3/3/2010	50	50	130
4/7/2010	8	13	130
5/5/2010	23	30	70
6/2/2010	80	17	17
7/14/2010	11	17	22
8/11/2010	80	80	80
9/29/2010	17	17	130
10/27/2010	300	500	500
11/29/2010	17	70	170
12/8/2010	30	80	140
1/13/2011	130	130	130
2/2/2011	30	30	30
3/2/2011	110	110	300
4/6/2011	2	4	70
5/4/2011	8	8	13
6/6/2011	11	11	30
7/6/2011	23	23	30

8/3/2011	7	7	50
9/7/2011	0	2	80
10/5/2011	23	23	500
11/2/2011	130	130	300
12/7/2011	50	50	110
1/11/2012	8	8	8
2/1/2012	13	23	80
3/7/2012	8	8	23
4/4/2012	17	50	130
5/4/2012	280	280	170
6/6/2012	50	110	300
7/11/2012	70	30	30
8/1/2012	50	13	13
9/5/2012	2	2	2
10/2/2012	30	30	110
11/13/2012	50	50	50
12/17/2012	300	300	300

average	54.73333	59.71667
median	23	23
95th percentile	281	


Carmichael Water District, Raw *E. coli* Levels, 2008-2012
E. coli, MPN/100mL
600
500
400
300
200
100
0
4/28/2007
11/14/2007
6/1/2008
12/18/2008
7/6/2009
1/22/2010
8/10/2010
2/26/2011
9/14/2011
4/1/2012
10/18/2012
5/6/2013
E. coli
Fecal Coliform


Carmichael Water District, Percent Occurrence of *E. coli,* 2008-2012
E. coli, MPN/100mL
600
500
400
300
200
100
0
0%
20%
40%
60%
80%
100%
120%
Percent Occurrence

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Carmichael Water District System No.: 3410004 Year: 2012 Quarter: 4

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr. 08	2nd Qtr. 08	3rd Qtr. 08	4th Qtr. 08	1st Qtr. 09	2nd Qtr. 09	3rd Qtr. 09	4th Qtr. 09	1st Qtr. 10	2nd Qtr. 10	3rd Qtr. 10	4th Qtr. 10	1st Qtr. 11	2nd Qtr. 11	3rd Qtr. 11	4th Qtr. 11	1st Qtr. 12	2nd Qtr. 12	3rd Qtr. 12	4th Qtr. 12
Sample Date (month/date):	1/29	4/23	7/23	11/19	2/19	4/14	7/8	11/13	2/10	4/14	8/11	11/18	2/17	5/25	8/10	10/19	1/25	5/3	7/18	10/31
Site 1	9.2	6.6	7.8	7.8	10.0	10.0	8.8	8.8	12.0	12.0	9.7	13.0	8.6	8.3	7.4	5.0	7.5	8.7	7.7	8.3
Site 2	11.0	9.9	10.0	9.6	14.0	28.0	22.0	14.0	17.0	15.0	13.0	11.0	12.0	13.0	2.3	9.2	9.7	14.0	11.0	11.0
Site 3	13.0	0.0	0.5	14.0	15.0	20.0	0.0	16.0	18.0	18.0	0.0	15.0	12.0	0.0	0.0	13.0	12.0	0.0	0.0	16.0
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	11.1	5.5	6.1	10.5	13.0	19.3	10.3	12.9	15.7	15.0	7.6	13.0	10.9	7.1	3.2	9.1	9.7	7.6	6.2	11.8
Running Annual Average				8.3	8.8	12.2	13.3	13.9	14.6	13.5	12.8	12.8	11.6	9.6	8.6	7.6	7.3	7.4	8.2	8.8
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	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Identify the sample locations in the table below.

Site	Sample Location
1	Bajamont Water Treatment Plant (Treated)
2	5755 El Camino Ave
3	2029 Gunn Rd.
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.

3/28/02

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Carmichael Water District System No.: 3410004 Year: 2012 Quarter: 4

Year:	2008				2009				2010				2011				2012			
Quarter:	1st Qtr. 08	2nd Qtr. 08	3rd Qtr. 08	4th Qtr. 08	1st Qtr. 09	2nd Qtr. 09	3rd Qtr. 09	4th Qtr. 09	1st Qtr. 10	2nd Qtr. 10	3rd Qtr. 10	4th Qtr. 10	1st Qtr. 11	2nd Qtr. 11	3rd Qtr. 11	4th Qtr. 11	1st Qtr. 12	2nd Qtr. 12	3rd Qtr. 12	4th Qtr. 12
Sample Date (month/date):	1/29	4/23	7/23	11/19	2/19	4/14	7/8	11/13	2/10	4/14	8/11	11/18	2/17	5/26	8/10	10/19	1/25	5/3	7/18	10/31
Site 1	8.6	4.2	2.4	3.6	7.0	8.7	6.9	6.7	9.5	7.8	5.6	12.0	8.2	4.1	5.4	3.8	5.0	6.3	8.1	5.5
Site 2	10.0	6.3	5.8	4.8	9.3	10.0	12.0	10.0	12.0	9.3	9.6	11.0	11.0	6.9	2.8	6.6	6.5	9.9	7.7	21.0
Site 3	12.0	0.0	0.0	6.4	11.0	15.0	0.0	12.0	14.0	12.0	0.0	11.0	11.0	0.0	0.0	8.4	8.7	0.0	0.0	9.5
Site 4																				
Site 5																				
Site 6																				
Site 7																				
Site 8																				
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	10.2	3.5	2.7	4.9	9.1	11.2	6.3	9.6	11.8	9.7	5.1	11.3	10.1	3.7	2.7	6.3	6.7	5.4	5.3	12.0
Running Annual Average				5.3	5.1	7.0	7.9	9.1	9.7	9.4	9.0	9.5	9.0	7.5	7.0	5.7	4.9	5.3	5.9	7.4
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	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Identify the sample locations in the table below.

Site	Sample Location
1	Bajamont Water Treatment Plant (Treated)
2	5755 El Camino Ave
3	2029 Gunn Rd.
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.

3/28/02

System Summary, City of Sacramento

WATER SYSTEM:		
Utility Name		City of Sacramento
Service Area		Sacramento
Number Customers - Retail/Wholesale		472,178 - Retail/ Sacramento County, Cal Am Water, Fruitridge Vista, Sacramento Suburban WD - Wholesale
PWSID No.		CA 3410020
SOURCE:		
Name		Lower American River
Entitlement and Amount		225,000 AF/YR (Water Rights and Contracts - USBR)
INTAKE:		
Location and Description		Pier Style Intake Structure near Howe Avenue
Intake Protection Facilities		Fish Screens
WTP:		
Name		E. A. Fairbairn WTP
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		160 MGD
Capacity Flow Range (MGD)		30-160 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	44 MGD
	Summer (Apr-Sep)	66 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Turbidity, Coliform, TOC, Title 22
	Treated Water	Turbidity, Coliform, TOC, DBPs, Lead/Copper, Title 22
SHARED PRETREATMENT PROCESSES:		
Recycle	Amount	<10% Plant Flow
	Frequency	Intermittent - As Needed
Pre-Chlorination	Chemical and Dose	Chlorine Gas (1.5-2.5 mg/L)
pH Adjustment	Chemical and Dose	Sodium Hydroxide Addition if Necessary
Grit Basin	Volume Basin	0.292 MG
UNIT PROCESSES FOR TRAINS 1/2:		
Chemical Addition	Chemical, Purpose & Dose	Alum-Coagulant (9.5 mg/L)
Rapid Mix	Volume Basin	650 gallons
	Type of Mixing	Pump Injection
	Mixing Energy (G)	750 (1/s)
Flocculation	No. of Basins	2 (3 stages)
	Volume Basin	1.5 MG
Chemical Addition	Chemical, Purpose & Dose	Polymer-Floc Aid (0.03 mg/L)
	Type of Flocculators	Mechanical - Horizontal
	Mixing Energy	20,20,20
Sedimentation	No. of Basins	2
	Volume Basin	6.074 MG
	Surface Load Rate	0.99 gpm/sf
	Method of Sludge Removal	Chain and Flight, Manual Removal
UNIT PROCESSES FOR TRAINS 3/4:		
Chemical Addition	Chemical, Purpose & Dose	Alum-Coagulant (9.5 mg/L)
Rapid Mix	Volume Basin	650 gallons
	Type of Mixing	Pump Injection
	Mixing Energy (G)	750-1000 (1/s)
Flocculation	No. of Basins	2 (4 stages)
	Volume Basin	1.5 MG
Chemical Addition	Chemical, Purpose & Dose	Polymer-Floc Aid (0.03 mg/L)
	Type of Flocculators	Mechanical - Vertical
	Mixing Energy	60/30, 40/20, 30/15, 20/10
Sedimentation	No. of Basins	2
	Volume Basin	6.343 MG
	Surface Load Rate	0.97 gpm/sf
	Method of Sludge Removal	Chain and Flight
SHARED FILTRATION PROCESSES:		
Chemical Addition	Chemical, Purpose & Dose	Polymer-Filter Aid (0.03 mg/L)
Filtration	No. of Filters	16 (8 old + 8 new)
	Type of Filter	Old - Gravity Tri Media, New - Gravity Dual Media
	Filter Box Volume	0.33 MG
	Underdrain Type	Old - Concrete Teepee, New - Concrete Plenum w/ Nozzles

System Summary, City of Sacramento

	Media: Type, Depth, Area	Old: Anthracicte- 12 inches, Sand and Garnet 12 inches, 1742 sf/filter New: Anthracite- 30 inches, Sand 12 inches, 1568 sf/filter
	Filtration Rate	Old - 5.7, New - 5.1 gpm/sf @ 100MGD
	Backwash: Criteria,Rate	Turbidity, headloss, hours 18 gpm/sf
	Filter -to-Waste Facilities	Old - Yes, manual, New - Yes
SHARED POSTTREATMENT PROCESSES:		
Post-Chlorination	Chemical and Dose	Chlorine Gas (0.2-0.5 mg/L)
Fluoridation	Chemical and Dose	Hydrofluosilic Acid (0.72 mg/L F)
pH Adjustment	Chemical and Dose	Calcium Oxide (7.5 mg/L)
Wastewater Handling	Facility	Lagoons
	Soucres	Filter Backwash Water, sludge lagoon decant water
	Decant Recycle Location	Headworks, Upstream of Chemical Feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	45 MG (not including on site plant storage reservoirs)
Disinfection Booster Stations	Number	1
	Range Cl2 Dosing (mg/L)	0.4 - 0.6 mg/L
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DPH Engineer	Salvador Turrubiartes
	Other WTP's	American River Notification Tree
	City/County/ State/Federal	Numerous First Responders (All Counties) as Well as Direct Dischargers

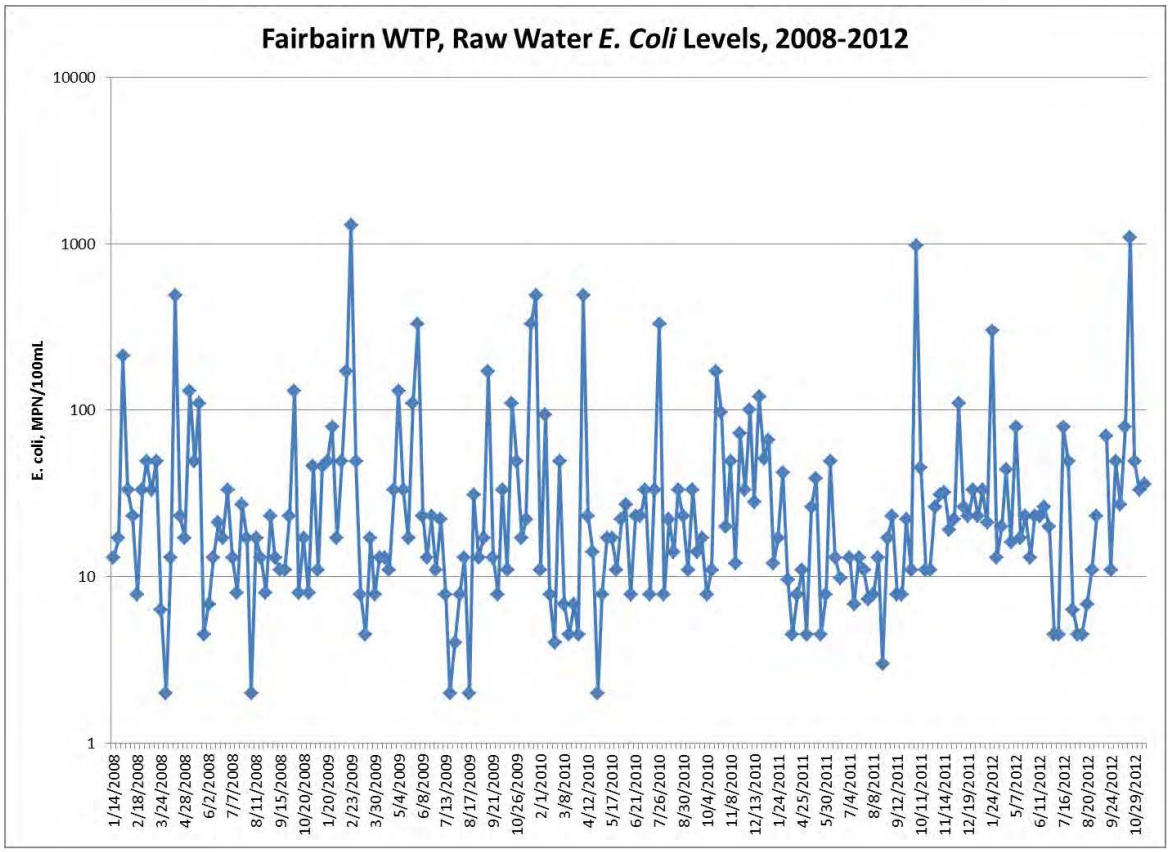
EA Fairbairn Water Treatment Plant Tap 1 (Raw Water) Total Coliform & *E. Coli* enumeration, CY 2008-2012

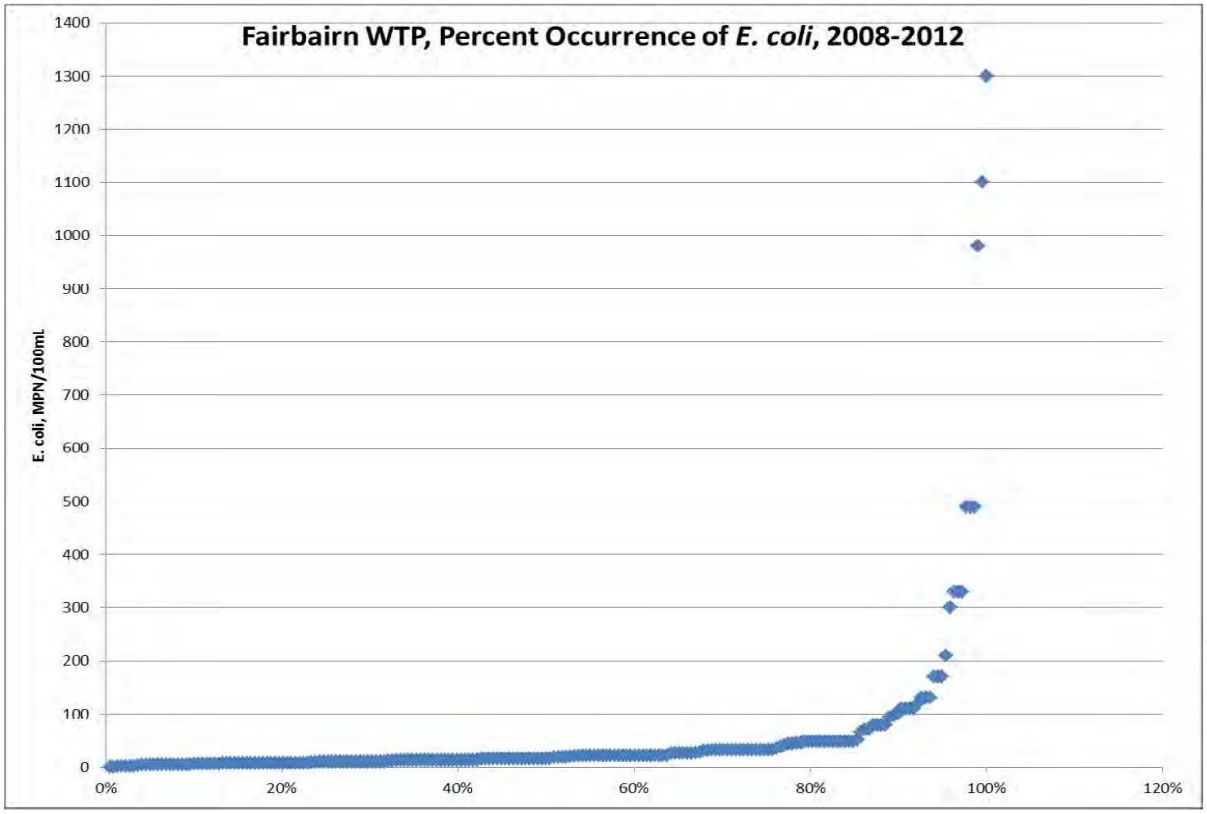
Sample Date	Total Coliform (MPN)	E. Coli (MPN)
1/14/2008	330	13
1/21/2008	390	17
1/28/2008	3500	210
2/4/2008	1100	33
2/11/2008	170	23
2/18/2008	32	7.8
2/25/2008	5400	33
3/3/2008	790	49
3/10/2008	490	33
3/17/2008	130	49
3/24/2008	1400	6.3
3/31/2008	220	2
4/7/2008	1100	13
4/14/2008	5400	490
4/21/2008	3500	23
4/28/2008	1100	17
5/5/2008	1700	130
5/12/2008	170	49
5/19/2008	3500	110
5/26/2008	460	4.5
6/2/2008	2200	6.8
6/9/2008	330	13
6/16/2008	700	21
6/23/2008	1100	17
6/30/2008	540	33
7/7/2008	1400	13
7/14/2008	220	8
7/21/2008	490	27
7/28/2008	700	17
8/4/2008	630	2
8/11/2008	170	17
8/18/2008	330	13
8/25/2008	330	8
9/1/2008	460	23
9/8/2008	700	13
9/15/2008	790	11
9/22/2008	3500	11
9/29/2008	1700	23
10/6/2008	2400	130
10/13/2008	700	8
10/20/2008	210	17
10/27/2008	3500	8
11/3/2008	9200	46
11/10/2008	1300	11
1/12/2009	400	46
1/20/2009	280	49
1/26/2009	1100	79
2/2/2009	490	17
2/9/2009	2400	49
2/16/2009	350	170
2/23/2009	2400	1300
3/2/2009	5400	49
3/9/2009	460	7.8
3/16/2009	130	4.5
3/23/2009	460	17
3/30/2009	220	7.8

4/6/2009	1300	13
4/13/2009	790	13
4/20/2009	350	11
4/27/2009	790	33
5/4/2009	700	130
5/11/2009	330	33
5/18/2009	700	17
5/25/2009	280	110
6/1/2009	790	330
6/8/2009	1300	23
6/15/2009	490	13
6/22/2009	140	23
6/29/2009	490	11
7/6/2009	280	22
7/13/2009	280	7.8
7/20/2009	140	2
7/27/2009	700	4
8/4/2009	49	7.8
8/10/2009	790	13
8/17/2009	170	2
8/24/2009	790	31
8/31/2009	790	13
9/7/2009	490	17
9/14/2009	2400	170
9/21/2009	9200	13
9/28/2009	630	7.8
10/5/2009	1300	33
10/12/2009	330	11
10/19/2009	1700	110
10/26/2009	1300	49
11/2/2009	220	17
11/9/2009	1700	22
1/19/2010	3500	330
1/25/2010	5400	490
2/1/2010	240	11
2/8/2010	1700	94
2/15/2010	220	7.8
2/22/2010	920	4
3/1/2010	230	49
3/8/2010	310	6.8
3/15/2010	280	4.5
3/22/2010	79	6.8
3/29/2010	170	4.5
4/5/2010	5400	490
4/12/2010	1700	23
4/19/2010	350	14
4/26/2010	40	2
5/3/2010	220	7.8
5/10/2010	700	17
5/17/2010	350	17
5/24/2010	174	11
5/31/2010	460	22
6/7/2010	1700	27
6/13/2010	1100	7.8
6/21/2010	1300	23
6/27/2010	1100	23
7/5/2010	280	33
7/12/2010	1100	7.8
7/19/2010	1300	33
7/26/2010	1300	330

8/2/2010	170	7.8
8/9/2010	790	22
8/16/2010	350	14
8/23/2010	460	33
8/30/2010	170	23
9/6/2010	240	11
9/13/2010	790	33
9/20/2010	280	14
9/27/2010	5400	17
10/4/2010	5400	7.8
10/11/2010	1400	11
10/18/2010	3500	170
10/25/2010	9200	97
11/1/2010	1785	20
11/8/2010	3500	49
11/15/2010	1400	12
11/22/2010	2200	72
11/29/2010	2400	33
12/6/2010	2700	100
12/13/2010	670	28
12/20/2010	2200	120
12/27/2010	770	51
1/3/2011	720	66
1/18/2011	280	12
1/24/2011	310	17
2/2/2011	500	42
4/6/2011	360	9.6
4/11/2011	230	4.5
4/18/2011	170	7.8
4/25/2011	330	11
5/2/2011	490	4.5
5/9/2011	170	26
5/16/2011	1800	39
5/23/2011	170	4.5
5/30/2011	79	7.8
6/6/2011	490	49
6/13/2011	1900	13
6/20/2011	770	9.8
6/27/2011	230	<1.8
7/4/2011	40	13
7/11/2011	120	6.8
7/18/2011	130	13
7/26/2011	510	11
8/1/2011	480	7.3
8/8/2011	230	7.8
8/15/2011	230	13
8/22/2011	350	3
8/29/2011	170	17
9/6/2011	70	23
9/12/2011	170	7.8
9/19/2011	1700	7.8
9/26/2011	490	22
10/2/2011	170	11
10/10/2011	>2400	980
10/11/2011	740	45
10/18/2011	870	11
10/24/2011	1000	11
10/30/2011	2400	26
11/7/2011	870	31
11/14/2011	2800	32

11/21/2011	520	19
11/28/2011	790	22
12/5/2011	5400	110
12/12/2011	1100	26
12/19/2011	1100	23
12/27/2011	460	33
1/2/2012	540	23
1/9/2012	490	33
1/17/2012	690	21
1/24/2012	4400	300
1/30/2012	230	13
2/6/2012	400	20
4/25/2012	1300	44
4/30/2012	460	16
5/7/2012	1700	79
5/14/2012	1200	17
5/21/2012	220	23
5/28/2012	2400	13
6/4/2012	3500	23
6/11/2012	700	23
6/18/2012	3500	26
6/28/2012	1700	20
7/2/2012	16000	4.5
7/9/2012	2200	4.5
7/16/2012	5400	79
7/23/2012	1700	49
7/30/2012	980	6.3
8/6/2012	540	4.5
8/13/2012	330	4.5
8/20/2012	2400	6.8
8/27/2012	210	11
9/4/2012	1100	23
9/10/2012	140	<1.8
9/17/2012	490	70
9/24/2012	490	11
10/1/2012	700	49
10/8/2012	2400	27
10/15/2012	230	79
10/22/2012	16000	1100
10/29/2012	1700	49
11/5/2012	1100	33
11/14/2012	1300	36


Fairbairn WTP, Raw Water E. Coli Levels, 2008-2012
E. coli, MPN/100mL
10000
1000
100
10
1
1/14/2008
2/18/2008
3/24/2008
4/28/2008
6/2/2008
7/7/2008
8/11/2008
9/15/2008
10/20/2008
1/20/2009
2/23/2009
3/30/2009
5/4/2009
6/8/2009
7/13/2009
8/17/2009
9/21/2009
10/26/2009
2/1/2010
3/8/2010
4/12/2010
5/17/2010
6/21/2010
7/26/2010
8/30/2010
10/4/2010
11/8/2010
12/13/2010
1/24/2011
4/25/2011
5/30/2011
7/4/2011
8/8/2011
9/12/2011
10/11/2011
11/14/2011
12/19/2011
1/24/2012
5/7/2012
6/11/2012
7/16/2012
8/20/2012
9/24/2012
10/29/2012


Fairbairn WTP, Percent Occurrence of E. coli, 2008-2012
E. coli, MPN/100mL
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0%
20%
40%
60%
80%
100%
120%

SITE	DATE	ALK, MG/L	TOC, MG/L
EAFWTP Tap 01 (Raw)	2/5/2008	33	1.80
EAFWTP Tap 08 (Filter Effluent)	2/5/2008		1.00
EAFWTP Tap 01 (Raw)	3/6/2008	35	1.80
EAFWTP Tap 01 (Raw)	4/14/2008	32	1.50
EAFWTP Tap 08 (Filter Effluent)	4/14/2008		1.10
EAFWTP Tap 01 (Raw)	5/6/2008	31	1.30
EAFWTP Tap 08 (Filter Effluent)	5/6/2008		0.96
EAFWTP Tap 01 (Raw)	6/2/2008	24	1.20
EAFWTP Tap 08 (Filter Effluent)	6/2/2008		0.85
EAFWTP Tap 01 (Raw)	7/10/2008	24	1.40
EAFWTP Tap 08 (Filter Effluent)	7/10/2008		0.92
EAFWTP Tap 01 (Raw)	8/4/2008	24	1.50
EAFWTP Tap 08 (Filter Effluent)	8/4/2008		1.00
EAFWTP Tap 01 (Raw)	9/2/2008	23	1.40
EAFWTP Tap 08 (Filter Effluent)	9/2/2008		0.99
EAFWTP Tap 01 (Raw)	10/3/2008	21	1.30
EAFWTP Tap 08 (Filter Effluent)	10/3/2008		0.85
EAFWTP Tap 01 (Raw)	11/3/2008	24	1.30
EAFWTP Tap 08 (Filter Effluent)	11/3/2008		1.20
EAFWTP Tap 01 (Raw)	2/3/2009	33	1.26
EAFWTP Tap 08 (Filter Effluent)	2/3/2009	26	0.84
EAFWTP Tap 01 (Raw)	3/3/2009	33	2.34
EAFWTP Tap 08 (Filter Effluent)	3/3/2009	25	1.30
EAFWTP Tap 01 (Raw)	4/16/2009	27	1.50
EAFWTP Tap 08 (Filter Effluent)	4/16/2009	18	0.87
EAFWTP Tap 01 (Raw)	5/6/2009	24	2.19
EAFWTP Tap 08 (Filter Effluent)	5/6/2009		1.08
EAFWTP Tap 01 (Raw)	7/1/2009	21	2.00
EAFWTP Tap 08 (Filter Effluent)	7/1/2009		1.22
EAFWTP Tap 01 (Raw)	8/2/2009	20	1.93
EAFWTP Tap 08 (Filter Effluent)	8/2/2009		1.18
EAFWTP Tap 01 (Raw)	9/13/2009	21	1.52
EAFWTP Tap 08 (Filter Effluent)	9/13/2009		0.96
EAFWTP Tap 01 (Raw)	10/5/2009	20	1.31
EAFWTP Tap 08 (Filter Effluent)	10/5/2009		0.94
EAFWTP Tap 01 (Raw)	11/2/2009	22	1.41
EAFWTP Tap 08 (Filter Effluent)	11/2/2009		0.97
EAFWTP Tap 01 (Raw)	2/2/2010	30	1.79
EAFWTP Tap 08 (Filter Effluent)	2/2/2010		1.09
EAFWTP Tap 08 (Filter Effluent)	3/1/2010	25	1.21
EAFWTP Tap 01 (Raw)	3/2/2010	28	1.67
EAFWTP Tap 01 (Raw)	4/6/2010	31	1.42
EAFWTP Tap 08 (Filter Effluent)	4/7/2010	32	0.94
EAFWTP Tap 01 (Raw)	5/5/2010	30	1.28
EAFWTP Tap 08 (Filter Effluent)	5/6/2010	30	0.82
EAFWTP Tap 01 (Raw)	6/2/2010	25	1.48
EAFWTP Tap 08 (Filter Effluent)	6/2/2010	27	0.99
EAFWTP Tap 01 (Raw)	7/2/2010	22	1.39
EAFWTP Tap 08 (Filter Effluent)	7/2/2010	0	0.83
EAFWTP Tap 01 (Raw)	8/9/2010	21	1.50
EAFWTP Tap 08 (Filter Effluent)	8/9/2010	21	1.00
EAFWTP Tap 01 (Raw)	9/1/2010	20	1.40
EAFWTP Tap 08 (Filter Effluent)	9/1/2010	21	0.86
EAFWTP Tap 01 (Raw)	10/22/2010	22	1.30
EAFWTP Tap 08 (Filter Effluent)	10/22/2010		0.85
EAFWTP Tap 01 (Raw)	11/1/2010	22	1.40
EAFWTP Tap 08 (Filter Effluent)	11/1/2010	22	0.91
EAFWTP Tap 01 (Raw)	12/2/2010	24	1.54
EAFWTP Tap 08 (Filter Effluent)	12/2/2010	25	1.02

EAFWTP Tap 01 (Raw)	1/5/2011	25	1.80
EAFWTP Tap 08 (Filter Effluent)	1/5/2011		1.10
EAFWTP Tap 01 (Raw)	2/1/2011	26	1.49
EAFWTP Tap 08 (Filter Effluent)	2/1/2011		0.85
EAFWTP Tap 01 (Raw)	4/7/2011	28	1.49
EAFWTP Tap 08 (Filter Effluent)	4/7/2011		0.85
EAFWTP Tap 01 (Raw)	5/2/2011	25	1.28
EAFWTP Tap 08 (Filter Effluent)	5/2/2011		0.67
EAFWTP Tap 01 (Raw)	6/1/2011	22	1.22
EAFWTP Tap 08 (Filter Effluent)	6/1/2011		0.75
EAFWTP Tap 01 (Raw)	7/1/2011	17	1.52
EAFWTP Tap 08 (Filter Effluent)	7/1/2011		0.92
EAFWTP Tap 01 (Raw)	8/3/2011		1.28
EAFWTP Tap 08 (Filter Effluent)	8/3/2011		0.73
EAFWTP Tap 01 (Raw)	8/8/2011	18	1.38
EAFWTP Tap 08 (Filter Effluent)	8/8/2011		0.86
EAFWTP Tap 08 (Filter Effluent)	9/1/2011		0.76
EAFWTP Tap 01 (Raw)	9/6/2011	17	1.26
EAFWTP Tap 01 (Raw)	10/3/2011	18	1.29
EAFWTP Tap 08 (Filter Effluent)	10/3/2011		0.79
EAFWTP Tap 01 (Raw)	11/1/2011	18	1.39
EAFWTP Tap 08 (Filter Effluent)	11/1/2011		0.83
EAFWTP Tap 01 (Raw)	12/2/2011	22	1.25
EAFWTP Tap 08 (Filter Effluent)	12/2/2011		0.86
EAFWTP Tap 01 (Raw)	1/4/2012	22	1.16
EAFWTP Tap 08 (Filter Effluent)	1/4/2012		0.74
EAFWTP Tap 01 (Raw)	2/1/2012	24	1.11
EAFWTP Tap 08 (Filter Effluent)	2/1/2012		0.77
EAFWTP Tap 01 (Raw)	5/1/2012	25	1.54
EAFWTP Tap 08 (Filter Effluent)	5/1/2012		0.93
EAFWTP Tap 01 (Raw)	6/1/2012	25	1.59
EAFWTP Tap 08 (Filter Effluent)	6/1/2012		1.17
EAFWTP Tap 01 (Raw)	7/2/2012	23	1.59
EAFWTP Tap 08 (Filter Effluent)	7/2/2012		1.07
EAFWTP Tap 01 (Raw)	8/2/2012	23	1.40
EAFWTP Tap 08 (Filter Effluent)	8/2/2012		0.86
EAFWTP Tap 01 (Raw)	9/4/2012	22	1.58
EAFWTP Tap 08 (Filter Effluent)	9/4/2012		1.00
EAFWTP Tap 01 (Raw)	10/1/2012	21	1.45
EAFWTP Tap 08 (Filter Effluent)	10/1/2012		0.99
EAFWTP Tap 01 (Raw)	11/1/2012	22	1.78
EAFWTP Tap 08 (Filter Effluent)	11/1/2012		1.17

Switched from Stage 1 to Stage 2 Sites: 1Q 2011
Switched from Stage 1 method to Stage 2 method (locational running annual average): 1Q 2012

SAMPLE DATE	SAMPLE SITE	CHBR3	CHCL2BR	CHCL3	CHCLBR2	TOTAL THM
3/14/2008	1 SA	<0.50	8.23	34.2	1.46	43.9
3/14/2008	1 SF	<0.50	5.95	28.9	1.43	36.3
3/14/2008	2 S 12	1.24	2.5	17.2	1.03	22
3/14/2008	2 S 14	<0.50	7.54	26.1	1.32	35
3/14/2008	3 S 6	<0.50	4.17	33.2	<0.50	37.4
3/14/2008	3 SB	<0.50	4.4	37.5	<0.50	41.9
3/14/2008	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.0
3/14/2008	4 N 2	1.06	<0.50	<0.50	<0.50	1.06
3/14/2008	4 NE	<0.50	<0.50	<0.50	<0.50	<2.0
3/14/2008	5 SE	<0.50	7.76	30.2	2.12	40.1
3/14/2008	5 SJ	<0.50	5.02	43.6	<0.50	48.6
6/10/2008	1 SA	<0.50	5.42	31.9	0.64	38
6/10/2008	1 SF	<0.50	3.15	37.5	<0.50	40.7
6/10/2008	2 S 12	<0.50	2.57	36	<0.50	38.6
6/10/2008	2 S 14	<0.50	5.38	31.1	0.59	37.1
6/10/2008	3 S 6	<0.50	2.23	30.3	<0.50	32.5
6/10/2008	3 SB	<0.5	2.81	38.5	<0.5	41.3
6/10/2008	4 N 1	1.54	8.59	30.7	4.39	45.2
6/10/2008	4 N 2	1.47	<0.5	<0.5	<0.5	1.47
6/10/2008	4 N 5	1.02	5.04	24.9	1.8	32.8
6/10/2008	4 NE	<0.50	<0.50	<0.50	<0.50	<2.0
6/10/2008	5 SE	<0.50	2.92	38.4	<0.50	41.3
6/10/2008	5 SJ	<0.50	2.79	38.1	<0.50	40.9
9/16/2008	1 SA	<0.50	7.71	36.3	1.13	45.1
9/16/2008	1 SF	<0.50	3.69	43.5	<0.50	47.2
9/16/2008	2 S 12	<0.50	3.4	41.5	<0.50	44.9
9/16/2008	2 S 14	<0.50	6.98	33.3	1.02	41.3
9/16/2008	3 S 6	<0.50	3.12	36.4	<0.50	39.5
9/16/2008	3 SB	<0.50	4.03	49.8	<0.50	53.8
9/16/2008	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
9/16/2008	4 N 2	0.64	<0.50	<0.50	<0.50	0.64

9/16/2008	4 N 5	1.5	2.03	7.21	1.28	12
9/16/2008	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
9/16/2008	5 SE	<0.50	4.94	47.2	<0.50	52.1
9/16/2008	5 SJ	<0.50	3.79	46	<0.50	49.8
12/11/2008	1 SA	<0.50	8.18	38	0.97	47.2
12/11/2008	1 SF	<0.50	7.21	33.3	0.86	41.4
12/11/2008	2 S 14	<0.50	5.29	25.9	0.59	31.8
12/11/2008	3 S 6	<0.50	8.03	36.9	0.96	45.9
12/11/2008	4 N 1	<0.50	6.57	29.4	0.77	36.7
12/11/2008	4 N 5	<0.50	8.05	35.3	0.98	44.3
12/11/2008	4 NE	<0.50	8.41	37.7	1.02	47.1
12/11/2008	5 SE	<0.50	8.03	38.1	0.95	47.1
12/30/2008	2 S 12	<0.50	8.46	49.7	0.92	59.1
12/30/2008	3 SB	<0.50	8.72	54.7	0.97	64.4
12/30/2008	4 N 2	<0.50	8.51	50.2	1.01	59.7
12/30/2008	5 SJ	<0.50	9.15	53.1	1.12	63.4
3/10/2009	1 SA	0.7	5.45	45.3	1.72	53.2
3/10/2009	1 SF	<0.50	3.72	48.2	<0.50	51.9
3/10/2009	2 S 12	<0.50	4	50	<0.50	54
3/10/2009	2 S 14	<0.50	4.21	49.4	<0.50	53.6
3/10/2009	3 S 6	<0.50	3.52	42.8	<0.50	46.3
3/10/2009	3 SB	<0.50	4.63	56.9	<0.50	61.5
3/10/2009	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
3/10/2009	4 N 2	<0.50	<0.50	<0.50	<0.50	<2.00
3/10/2009	4 N 5	0.79	<0.50	<0.50	<0.50	0.79
3/10/2009	4 NE	0.53	<0.50	<0.50	<0.50	0.53
3/10/2009	5 SJ	<0.50	4.79	58.8	<0.50	63.6
3/13/2009	5 SE	<0.50	4.43	49.7	<0.50	54.1
6/9/2009	1 SA	<0.50	7.66	51.8	0.68	60.1
6/9/2009	1 SF	<0.50	2.44	51.6	<0.50	54
6/9/2009	2 S 12	<0.50	2.5	52.1	<0.50	54.6
6/9/2009	2 S 14	<0.50	6.52	52.6	<0.50	59.1
6/9/2009	3 S 6	<0.50	2.09	42.3	<0.50	44.4
6/9/2009	3 SB	<0.50	3.39	52.7	<0.50	56.1

6/9/2009	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
6/9/2009	4 N 2	0.89	<0.50	<0.50	<0.50	0.89
6/9/2009	4 N 5	1.23	<0.50	<0.50	<0.50	1.23
6/9/2009	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
6/9/2009	5 SE	<0.50	3.55	54.7	<0.50	58.3
6/9/2009	5 SJ	<0.50	2.94	54.1	<0.50	57
9/8/2009	1 SA	<0.50	7.84	31.3	1.07	40.2
9/8/2009	1 SF	<0.50	3.03	52	<0.50	55
9/8/2009	2 S 12	<0.50	2.88	54	<0.50	56.9
9/8/2009	2 S 14	<0.50	6.93	26.8	1.07	34.8
9/8/2009	3 S 6	<0.50	2.57	48.7	<0.50	51.3
9/8/2009	3 SB	<0.50	2.92	55.8	<0.50	58.7
9/8/2009	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
9/8/2009	4 N 2	1.26	<0.50	<0.50	<0.50	<2
9/8/2009	4 N 5	1.39	7.21	31.2	2.69	42.5
9/8/2009	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
9/8/2009	5 SE	<0.50	5.28	55	<0.50	60.3
9/8/2009	5 SJ	<0.50	3.15	59.3	<0.50	62.5
12/8/2009	1 SA	<0.50	6.02	33.2	0.58	39.8
12/8/2009	1 SF	<0.50	5.05	31.3	<0.50	36.4
12/8/2009	2 S 12	1.41	1.12	2.4	1.33	6.26
12/8/2009	2 S 14	<0.50	5.22	37.2	<0.50	42.4
12/8/2009	3 S 6	<0.50	5.62	27.9	1.25	34.8
12/8/2009	3 SB	1.28	11	31.5	5.03	48.8
12/8/2009	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
12/8/2009	4 N 2	<0.50	<0.50	<0.50	<0.50	<2.00
12/8/2009	4 N 5	<0.50	<0.50	<0.50	<0.50	<2.00
12/8/2009	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
12/8/2009	5 SE	<0.50	6.72	37.5	0.66	44.9
12/8/2009	5 SJ	<0.50	8.12	39.6	1.71	49.4
3/9/2010	1 SA	<0.50	4.08	42.2	0.68	47
3/9/2010	1 SF	<0.50	2.93	35	<0.50	37.9
3/9/2010	2 S 12	<0.50	3.18	40.1	<0.50	43.3
3/9/2010	2 S 14	<0.50	3.16	36.8	<0.50	40

3/9/2010	3 S 6	<0.50	2.68	30.5	<0.50	33.2
3/9/2010	3 SB	<0.50	2.74	31	<0.50	33.7
3/9/2010	4 N 1	0.54	<0.50	<0.50	<0.50	<2.00
3/9/2010	4 N 2	<0.50	<0.50	<0.50	<0.50	<2.00
3/9/2010	4 N 5	<0.50	<0.50	<0.50	<0.50	<2.00
3/9/2010	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
3/9/2010	5 SE	<0.50	3.44	46.6	<0.50	50
3/9/2010	5 SJ	<0.50	3.37	46.6	<0.50	50
6/8/2010	1 SA	<0.50	5.15	43.2	<0.50	48.4
6/8/2010	1 SF	<0.50	3.09	43.1	<0.50	46.2
6/8/2010	2 S 12	<0.50	3.06	46.8	<0.50	49.9
6/8/2010	2 S 14	<0.50	4.81	40.8	<0.50	45.6
6/8/2010	3 S 6	<0.50	2.77	40.5	<0.50	43.3
6/8/2010	3 SB	<0.50	3	44.2	<0.50	47.2
6/8/2010	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
6/8/2010	4 N 2	<0.50	<0.50	<0.50	<0.50	<2.00
6/8/2010	4 N 5	0.64	<0.50	<0.50	<0.50	0.64
6/8/2010	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
6/8/2010	5 SE	<0.50	3.76	49.9	<0.50	53.7
6/8/2010	5 SJ	<0.50	3.85	49.9	<0.50	53.8
9/7/2010	1 SA	<0.50	7.02	38.3	0.84	46.2
9/7/2010	1 SF	<0.50	3.81	44.5	<0.50	48.3
9/7/2010	2 S 12	<0.50	2.82	46.6	<0.50	49.4
9/7/2010	2 S 14	<0.50	6.2	34.7	0.81	41.7
9/7/2010	3 S 6	<0.50	2.68	43.7	<0.50	46.4
9/7/2010	3 SB	<0.50	3.02	46.5	<0.50	49.5
9/7/2010	4 N 1	<0.50	4.7	20.5	1.41	26.6
9/7/2010	4 N 2	0.72	<0.50	<0.50	0.58	1.3
9/7/2010	4 N 5	0.52	<0.50	<0.50	<0.50	0.52
9/7/2010	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
9/7/2010	5 SE	<0.50	5.11	46.2	0.52	51.8
9/7/2010	5 SJ	<0.50	2.91	47.3	<0.50	50.2
12/7/2010	1 SA	<0.50	3	36	<0.50	39
12/7/2010	1 SF	<0.50	2.43	36.7	<0.50	39.1

12/7/2010	2 S 12	<0.50	2.52	35.8	<0.50	38.3
12/7/2010	2 S 14	0.88	2	19.8	1	23.7
12/7/2010	3 S 6	<0.50	3.16	50.7	<0.50	53.9
12/7/2010	3 SB	<0.50	2.42	35.8	<0.50	38.2
12/7/2010	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
12/7/2010	4 N 2	<0.50	<0.50	<0.50	<0.50	<2.00
12/7/2010	4 N 5	<0.50	<0.50	<0.50	<0.50	<2.00
12/7/2010	4 NE	<0.50	<0.50	<0.50	<0.50	<2.00
12/7/2010	5 SE	<0.50	2.7	36	<0.50	38.7
12/7/2010	5 SJ	<0.50	2.67	36.5	<0.50	39.2
1/11/2011	1 SA	<0.50	2.34	33.6	<0.50	35.9
1/11/2011	1 SI	<0.50	2.3	33.8	<0.50	36.1
1/11/2011	2319 E ST	<0.50	2.33	31.6	<0.5	33.9
1/11/2011	3 S 6	<0.50	2.26	31.8	<0.50	34.1
1/11/2011	3 SB	<0.50	2.18	34.4	<0.50	36.6
1/11/2011	5 SC	1	3.8	29.3	2.4	36.5
1/11/2011	5 SE	<0.50	2.28	34.9	<0.50	37.2
1/11/2011	5 SF	<0.50	2.14	36	<0.50	38.1
1/11/2011	5 SJ	<0.50	2.23	37.2	<0.50	39.4
1/11/2011	7467 S. LAND PARK	0.71	3.01	28.7	1.57	34
3/8/2011	1 SA	<0.50	5.34	53.6	<0.50	58.9
3/8/2011	2319 E ST	1.2	4.92	33.3	2.04	41.5
3/8/2011	3 S 6	1.18	6.26	37.7	2.98	48.1
3/8/2011	3 SB	2.66	9.57	30	6.48	48.7
3/8/2011	404 BLUE DOLPHIN	<0.50	5.6	54.8	<0.50	60.4
3/8/2011	5 S C	<0.50	5.64	57.9	<0.50	63.5
3/8/2011	5 SE	<0.50	4.89	52.1	<0.50	57
3/8/2011	5 SF	<0.50	5.82	54.1	0.6	60.5
3/8/2011	5 SJ	1.36	8.97	49.2	4.02	63.6
3/8/2011	7467 S LAND PARK DR	<0.50	4.52	51.4	<0.50	55.9
3/8/2011	SRWTP	<0.50	5.3	43.8	<0.50	49.1
3/9/2011	1 S I	<0.50	6.76	57.9	0.52	65.2
4/12/2011	1 SA	<0.50	4.84	48.4	<0.50	53.2
4/12/2011	1 SI	1.72	4.23	28.2	2.68	36.8

4/12/2011	2319 E ST	0.92	1.76	12.3	0.81	15.8
4/12/2011	3 S 6	<0.50	2.04	35.2	<0.50	37.2
4/12/2011	3 SB	<0.50	2.47	38.6	<0.50	41.1
4/12/2011	404 BLUE DOLPHIN	<0.50	5.49	47.7	0.92	54.1
4/12/2011	5 SC	<0.50	4.94	44.2	0.58	49.7
4/12/2011	5 SE	0.5	4.33	36	1.27	42.1
4/12/2011	5 SF	0.65	4.92	35.6	1.8	43
4/12/2011	5 SJ	<0.50	4.96	41.1	1.92	48
4/12/2011	7647 S. LAND PARK	<0.50	4.22	38.8	<0.50	43
4/12/2011	SRWTP	<0.50	3.3	33.3	<0.50	36.6
7/12/2011	1 SA	<0.50	4.9	42	<0.50	46.9
7/12/2011	1 SF	<0.50	2.62	51.6	<0.50	54.2
7/12/2011	2 S 12	<0.50	1.9	53.8	<0.50	55.7
7/12/2011	2 S 14	<0.50	4.48	36.5	<0.50	41
7/12/2011	3 S 6	<0.50	1.74	50.4	<0.50	52.1
7/12/2011	3 SB	<0.50	2.02	58.9	<0.50	60.9
7/12/2011	4 N 1	<0.50	<0.50	<0.50	<0.50	<2.00
7/12/2011	4 N 2	0.78	<0.50	<0.50	<0.50	0.78
7/12/2011	4 N 5	0.5	<0.50	<0.50	<0.50	0.5
7/12/2011	4 NE	<0.50	0.62	1.98	0.56	3.16
7/12/2011	5 SE	<0.50	4.2	55.4	<0.50	59.6
7/12/2011	5 SJ	<0.50	2.03	54.2	<0.50	56.2
7/28/2011	1 SI	<0.50	7.16	42.2	0.71	50.1
7/28/2011	2319 E ST	<0.50	5.12	32.3	<0.50	37.4
7/28/2011	404 BLUE DOLPHIN	<0.50	6.48	42.8	0.72	50
7/28/2011	5 SC	<0.50	5.67	36	0.6	42.3
7/28/2011	5 SF	<0.50	5.98	54.6	0.62	61.2
7/28/2011	7467 S LD PARK	<0.50	5.72	33.6	0.59	39.9
7/28/2011	SRWTP	<0.50	5.32	31	<0.50	36.3
10/11/2011	1 SA	<0.5	4.3	40.81	<0.5	45.11
10/11/2011	1 SI	1.53	6.48	28.07	4.185	40.265
10/11/2011	2319 E ST	<0.5	4.13	29.785	0.71	34.625
10/11/2011	3 S 6	<0.5	2.2	54.66	<0.5	56.86
10/11/2011	3 SB	<0.5	2.2	53.41	<0.5	55.61

10/11/2011	404 BLUE DOLPH	<0.5	3.54	28.725	<0.5	32.265
10/11/2011	5 SC	<0.5	4.87	41.69	<0.5	46.56
10/11/2011	5 SE	1.01	4.765	31.435	2.565	39.775
10/11/2011	5 SF	0.48	5.58	33.265	2.07	41.395
10/11/2011	5 SJ	<0.5	2.85	66.25	<0.5	69.1
10/11/2011	7467 S LD PARK	<0.5	4.985	40.44	<0.5	45.425
10/11/2011	SRWTP	<0.5	3.58	41.48	<0.5	45.06
1/10/2012	1 SA	<0.5	2	24.4	<0.5	26.4
1/10/2012	1 SI	<0.5	2.2	25.3	<0.5	27.4
1/10/2012	2319 E STREET	<0.5	1.8	23	<0.5	24.8
1/10/2012	3 S 6	<0.5	1.6	20.3	<0.5	21.9
1/10/2012	3 SB	<0.5	2	25.8	<0.5	27.8
1/10/2012	404 BLUE DOLPHIN	<0.5	2.2	26	<0.5	28.2
1/10/2012	5 SC	<0.5	2.4	26.4	<0.5	28.8
1/10/2012	5 SE	<0.5	2.2	25.8	<0.5	27.9
1/10/2012	5 SF	<0.5	2.1	25.4	<0.5	27.6
1/10/2012	5 SJ	<0.5	2.2	26.1	<0.5	28.3
1/10/2012	7467 S. LAND PARK	<0.5	2.1	21	<0.5	23.1
1/10/2012	SRWTP	<0.5	1.6	14.8	<0.5	16.8
4/10/2012	1 SA	<0.5	6	51.77	0.6	58.37
4/10/2012	1 SI	<0.5	5.37	48.81	<0.5	54.18
4/10/2012	2319 E STREET	<0.5	5.45	39.85	1.03	46.33
4/10/2012	3 S 6	<0.5	6.32	49.75	1.3	57.37
4/10/2012	3 SB	0.97	8.75	59.67	3.2	72.58
4/10/2012	404 BLUE DOLPHIN	<0.5	5.24	50.98	<0.5	56.22
4/10/2012	5 SC	<0.5	5.27	51.72	<0.5	56.98
4/10/2012	5 SE	<0.5	5.81	59.05	<0.5	64.86
4/10/2012	5 SF	<0.5	5.77	58.32	<0.5	63.92
4/10/2012	5 SJ	<0.5	6.02	54.11	0.77	60.89
4/10/2012	7467 S.LAND PARK	<0.5	5.24	51.76	<0.5	57
4/10/2012	SRWTP TAP	<0.5	5.51	34.62	0.55	40.69
7/10/2012	1 SA	<0.5	4.18	39.52	<0.5	43.7
7/10/2012	1 SI	<0.5	2.93	61.5	<0.5	64.43
7/10/2012	2319 E STREET	<0.5	4.21	38.32	<0.5	42.53

7/10/2012	3 S 6	<0.5	2.16	49.16	<0.5	51.32
7/10/2012	3 SB	<0.5	2.6	58.12	<0.5	60.72
7/10/2012	404 BLUE DOLPHIN	<0.5	4.53	48.34	<0.5	52.87
7/10/2012	5 SC	<0.5	4.28	42.98	<0.5	47.26
7/10/2012	5 SE	<0.5	3.1	57.64	<0.5	60.74
7/10/2012	5 SF	<0.5	3.3	73.45	<0.5	76.75
7/10/2012	5 SJ	<0.5	3.37	71.55	<0.5	74.92
7/10/2012	7467 S.LAND PARK	<0.5	4.17	39.25	<0.5	43.42
7/10/2012	SRWTP	<0.5	3.21	30.4	<0.5	33.61
10/9/2012	1 SA	<0.50	4.23	33.4	<0.50	37.6
10/9/2012	1 SI	<0.50	3.42	60	<0.50	63.4
10/9/2012	2319 E STREET	<0.50	4.13	31.5	<0.50	35.6
10/9/2012	3 S 6	<0.50	2.99	52	<0.50	55
10/9/2012	3 SB	<0.50	3.29	56.7	<0.50	60
10/9/2012	404 BLUE DOPHIN	<0.50	5.71	37.4	<0.50	43.1
10/9/2012	5 SC	<0.50	4.7	33.2	<0.50	37.9
10/9/2012	5 SE	<0.50	4.33	49.8	<0.50	54.1
10/9/2012	5 SF	<0.50	4.76	44.5	<0.50	49.2
10/9/2012	5 SJ	<0.50	3.58	63.5	<0.50	67.1
10/9/2012	7467 S. LAND PARK	<0.50	4.24	31.4	<0.50	35.6
10/9/2012	SRWTP	<0.50	2.77	23.8	<0.50	26.6

Switched from Stage 1 to Stage 2 Sites: 1Q 2011

Switched from Stage 1 method to Stage 2 method (locational running annual average): 1Q 2012

SAMPLE DATE	SAMPLE SITE	DBAA	DCAA	MBAA	MCAA	TCAA	TOTAL HAA
3/14/2008	1 SA	<1.0	4.5	<1.0	<2.0	12	16
3/14/2008	1 SF	<1.0	12	<1.0	<2.0	15	27
3/14/2008	2 S 12	<1.0	6.8	<1.0	<2.0	8.3	15
3/14/2008	2 S 14	<1.0	10	<1.0	<2.0	11	21
3/14/2008	3 S 6	<1.0	14	<1.0	<2.0	18	32
3/14/2008	3 SB	<1.0	5.4	<1.0	<2.0	17	22
3/14/2008	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
3/14/2008	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
3/14/2008	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
3/14/2008	5 SE	<1.0	10	<1.0	<2.0	13	23
3/14/2008	5 SJ	<1.0	2.3	<1.0	<2.0	18	20
6/10/2008	1 SA	<1.0	4.4	<1.0	<2.0	9.2	14
6/10/2008	1 SF	<1.0	3.4	<1.0	<2.0	14	17
6/10/2008	2 S 12	<1.0	6.4	<1.0	<2.0	14	20
6/10/2008	2 S 14	<1.0	5.1	<1.0	<2.0	8.8	14
6/10/2008	3 S 6	<1.0	7	<1.0	<2.0	14	21
6/10/2008	3 SB	<1.0	4.3	<1.0	<2.0	16	20
6/10/2008	4 N 1	<1.0	8.3	<1.0	<2.0	11	19
6/10/2008	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
6/10/2008	4 N 5	<1.0	8.8	<1.0	<2.0	7.8	17
6/10/2008	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
6/10/2008	5 SE	<1.0	3.5	<1.0	<2.0	15	28
6/10/2008	5 SJ	<1.0	3.1	<1.0	<2.0	16	19
9/16/2008	1 SA	<1.0	8.1	<1.0	<2.0	14	22
9/16/2008	1 SF	<1.0	5.8	<1.0	<2.0	16	22
9/16/2008	2 S 12	<1.0	9	<1.0	<2.0	16	25
9/16/2008	2 S 14	<1.0	11	<1.0	<2.0	13	24
9/16/2008	3 S 6	<1.0	8	<1.0	<2.0	14	22
9/16/2008	3 SB	<1.0	5.3	<1.0	<2.0	18	23
9/16/2008	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0
9/16/2008	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0
9/16/2008	4 N 5	<1.0	2.5	<1.0	<2.0	2.9	5.4
9/16/2008	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0
9/16/2008	5 SE	<1.0	4.8	<1.0	<2.0	19	24
9/16/2008	5 SJ	<1.0	4.6	<1.0	<2.0	17	22
12/11/2008	1 SA	<1.00	4	<1.00	<2.0	15	19
12/11/2008	1 SF	<1.00	8.4	<1.00	<2.0	14	23

12/11/2008	2 S 12	<1.00	16	<1.00	<2.0	18	34
12/11/2008	2 S 14	<1.00	9.7	<1.00	<2.0	13	22
12/11/2008	3 S 6	<1.00	8	<1.00	<2.0	16	24
12/11/2008	3 SB	<1.00	1.8	<1.00	<2.0	18	19
12/11/2008	4 N 1	<1.00	12	<1.00	<2.0	13	25
12/11/2008	4 N 2	<1.00	16	<1.00	<2.0	18	34
12/11/2008	4 N 5	<1.00	14	<1.00	<2.0	16	30
12/11/2008	4 NE	<1.00	14	<1.00	<2.0	16	31
12/11/2008	5 SE	<1.00	8	<1.00	<2.0	17	25
12/11/2008	5 SJ	<1.00	2.5	<1.00	<2.0	18	20
3/10/2009	1 SA	<1.0	6.5	<1.0	<2.0	26	32
3/10/2009	1 SF	<1.0	25	<1.0	3.1	26	54
3/10/2009	2 S 12	<1.0	24	<1.0	3.6	27	55
3/10/2009	2 S 14	<1.0	26	<1.0	3.6	27	56
3/10/2009	3 S 6	<1.0	21	<1.0	3	22	47
3/10/2009	3 SB	<1.0	12	<1.0	2	27	41
3/10/2009	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6
3/10/2009	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6
3/10/2009	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6
3/10/2009	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6
3/10/2009	5 SE	<1.0	15	<1.0	2.3	28	45
3/10/2009	5 SJ	<1.0	9.2	<1.0	<2.0	26	35
6/9/2009	1 SA	<1.0	11	<1.0	2.6	27	40
6/9/2009	1 SF	<1.0	16	<1.0	2.2	24	42
6/9/2009	2 S 12	<1.0	20	<1.0	2.9	26	49
6/9/2009	2 S 14	<1.0	13	<1.0	2.3	22	38
6/9/2009	3 S 6	<1.0	16	<1.0	2.1	22	40
6/9/2009	3 SB	<1.0	18	<1.0	<2.0	23	42
6/9/2009	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6
6/9/2009	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
6/9/2009	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
6/9/2009	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
6/9/2009	5 SE	<1.0	8.6	<1.0	<2.0	29	38
6/9/2009	5 SJ	<1.0	19	<1.0	2.7	27	48
9/8/2009	1 SA	<1.0	14	<1.0	2.2	22	38
9/8/2009	1 SF	<1.0	13	<1.0	2.5	17	33
9/8/2009	2 S 12	<1.0	14	<1.0	2.1	19	35
9/8/2009	2 S 14	<1.0	10	<1.0	<2.0	20	30
9/8/2009	3 S 6	<1.0	14	<1.0	2.1	17	33
9/8/2009	3 SB	<1.0	16	<1.0	2.6	20	39

9/8/2009	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
9/8/2009	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
9/8/2009	4 N 5	<1.0	15	<1.0	2.1	12	30
9/8/2009	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
9/8/2009	5 SE	<1.0	12	<1.0	2.3	18	33
9/8/2009	5 SJ	<1.0	12	<1.0	2.5	20	35
12/8/2009	1 SA	<1	5.2	<1	<2	15	20
12/8/2009	1 SF	<1	13	<1	3.2	19	35
12/8/2009	2 S 12	<1	<1	<1	<2	<1	<6
12/8/2009	2 S 14	<1	13	<1	2.7	19	34
12/8/2009	3 S 6	<1	12	<1	<2	18	30
12/8/2009	3 SB	<1	8.6	<1	<2	15	23
12/8/2009	4 N 1	<1	<1	<1	<2	<1	<6
12/8/2009	4 N 2	<1	<1	<1	<2	<1	<5
12/8/2009	4 N 5	<1	<1	<1	<2	<1	<6
12/8/2009	4 NE	<1	<1	<1	<2	<1	<6
12/8/2009	5 SE	<1	7	<1	<1	16	23
12/8/2009	5 SJ	<1.0	5	<1.0	<1	15	20
3/9/2010	1 SA	<1.0	4.6	<1.0	<2.0	17	21
3/9/2010	1 SF	<1.00	13	<1.00	<2.0	15	28
3/9/2010	2 S 12	<1.0	15	<1.0	<2.0	14	29
3/9/2010	2 S 14	<1.0	14	<1.0	<2.0	15	28
3/9/2010	3 S 6	<1.0	12	<1.0	<2.0	13	25
3/9/2010	3 SB	<1.0	13	<1.0	<2.0	14	27
3/9/2010	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
3/9/2010	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
3/9/2010	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6
3/9/2010	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
3/9/2010	5 SE	<1.0	5.4	<1.0	<2.0	17	22
3/9/2010	5 SJ	<1.0	6.4	<1.0	<2.0	19	25
6/8/2010	1 SA	<1.0	5.5	<1.0	<2.0	14	20
6/8/2010	1 SF	<1.0	4.7	<1.0	<2.0	18	23
6/8/2010	2 S 12	<1.0	17	<1.0	<2.0	29	46
6/8/2010	2 S 14	<1.0	6.8	<1.0	<2.0	14	21
6/8/2010	3 S 6	<1.0	12	<1.0	<2.0	28	40
6/8/2010	3 SB	<1.0	10	<1.0	<2.0	30	40
6/8/2010	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6
6/8/2010	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6
6/8/2010	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6
6/8/2010	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6

6/8/2010	5 SE	<1.0	6.7	<1.0	<2.0	19	25
6/8/2010	5 SJ	<1.0	2.7	<1.0	<2.0	18	20
9/7/2010	1 SA	<1.0	15	<1.0	<2.0	15	30
9/7/2010	1 SF	<1.0	15	<1.0	<2.0	19	34
9/7/2010	2 S 12	<1.0	13	<1.0	<2.0	19	33
9/7/2010	2 S 14	<1.0	15	<1.0	<2.0	12	27
9/7/2010	3 S 6	<1.0	13	<1.0	<2.0	18	31
9/7/2010	3 SB	<1.0	12	<1.0	<2.0	20	32
9/7/2010	4 N 1	<1.0	13	<1.0	<2.0	10	24
9/7/2010	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6
9/7/2010	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6
9/7/2010	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6
9/7/2010	5 SE	<1.0	13	<1.0	<2.0	20	33
9/7/2010	5 SJ	<1.0	6.2	<1.0	<2.0	21	28
12/7/2010	1 SA	<1.0	3.2	<1.0	<2.0	19	22
12/7/2010	1 SF	<1.0	6.1	<1.0	<2.0	19	25
12/7/2010	2 S 12	<1.0	9.5	<1.0	<2.0	19	29
12/7/2010	2 S 14	<1.0	4.9	<1.0	<2.0	12	17
12/7/2010	3 S 6	<1.0	2.8	<1.0	<2.0	11	14
12/7/2010	3 SB	<1.0	6.1	<1.0	<2.0	18	24
12/7/2010	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
12/7/2010	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
12/7/2010	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
12/7/2010	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
12/7/2010	5 SE	<1.0	4	<1.0	<2.0	18	22
12/7/2010	5 SJ	<1.0	4.4	<1.0	<2.0	19	23
1/11/2011	1 SA	<1.0	3.4	<1.0	<2.0	18	22
1/11/2011	1 SI	<1	3.9	<1.0	<2.0	18	22
1/11/2011	2319 E ST	<1.0	6.7	<1.0	<2.0	17	23
1/11/2011	3 S 6	<1.0	12	<1.0	<2.0	16	28
1/11/2011	3 SB	<1.0	4.2	<1.0	<2.0	18	23
1/11/2011	5 SC	<1.0	4.8	<1.0	<2.0	16	21
1/11/2011	5 SE	<1.0	4.4	<1.0	<2.0	19	24
1/11/2011	5 SF	<1.0	4	<1.0	<2.0	19	23
1/11/2011	5 SJ	<1.0	3.9	<1.0	<2.0	21	24
1/11/2011	7467 S. LAND PARK	<1.0	5.4	<1.0	<2.0	17	23
3/8/2011	1 SA	<1.0	4.2	<1.0	<2.0	15	19
3/8/2011	2319 E ST	<1.0	13	<1.0	<2.0	11	23
3/8/2011	3 S 6	<1.0	10	<1.0	<2.0	13	24
3/8/2011	3 SB	<1.0	6	<1.0	<2.0	12	18

3/8/2011	404 BLUE DOLPHIN	<1.0	8.5	<1.0	<2.0	17	25
3/8/2011	5 S C	<1.0	14	<1.0	<2.0	15	29
3/8/2011	5 SE	<1.0	11	<1.0	<2.0	17	28
3/8/2011	5 SF	<1.0	9.1	<1.0	<2.0	17	26
3/8/2011	5 SJ	<1.0	3	<1.0	<2.0	16	19
3/8/2011	7467 S LAND PARK DR	<1.0	18	<1.0	<2.0	17	35
3/8/2011	SRWTP	<1.0	17	<1.0	<2.0	14	31
3/9/2011	1 S I	<1.0	12	<1.0	<2.0	16	28
4/12/2011	1 SA	<1.0	3.7	<1.0	<2.0	16	20
4/12/2011	1 SI	<1.0	1.9	<1.0	<2.0	13	15
4/12/2011	2319 E ST	<1.0	4.8	<1.0	<2.0	5.7	10
4/12/2011	3 S 6	<1.0	11	<1.0	<2.0	17	28
4/12/2011	3 SB	<1.0	7.3	<1.0	<2.0	17	24
4/12/2011	404 BLUE DOLPHIN	<1.0	7.4	<1.0	<2.0	15	23
4/12/2011	5 SC	<1.0	8.9	<1.0	<2.0	14	23
4/12/2011	5 SE	<1.0	7.2	<1.0	<2.0	13	20
4/12/2011	5 SF	<1.0	6.5	<1.0	<2.0	15	21
4/12/2011	5 SJ	<1.0	2.4	<1.0	<2.0	19	21
4/12/2011	7647 S. LAND PARK	<1.0	8.3	<1.0	<2.0	16	24
4/12/2011	SRWTP	<1.0	14	<1.0	<2.0	12	26
7/12/2011	1 SA	<1.0	7	<1.0	<2.0	11	18
7/12/2011	1 SF	<1.0	6.8	<1.0	<2.0	17	24
7/12/2011	2 S 12	<1.0	13	<1.0	<2.0	16	30
7/12/2011	2 S 14	<0.98	7.3	<0.98	<2.0	12	19
7/12/2011	3 S 6	<1.0	8.3	<1.0	<2.0	17	25
7/12/2011	3 SB	<1.0	7.1	<1.0	<2.0	18	25
7/12/2011	4 N 1	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
7/12/2011	4 N 2	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
7/12/2011	4 N 5	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
7/12/2011	4 NE	<1.0	<1.0	<1.0	<2.0	<1.0	<6.0
7/12/2011	5 SE	<1.0	7.3	<1.0	<2.0	16	24
7/12/2011	5 SJ	<1.0	5.4	<1.0	<2.0	18	24
7/28/2011	1 SI	<0.99	6.6	<0.99	<2.0	12	19
7/28/2011	2319 E ST	<0.98	9.3	<0.98	<2.0	11	20
7/28/2011	404 BLUE DOLPHIN	<0.98	12	<0.98	<2.0	14	25
7/28/2011	5 SC	<0.98	11	<0.98	<2.0	13	23
7/28/2011	5 SF	<1.0	7.5	<1.0	<2.0	19	26
7/28/2011	7467 S LD PARK	<1.0	11	<1.0	<2.0	13	25
7/28/2011	SRWTP	<0.99	<0.99	<0.99	<2.0	11	23
10/11/2011	1 SA	<1.0	9.2	<1.0	2.1	16	27

10/11/2011	1 SI	<1.0	2.5	<1.0	<2.0	13	15
10/11/2011	2319 E ST	<1.0	9.3	<1.0	2.2	13	25
10/11/2011	3 S 6	<1.0	9.4	<1.0	2.1	22	34
10/11/2011	3 SB	<1.0	5.8	<1.0	<2.0	17	22
10/11/2011	404 BLUE DOLPH	<1.0	9.5	<1.0	<2.0	18	27
10/11/2011	5 SC	<1.0	9.6	<1.0	2.6	15	28
10/11/2011	5 SE	<1.0	4.3	<1.0	<2.0	13	18
10/11/2011	5 SF	<1.0	4.8	<1.0	<2.0	17	22
10/11/2011	5 SJ	<1.0	3.5	<1.0	<2.0	19	22
10/11/2011	7467 S LD PARK	<1.0	9	<1.0	2.1	13	25
10/11/2011	SRWTP	<1.0	11	<1.0	2.6	14	28
1/10/2012	1 SA	<1.0	3.6	<1.0	<2.0	12	15
1/10/2012	1 SI	<1.0	3.6	<1.0	<2.0	12	16
1/10/2012	2319 E STREET	<1.0	4.2	<1.0	<2.0	9.9	14
1/10/2012	3 S 6	<1.0	6.1	<1.0	<2.0	8.2	14
1/10/2012	3 SB	<1.0	1.5	<1.0	<2.0	10	12
1/10/2012	404 BLUE DOLPHIN	<1.0	3.8	<1.0	<2.0	10	14
1/10/2012	5 SC	<1.0	3.8	<1.0	<2.0	10	14
1/10/2012	5 SE	<1.0	3.4	<1.0	<2.0	11	14
1/10/2012	5 SF	<1.0	4.2	<1.0	<2.0	11	15
1/10/2012	5 SJ	<1.0	3.8	<1.0	<2.0	11	15
1/10/2012	7467 S. LAND PARK	<1.0	3.7	<1.0	<2.0	9.5	13
1/10/2012	SRWTP	<1.0	4.3	<1.0	<2.0	7.5	12
4/10/2012	1 SA	<1.0	5.81	<1.0	<2.0	21.9	27.7
4/10/2012	1 SI	<1.0	8.23	<1.0	<2.0	21.5	29.7
4/10/2012	2319 E STREET	<1.0	19.8	<1.0	<2.0	18.3	38.2
4/10/2012	3 S 6	<1.0	11	<1.0	4.3	22.1	37.4
4/10/2012	3 SB	<1.0	5.8	<1.0	<2.0	28.4	34.2
4/10/2012	404 BLUE DOLPHIN	<1.0	10.4	<1.0	<2.0	20.1	30.5
4/10/2012	5 SC	<1.0	10	<1.0	<2.0	20.8	30.8
4/10/2012	5 SE	<1.0	10.2	<1.0	2.3	22.7	35.2
4/10/2012	5 SF	<1.0	6.4	<1.0	<2.0	21.4	27.8
4/10/2012	5 SJ	<1.0	5.7	<1.0	<2.0	24.9	30.6
4/10/2012	7467 S.LAND PARK	<1.0	9.15	<1.0	<2.0	22.2	31.4
4/10/2012	SRWTP TAP	<1.0	17.4	<1.0	<2.0	15.7	33.1
7/10/2012	1 SA	<1.0	4.7	<1.0	<2.0	10.7	15.4
7/10/2012	1 SI	<1.0	4.54	<1.0	<2.0	22.4	26.9
7/10/2012	2319 E STREET	<1.0	5.15	<1.0	<2.0	10.1	15.3
7/10/2012	3 S 6	<1.0	9.84	<1.0	<2.0	19	28.8
7/10/2012	3 SB	<1.0	9.72	<1.0	<2.0	21.7	31.4

7/10/2012	404 BLUE DOLPHIN	<1.0	5.82	<1.0	<2.0	13.2	19
7/10/2012	5 SC	<1.0	5.45	<1.0	<2.0	13.6	19
7/10/2012	5 SE	<1.0	7.85	<1.0	<2.0	21.2	29
7/10/2012	5 SF	<1.0	4.37	<1.0	<2.0	22	26.4
7/10/2012	5 SJ	<1.0	4.61	<1.0	<2.0	22.9	27.5
7/10/2012	7467 S.LAND PARK	<1.0	5.22	<1.0	<2.0	13.3	18.5
7/10/2012	SRWTP	<1.0	4.8	<1.0	<2.0	10.6	15.4
10/9/2012	1 SA	<1	4.13	<1	<2	10.6	14.7
10/9/2012	1 SI	<1	4.95	<1	<2	16.1	21.1
10/9/2012	2319 E STREET	<1	4.52	<1	<2	10	14.5
10/9/2012	3 S 6	<1	9.43	<1	<2	16.2	25.7
10/9/2012	3 SB	<1	6.98	<1	<2	14.8	21.8
10/9/2012	404 BLUE DOPHIN	<1	5.45	<1	<2	10.8	16.3
10/9/2012	5 SC	<1	5.44	<1	<2	10.7	16.1
10/9/2012	5 SE	<1	5.25	<1	<2	14.4	19.6
10/9/2012	5 SF	<1	4.21	<1	<2	10.1	14.3
10/9/2012	5 SJ	<1	5.36	<1	<2	17.6	23
10/9/2012	7467 S. LAND PARK	<1	4.98	<1	<2	11.6	16.5
10/9/2012	SRWTP	<1	3.88	<1	<2	7.94	11.8

APPENDIX C
REGULATORY FRAMEWORK

REGULATORY FRAMEWORK

This Appendix 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 Department of Public Health (DPH). Under the provisions of the Safe Drinking Water Act (SDWA), the DPH has the primary enforcement responsibility (referred to as "primacy"). The Health and Safety Code of the California Administrative Code establishes DPH'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 DPH 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.

In the fall of 2010 the USEPA worked with the drinking water community to solicit input on the key groups of water quality constituents which may be appropriate for regulation. Nine groups of constituents were identified:

- Ready for regulatory consideration – carcinogenic volatile organic compounds (VOCs), nitrosamines, and DBPs from chlorination
- Future consideration with data gaps - perfluoronated compounds, organophosphates, and carbamates
- Long-term consideration with significant gaps and other issues – triazines, chloroacetanilides, cyanotoxins

In February 2011 the USEPA announced that it will move forward with development of regulatory standards for a group of carcinogenic VOCs. A draft rule is expected in late 2013 or early 2014, with a final in 2015. These are largely industrial contaminants and include 16 VOCs, eight of which are already regulated. This does include TCE and PCE, as recommended by the Six-Year Review process. The USEPA also announced that the second group of contaminants to be addressed will be nitrosamine DBPs, although no schedule has been proposed yet.

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 DPH. 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 DPH 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.

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.

Table 1
Summary of 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	2008	11	Chemical
CA Waterworks Standard	2008	None	None
Endocrine Disrupters Screening Program	2009/2010	73	Endocrine Disrupters
Contaminant Candidate List 3	2009	104	Chemical and Microbiological
Six-Year Review	2010	-	-
CA Notification Levels	On-Going	54	IOCs, VOCs, SOCs
Unregulated Contaminant Monitoring Rule 3	2012	30	Chemical and Biological
Revised Total Coliform Rule	2012	3	Microbiological

[1]California Adoption of Federal Rule

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 superceded 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 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 DPH 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 DPH 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). DPH 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 DPH 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 DPH 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 DPH. 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. 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, DPH 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 DPH, 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 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." DPH 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 TTHMs, HAA5, Chlorite, and Bromate

The USEPA has set MCLGs for four trihalomethanes, three haloacetic acids, chlorite, and bromate. These are shown in **Table 4**.

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

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.

Maximum Contaminant Levels for TTHMs, HAA5, Chlorite, and Bromate

The Stage 1 D/DBP Rule set MCLs for TTHM, 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 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 DPH 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 will 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 DPH 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

DPH 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 DPH 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 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.

Profiling is required for surface water systems if their annual average TTHM levels are greater than or equal to 80 percent of the new MCL (0.064 mg/L) or annual average HAA5 levels are greater than or equal to 80 percent of the new MCL (0.048 mg/L).

The disinfection profile is developed using a minimum of one year of weekly *Giardia lamblia* log inactivation. The month with the lowest average log inactivation will be identified as the critical period or benchmark. When only one year of data is used, the benchmark inactivation shall be the same as the critical period. When multiple years of data are used, the benchmark inactivation shall be the average of the critical period from each year.

After the profiling and benchmarking is complete, a utility must submit 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). DPH 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. DPH 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 (DPH 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. DPH 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 DPH 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 DPH 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 DPH approved operating capacity.

Each system must collect and maintain the following information: copy of recycle notice to DPH, 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.

DPH 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 DPH in 2012. It applies to public water systems (PWSs) that are community water systems (CWSs) or nontransient noncommunity 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). Currently, compliance with the MCL is calculated using a running annual average (RAA) to average compliance samples from all distribution system sampling locations. Under Stage 2 DBPR, the MCL will be 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 trihalomethane (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 the Initial Distribution System Evaluation (IDSE) Final Report.

In May 2012 DPH 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 DBPR compliance monitoring to identify and select Stage 2 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 are based on the retail population served 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 DBPR will be 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 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 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 DBP operational evaluation levels are identified using the system's Stage 2 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 at least as low as the DBP samples analyzed for compliance. 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 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 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. Based on data submitted by large systems the USEPA revised the trigger threshold to 100 MPN/100 mL for all surface water supplies in 2010.

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 presedimentation 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. DPH revised the existing requirements by modifying the format substantially, and not necessarily the content. DPH 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 DPH 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 DPH 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. DPH 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

DPH developed a primary MCL for perchlorate in drinking water in July 2007. DPH set the MCL for perchlorate at 6 ug/L. The Office of Environmental Health Hazard Assessment (OEHHA) published a final public health goal (PHG) for perchlorate of 6 ug/L in March 2004. OEHHA proposed revising the PHG down to 1 µg/L in January 2011. 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.

On December 7, 2012, OEHHA published a revised draft technical support document for a proposed update of the PHG for perchlorate. The proposal includes revising the PHG from 6 ug/L to 1 ug/L. This is the second public comment period on the proposal, with comments due on January 22, 2013. It is expected that the proposal may be finalized in 2013. If the PHG is reduced, then DPH will be required to reassess the MCL for perchlorate to determine if it is adequate or if it should be lowered as well. This

process would likely be coordinated with any new standard published by the USEPA and could take an additional two years.

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. A proposed rule was expected in February 2013, with a final by August 2014. 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?	DPH 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 DPH 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 DPH. 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 DPH 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.
- 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. Tier 1 is a screening process and Tier 2 is a testing process. The initial list of 67 chemicals considered for Tier 1 screening is primarily pesticides – both active ingredients and inerts. In December 2007, USEPA issued procedures for the initial screening. For active ingredients, test orders (requests for data) 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 (see below).

A second list of chemicals for Tier 1 screening was published in November 2010. The list of 134 chemicals includes a large number of 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).

Responses for test orders were due between October 2011 and February 2012. The USEPA is currently reviewing the data to determine the Tier 2 testing requirements. Tier 2 testing will be focused on determining the endocrine-related effects caused by the chemical and the associated doses. Pesticides will be coordinated with the regulatory review program through the USEPA Office of Pesticide Programs to reduce workload.

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 focuses on chemicals that are toxic and have potential to be present in drinking water supplies. This includes 116 constituents, 104 chemicals and 12 microbiological contaminants. The list is provided in **Attachment 2**. USEPA will select at least five constituents from the list to make regulatory determinations for, the draft determinations are expected in late 2013 or early 2014 with final determinations later in 2014. It is predicted that positive determinations to regulate will be made for nitrosamines, strontium, and chlorate.

The USEPA will prepare a fourth CCL list after completion of the regulatory determinations for CCL3. In May 2012 the USEPA put out a request for nominations to the CCL4. The draft is expected in early 2014 with a final by October 2014.

Six-Year Review

In March 2010, the USEPA published its Six-Year Review of the National Primary Drinking Water Regulations. This is an assessment of the existing 71 regulations to determine if any of the current standards are in need of a detailed analysis for possible regulatory revision. The USEPA determined that 67 of the 71 existing standards are acceptable as they stand. Four constituents; acrylamide, epichlorohydrin, TCE, and PCE, are all candidates for possible regulatory revision. 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

There are health assessments in progress for acrylamide, TCE, and PCE. Once all these analyses are completed then a regulatory revision determination will be made for each constituent. TCE and PCE will be included in the carcinogenic VOC Regulation, which is discussed later in the Anticipated Future Regulations section. This process will likely take quite a few years to complete. The next Six-Year Review will be published as a draft by December 2015 and final by March 2016. It will include a review of the

LT2ESWTR, potentially evaluating; binning, use of surrogates, and effectiveness of mitigation tools.

California Notification Levels

DPH 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 have been established in response to detection in drinking water supplies or in anticipation of possible contamination. Chemicals for which notification levels are established may eventually be regulated by MCLs. To date, 39 of the 93 chemicals for which notification levels have been established, are now regulated by MCLs. Of the remaining 54 chemicals, 30 currently have notification levels, as shown in **Table 9**, and 24 are chemicals with archived notification levels. Notification levels are calculated using standard risk assessment procedures. If a chemical is present in a water supply at a concentration that exceeds the notification level, the water system must inform its customers. If a chemical is present at the response level concentration, DPH 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.

Unregulated Contaminant Monitoring Rule 3

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. 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.

Sampling for the UCMR 3 will occur from 2013 through 2015. The monitoring includes 30 contaminants (28 chemicals and 2 viruses) under three lists. Nineteen of the target contaminants being considered are from the CCL3 that was finalized in September 2009. The eleven chemicals included in UCMR3 that are 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).

Table 9
DPH Current 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

- Assessment Monitoring (List 1 Contaminants) uses common analytical method technologies used by drinking water laboratories. For UCMR 3, all PWSs serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people will monitor for 21 List 1 contaminants during a 12-month period from January 2013 through December 2015. 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) monitoring uses specialized analytical method technologies not as commonly used by drinking water laboratories. 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 are required to monitor for seven List 2 contaminants during a 12-month period from January 2013 through December 2015. 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) uses newer method technologies not as commonly used by drinking water laboratories. For UCMR 3, EPA will select 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.

USEPA will pay for the analysis of all samples from systems serving 10,000 or fewer people and will arrange for the collection of samples from the systems that participate in the Pre-Screen Testing.

Changes from the UCMR2 include; adding PWSs that rely on 100 percent purchased water (consecutive systems), clarifying the terms of representative groundwater sampling, and updating reporting elements.

Revised Total Coliform Rule

The USEPA publish Final Revisions to the TCR in December 2012. These revisions will apply to all PWSs. There are numerous changes to the existing TCR, but the key topics include:

- 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 verify 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.

DPH has two years to adopt a similar version of this regulation. Compliance with this regulation will begin 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.

ANTICIPATED FUTURE REGULATIONS

The USEPA and DPH are developing new drinking water regulations. The major anticipated future regulations that will impact surface water supplies are shown in **Table 10** and those regulations are discussed below.

Table 10
Summary of Anticipated Major Federal and State Drinking Water Quality Regulations for Surface Water Supplies

Regulation	Year Final Expected	Number of Contaminants	Targeted Contaminants
USEPA Perchlorate Regulation	2014/2015	1	Perchlorate
USEPA cVOCs Regulation	2014/2015	Up to 16	Carcinogenic VOCs
CA Hexavalent Chromium	2013/2015	1	Hexavalent Chromium
CA Cross Connection Control Program	Unknown	None	None

[1] Draft/Final Rule Dates

USEPA Perchlorate Regulation

The USEPA is developing a regulation for perchlorate as well. A proposed rule was expected in February 2013, but has now been delayed until early 2014 with a final rule in late 2014 or early 2015. Any standard developed by USEPA would need to be adopted by the DPH within two years. This effort would likely be coordinated with the proposed revision of the PHG by OEHHA.

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 is projected for late 2013 or early 2014, with a final in 2015. These are largely industrial contaminants and include 16 VOCs, eight of which are already regulated so may result in reduced MCLs. The regulated list includes; trichloroethylene (TCE), tetrachloroethylene (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 Hexavalent Chromium Regulation

Chromium (VI), or hexavalent chromium, has 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. Chromium (VI) is currently regulated as part of the 50 µg/L MCL for total chromium. Senate Bill 541 was passed on October 9, 2001. This Bill required development of a new hexavalent chromium standard for drinking water in California by January 1, 2004, but development of the new standard was delayed. DPH published a Proposed Hexavalent Chromium Regulation on August 23, 2013 with an MCL of 10 µg/L. A final regulation is expected between July 2014 and July 2015.

OEHHA recommended a PHG for chromium (VI) of 0.2 µg/L, in a 2005 “pre-release” draft (OEHHA, 2005b). After reviewing the results of the National Toxicology Program study OEHHA proposed a new PHG in August 2009, at 0.06 µg/L. An external scientific peer review was requested and has been completed. In December 2010, OEHHA published a second draft of the proposed PHG further reducing it to 0.02 µg/L. This was finalized in July 2011.

In a parallel effort, the USEPA is now recommending 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.

California Cross Connection Control Program

This will apply to all PWSs. The DPH 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 CDPH

Classification	Contaminant	Regulation	MCL (mg/L)
Inorganics (Section 64432)			
	Aluminum	CDPH	1
	Antimony	Phase V	0.006
	Arsenic	Arsenic Rule	0.010
	Barium	CDPH	1
	Beryllium	Phase V	0.004
	Cadmium	Phase II	0.005
	Chromium	CDPH	0.05
	Copper	LCR	1.3 [1,2]
	Cyanide	Phase V	0.15
	Fluoride	CDPH	2
	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	CDPH	0.2
	Color	CDPH	15 Units
	Copper	CDPH	1
	Foaming Agents	CDPH	0.5
	Iron	CDPH	0.3
	Manganese	CDPH	0.05
	Methyl-tert-butyl-ether (MTBE)	CDPH	0.005
	Odor-Threshold	CDPH	3 Units
	Silver	CDPH	0.1
	Thiobencarb	CDPH	0.001
	Turbidity	CDPH	5 NTU
	Zinc	CDPH	5
Secondary Standards (Section 64449, Table 64449-B)			
	Total Dissolved Solids	CDPH	500/1,000/1,500 [4]
	Specific Conductance	CDPH	900/1,600/2,200 [4]
	Chloride	CDPH	250/500/600 [4]
	Sulfate	CDPH	250/500/600 [4]
General Mineral (Section 64449 (c) (2))			
	Bicarbonate	CDPH	MO
	Carbonate	CDPH	MO
	Hydroxide	CDPH	MO
	Alkalinity	CDPH	MO
	pH	CDPH	MO
	Calcium	CDPH	MO
	Magnesium	CDPH	MO
	Sodium	CDPH	MO
	Hardness	CDPH	MO
(Volatile) Organic Chemicals (Section 64444, Table 64444-A (a))			
	Benzene	CDPH	0.001
	Carbon Tetrachloride	CDPH	0.0005
	o-Dichlorobenzene	Phase II	0.6
	p-Dichlorobenzene	CDPH	0.005
	1,1-Dichloroethane	CDPH	0.005
	1,2-Dichloroethane	CDPH	0.0005
	1,1-Dichloroethylene	CDPH	0.006
	cis-1,2-Dichloroethylene	CDPH	0.006
	trans-1,2-Dichloroethylene	CDPH	0.01
	Dichloromethane (Methylene chloride)	Phase V	0.005
	1,2-Dichloropropane	Phase II	0.005
	1,3-Dichloropropene	CDPH	0.0005
	Ethylbenzene	CDPH	0.3
	Methyl-tert-butyl ether (MTBE)	CDPH	0.013
	Monochlorobenzene	CDPH	0.07
	Styrene	Phase II	0.1
	1,1,2,2-Tetrachloroethane	CDPH	0.001
	Tetrachloroethylene	Phase II	0.005
	Toluene	CDPH	0.15
	1,2,4-Trichlorobenzene	CDPH	0.005
	1,1,1-Trichloroethane	Phase I	0.2
	1,1,2-Trichloroethane	Phase V	0.005
	Trichloroethylene	Phase I	0.005
	Trichlorofluoromethane	CDPH	0.15
	1,1,2-Trichloro-1,2,2-Triflouroethane	CDPH	1.2
	Vinyl Chloride	CDPH	0.0005
	Xylenes (total)	CDPH	1.75

Summary of Contaminants
Currently Regulated by USEPA and CDPH

Classification	Contaminant	Regulation	MCL (mg/L)
(Non-Volatile Synthetic) Organic Chemicals (Section 64444, Table 64444-A (b))			
	Acrylamide	Phase II	TT (PAP)
	Alachlor	Phase II	0.002
	Atrazine	CDPH	0.001
	Bentazon	CDPH	0.018
	Benzo(a)pyrene	Phase V	0.0002
	Carbofuran	CDPH	0.018
	Chlordane	CDPH	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	CDPH	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	CDPH	0.00001
	Heptachlor Epoxide	CDPH	0.00001
	Hexachlorobenzene	Phase V	0.001
	Hexachlorocyclopentadiene	Phase V	0.05
	Lindane	Phase II	0.0002
	Methoxychlor	CDPH	0.03
	Molinate	CDPH	0.02
	Oxamyl	CDPH	0.05
	Pentachlorophenol	Phase II	0.001
	Picloram	Phase V	0.5
	PCBs	Phase II	0.0005
	Simazine	Phase V	0.004
	Thiobencarb	CDPH	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
Additional Organics with Current Notification Levels			**Current Notification Levels**
	Boron	CDPH	1
	n-butylbenzene	CDPH	0.26
	sec-butylbenzene	CDPH	0.26
	tert-butylbenzene	CDPH	0.26
	Carbon disulfide	CDPH	0.16
	Chlorate	CDPH	0.8
	2-chlorotoluene	CDPH	0.14
	4-chlorotoluene	CDPH	0.14
	Diazinon	CDPH	0.0012
	Dichlorodifluoromethane	CDPH	1
	1,4-Dioxane	CDPH	0.001
	Ethylene glycol	CDPH	14
	Formaldehyde	CDPH	0.1
	HMX	CDPH	0.35
	Isopropylbenzene	CDPH	0.77
	Manganese	CDPH	0.5
	Methyl isobutyl ketone (MIBK)	CDPH	0.12
	Naphthalene	CDPH	0.017
	N-Nitrosodiethylamine (NDEA)	CDPH	0.00001
	N-Nitrosodimethylamine (NDMA)	CDPH	0.00001
	N-Nitrosodi-propylamine (NDPA)	CDPH	0.00001
	Propachlor	CDPH	0.09
	n-propylbenzene	CDPH	0.26
	RDX	CDPH	0.0003
	tert-Butyl alcohol	CDPH	0.012
	1,2,3-Trichloropropane	CDPH	0.000005
	1,2,4-Trimethylbenzene	CDPH	0.33
	1,3,5-Trimethylbenzene	CDPH	0.33
	2,4,6-Trinitrotoluene (TNT)	CDPH	0.001
	Vanadium	CDPH	0.05
Additional Organics with Archived Notification Levels			**Archived Notification Levels**
	Aldicarb	CDPH	0.007
	Aldrin	CDPH	0.000002
	Baygon	CDPH	0.03
	a-Benzenehexachloride	CDPH	0.000015
	b-Benzenehexachloride	CDPH	0.000025
	Captan	CDPH	0.0015
	Carbaryl	CDPH	0.7
	Chloropicrin	CDPH	0.05
	Chlorpropham (CIPC)	CDPH	1.2
	1,3-Dichlorobenzene	CDPH	0.6
	2,4-Dimethylphenol	CDPH	0.1
	Dieldrin	CDPH	0.000002
	Dimethoate	CDPH	0.001
	Diphenamide	CDPH	0.2
	Ethion	CDPH	0.004

Summary of Contaminants
Currently Regulated by USEPA and CDPH

Classification	Contaminant	Regulation	MCL (mg/L)
	Malathion	CDPH	0.16
	Metam sodium	CDPH	0.00019
	Methylisothiocyanate	CDPH	0.19
	Methyl parathion	CDPH	0.002
	Parathion	CDPH	0.04
	Pentachloronitrobenzene	CDPH	0.02
	Phenol	CDPH	4.2
	Trithion	CDPH	0.007
	2,3,5,6-tetrachloroterephthalate	CDPH	3.5
Natural Radioactivity (Section 64441)			
	Gross Alpha Particle Activity	NPDWR	15 pCi/L
	Combined Radium 226 & 228	NPDWR	5 pCi/L
	Uranium	CDPH	20 pCi/L
Man-Made Radioactivity (Section 64443)			
	Tritium	CDPH	20,000 pCi/L
	Strontium-90	CDPH	8 pCi/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
CDPH - California Department of Public Health
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 3

CONTAMINANT CANDIDATE LIST 3

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	EDSP Screen List	UCMR2
alpha-Hexachlorocyclohexane	319-84-6		
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		
1,3-Dinitrobenzene	99-65-0		X
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	X	
Acetaldehyde	75-07-0		
Acetamide	60-35-5		
Acetochlor	34256-82-1		
Acetochlor ethanesulfonic acid (ESA)	187022-11-3		X
Acetochlor oxanilic acid (OA)	184992-44-4		X
Acrolein	107-02-8		
Alachlor ethanesulfonic acid (ESA)	142363-53-9		X
Alachlor oxanilic acid (OA)	171262-17-2		X
Aniline	62-53-3		
Bensulide	741-58-2		
Benzyl chloride	100-44-7		
Butylated hydroxyanisole	25013-16-5		
Captan[3]	133-06-2	X	
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	EDSP Screen List	UCMR2
Dimethoate[3]	60-51-5	X	X
Disulfoton	298-04-4	X	
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	X	
Ethylene glycol[2]	107-21-1		
Ethylene oxide	75-21-8		
Ethylene thiourea	96-45-7		
Fenamiphos	22224-92-6		
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		
Mestranol	72333		
Methamidophos	10265-92-6	X	
Methanol	67-56-1		
Methyl bromide (Bromomethane)	74-83-9		
Methyl tert-butyl ether[1]	1634-04-4		
Metolachlor	51218-45-2	X	X
Metolachlor ethanesulfonic acid (ESA)	171118-09-5		X
Metolachlor oxanilic acid (OA)	152019-73-3		X
Molinate[1]	2212-67-1		
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		X
N-nitrosodimethylamine (NDMA) [2]	62-75-9		X
N-nitroso-di-n-propylamine (NDPA)	621-64-7		X
N-Nitrosodiphenylamine	86-30-6		
N-nitrosopyrrolidine (NPYR)	930-55-2		X
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		
Perchlorate[1]	14797-73-0		X
Perfluorooctane sulfonic acid (PFOS)	1763231		
Permethrin	52645-53-1	X	
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		X

Common name--registry name	CASRN	EDSP Screen List	UCMR2
sec-Butylbenzene[2]	135-98-8		
Strontium[1]	7440-24-6		
Tebuconazole	107534-96-3	X	
Tebufenozide	112410-23-8		
Tellurium	13494-80-9		
Terbufos	13071-79-9		
Terbufos sulfone	56070-16-7		X
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 Notification Level in California
EDSP – USEPA Endocrine Disrupters Screening Program
UCMR2 – USEPA Unregulated Contaminant Monitoring Rule 2

APPENDIX D
WATERSHED CONTAMINANT SOURCES INFORMATION

OES Spills Tributary to the American River, 2008 - 2012

Date	Location/County	Agency Notifying	Type of Spill	Amount Spilled (Gal(S))	Contained Before Enter Waterway?	Waterway Entered
1/5/2008	El Dorado County	PG&E	Mineral Oil	13	No	Storm Drain
1/11/2008	Sacramento County	California State Prison Folsom	Sewage	500	No	American River
1/25/2008	Sacramento County	Sacramento County Regional Parks	Unknown	Unknown	No	Unknown
2/3/2008	El Dorado County	El Dorado Waste Water Dist.	Sewage	1,500	No	New York Creek
2/3/2008	Placer County	City of Colfax	Sewage	1,000	No	Bunch Creek
2/7/2008	Sacramento County	California State Prison Folsom	Sewage	100	No	American River
2/23/2008	Placer County	DFG/DPR	Petroleum	10	No	North Fork American River
2/27/2008	Placer County	Placer Co. Environmental Health	Sewage	1,000	No	Ditch
3/6/2008	El Dorado County	City of Placerville	Waste Water	125	No	Hangtown Creek
3/28/2008	El Dorado County	El Dorado Irrigation Dist.	Recycled Water	1,270	No	New York Creek
4/15/2008	El Dorado County	El Dorado County Env Management	Unknown	Unknown	No	Weber Creek
4/28/2008	Sacramento County	Sacramento City Hazmat	Sewage	40	No	Storm Drain
5/1/2008	Sacramento County	Sacramento County Fire Dept	Sewage	10-20 gal per min	No	Storm Drain
5/11/2008	Sacramento County	Sacramento Area Sewer Dist.	Sewage	Unknown	No	Drainage Channel
5/12/2008	Placer County	City of Colfax	Sewage	Unknown	No	Bunch Creek
6/2/2008	Sacramento County	Sacramento Metro Fire	Petroleum	Unknown	Unknown	American River
6/28/2008	Sacramento County	Sacramento Area Sewer Dist.	Sewage	Unknown	No	Unnamed Drainage Creek
7/24/2008	El Dorado County	El Dorado County Env Management	Paint	Unknown	No	Folsom Lake
8/4/2008	Placer County	Placer County Water Agency	Lubricating Oil	20(oz.)	No	Long Canyon Creek
8/7/2008	El Dorado County	El Dorado Irrigation Dist.	Recycled Water	100	No	Storm Drain
8/12/2008	El Dorado County	City of Placerville	Sewage	1400 gal per day	No	Hangtown Creek
9/1/2008	El Dorado County	CAL FIRE	Diesel	5	No	American River
9/10/2008	El Dorado County	Placerville Police	Unknown	Unknown	Unknown	Strom Drain
10/8/2008	El Dorado County	City of Placerville	Sewage	2,000	No	Hangtown Creek
10/17/2008	El Dorado County	El Dorado National Forest	Motor Oil/fuel	Unknown	Unknown	Rock Creek
10/27/2008	El Dorado County	City of Placerville	Sewage	300	No	Hangtown Creek
11/7/2008	El Dorado County	El Dorado Irrigation Dist.	Domestic Drinking Water	90,000	No	Hangtown Creek
11/19/2008	El Dorado County	City of Placerville	Sewage	1,700	No	Hangtown Creek
11/25/2008	El Dorado County	City of Placerville	Sewage	30	No	Cedar Ravine
12/9/2008	El Dorado County	El Dorado Irrigation Dist.	Disinfected Waste Water	20,000	No	Weber Creek
1/9/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	150	No	Storm Drain
1/11/2009	El Dorado County	El Dorado Irrigation Dist.	Sewage	1,000	No	Unknown Creek
1/12/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	50	No	Hangtown Creek
1/16/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	300	No	Hangtown Creek
2/18/2009	El Dorado County	El Dorado Irrigation Dist.	Sewage	200	No	Drainage Ditch
2/25/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	Unknown	No	Hangtown Creek
3/2/2009	Sacramento County	California State Prison Sacramento	Sewage	1,500	No	Storm Drain
3/9/2009	Placer County	City of Colfax	Sewage	500	No	Bunch Creek
4/18/2009	El Dorado County	El Dorado Irrigation Dist.	Sewage	180	No	Drainage Canal
4/21/2009	Placer County	Placer Co. Env Health	Unknown	Unknown	No	Folsom Lake
4/25/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	150	No	Chicken Ranch Slough
4/25/2009	Sacramento County	Sacramento City Fire Dept	Petroleum	20-25	No	Storm Drain
4/26/2009	Placer County	State Parks	Petroleum	25	No	American River
4/26/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	100	No	Storm Drain
4/26/2009	Placer County	Auburn Wastewater Treatment Plant	Sewage	Unknown	Unknown	Storm Drain
4/28/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	468	No	Creek
4/29/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	500	No	Hangtown Creek
5/1/2009	El Dorado County	City of Placerville	Sewage	Unknown	No	Hangtown Creek
5/3/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	110	No	Creek

OES Spills Tributary to the American River, 2008 - 2012

Date	Location/County	Agency Notifying	Type of Spill	Amount Spilled (Gal(S))	Contained Before Enter Waterway?	Waterway Entered
5/4/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	400	No	Hangtown Creek
5/6/2009	El Dorado County	City Of Placerville	Sewage	250	No	Hangtown Creek
6/12/2009	Sacramento County	Citizen	Unknown	Unknown	No	Storm Drain
7/6/2009	Sacramento County	DFG Fisheries	Petroleum	100YrdsX15 Yrds	No	American River
8/8/2009	Placer County	City of Colfax	Sewage	20	No	Bunch Creek
8/12/2009	El Dorado County	El Dorado Irrigation Dist.	Other	2,154,240	No	American River
8/26/2009	El Dorado County	El Dorado Irrigation Dist.	Sewage	2,000	No	New York Creek
9/23/2009	El Dorado County	City Of Placerville	Sewage	1,500	No	Hangtown Creek
9/30/2009	El Dorado County	City Of Placerville	Sewage	100	No	Hangtown Creek
10/6/2009	Placer County	City of Colfax	Sewage	50/10	No - Partial	Bunch Creek
10/17/2009	El Dorado County	City of Placerville Public Works Dept	Sewage	100	No	Hangtown Creek
10/22/2009	El Dorado County	El Dorado Env Management	Chemical	2	No	Hangtown Creek
11/28/2009	Sacramento County	Sacramento Area Sewer Dist.	Sewage	2,000	No	Unknown Creek
11/30/2009	El Dorado County	City Of Placerville	Sewage	15	No	Hangtown Creek
12/20/2009	El Dorado County	USFS	Petroleum	Unknown	No	American River
1/18/2010	El Dorado County	Veeder Root	Petroleum	0.5	No	Storm Drain
1/29/2010	Sacramento County	Sacramento Area Sewer Dist	Sewage	276	No	American River
1/29/2010	El Dorado County	City of Placerville Public Works Dept	Other	50,000	No	Hangtown Creek
1/30/2010	Sacramento County	Sacramento County Hazmat	Petroleum	10	No	Storm Drain
2/2/2010	Sacramento County	Private Citizen	Sewage	Unknown	No	Storm Drain
2/10/2010	Sacramento County	Sacramento Area Sewer Dist	Sewage	700	No	American River
2/26/2010	Sacramento County	Folsom Prison	Sewage	900	No	American River
4/4/2010	Sacramento County	Sac City FD	Petroleum	10	No	Storm Drain
4/8/2010	El Dorado County	Private Citizen	Sewage	Unknown	No	New York Creek
4/13/2010	Placer County	Private Citizen	Unknown	Unknown	No	Middle Fork American River
4/23/2010	Sacramento County	NRC	Petroleum	Unknown	No	Storm Drain
5/10/2010	Sacramento County	Sacramento County EMD	Other	Unknown	No	Storm Drain
5/15/2010	Sacramento County	Sac Metro Fire	Chemical	50-100	No	Storm Drain
5/29/2010	El Dorado County	Private Citizen	Other	Unknown	No	Folsom Lake
6/5/2010	Sacramento County	Sacramento County Hazmat	Chemical	2	No	Storm Drain
6/11/2010	Sacramento County	Sacramento Co Env Management	Chemical	15	No	Strong Ranch Slough
7/20/2010	Sacramento County	Private Citizen	Other	Unknown	No	Buffalo Creek
7/29/2010	Sacramento County	City of Folsom	Other	500	No	Storm Drain/Lake Natoma
8/1/2010	Sacramento County	Sacramento Env	Petroleum	3	No	Storm Drain
8/30/2010	El Dorado County	El Dorado Irrigation District	Sewage	285	No	New York Creek
9/3/2010	El Dorado County	El Dorado Irrigation District	Sewage	50	No	Unknown Creek
9/6/2010	El Dorado County	El Dorado Irrigation District	Other	150	No	Unknown Creek
9/9/2010	El Dorado County	El Dorado Irrigation District	Other	45	No	Unknown Creek
9/13/2010	El Dorado County	El Dorado Irrigation District	Other	20	No	Unknown Creek
9/17/2010	El Dorado County	El Dorado Irrigation District	Other	15	No	Unknown Creek
9/23/2010	El Dorado County	City of Placerville	Sewage	450	No	Cedar Ravine Creek
9/26/2010	El Dorado County	El Dorado Irrigation District	Other	650	No	Unknown Creek
10/5/2010	El Dorado County	City of Placerville	Sewage	100	No	Storm Drain
10/18/2010	El Dorado County	El Dorado Irrigation District	Other	60	No	Unknown Creek
10/20/2010	El Dorado County	El Dorado Irrigation District	Other	144,000	No	Folsom Lake
10/24/2010	El Dorado County	El Dorado Irrigation Dist	Sewage	2,500	No	New York Creek
10/26/2010	Sacramento County	Sacramento Area Sewer Dist	Sewage	1,420	No	Chicken Ranch Slough
10/29/2010	Sacramento County	Sacamento Area Sewer District	Sewage	Unknown	No	Unknown Creek
11/4/2010	El Dorado County	City of Placerville	Sewage	60	No	Hangtown Creek
11/22/2010	Placer County	NRC	Petroleum	Unknown	No	Middle Fork American River
11/28/2010	Sacramento County	Sacramento Area Sewer Dist	Sewage	2 gpm	No	Strong Ranch Slough
11/30/2010	Sacramento County	Sacramento Metro FD	Sewage	100-200	No	Storm Drain
12/8/2010	El Dorado County	City Of Placerville	Chemical	5	No	Hangtown Creek
12/16/2010	Sacramento County	Sacramento County	Chemical	1	No	Chicken Ranch Slough
12/18/2010	Sacramento County	Sacramento Area Sewer Dist	Sewage	Unknown	No	American River
12/23/2010	El Dorado County	EID	Other	4,000	No	Hangtown Creek
12/30/2010	Placer County	Placer Co Utilities Div	Other	45,000	No	Clipper Creek
1/11/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	1,000	NO	VERDE CRUZ CREEK

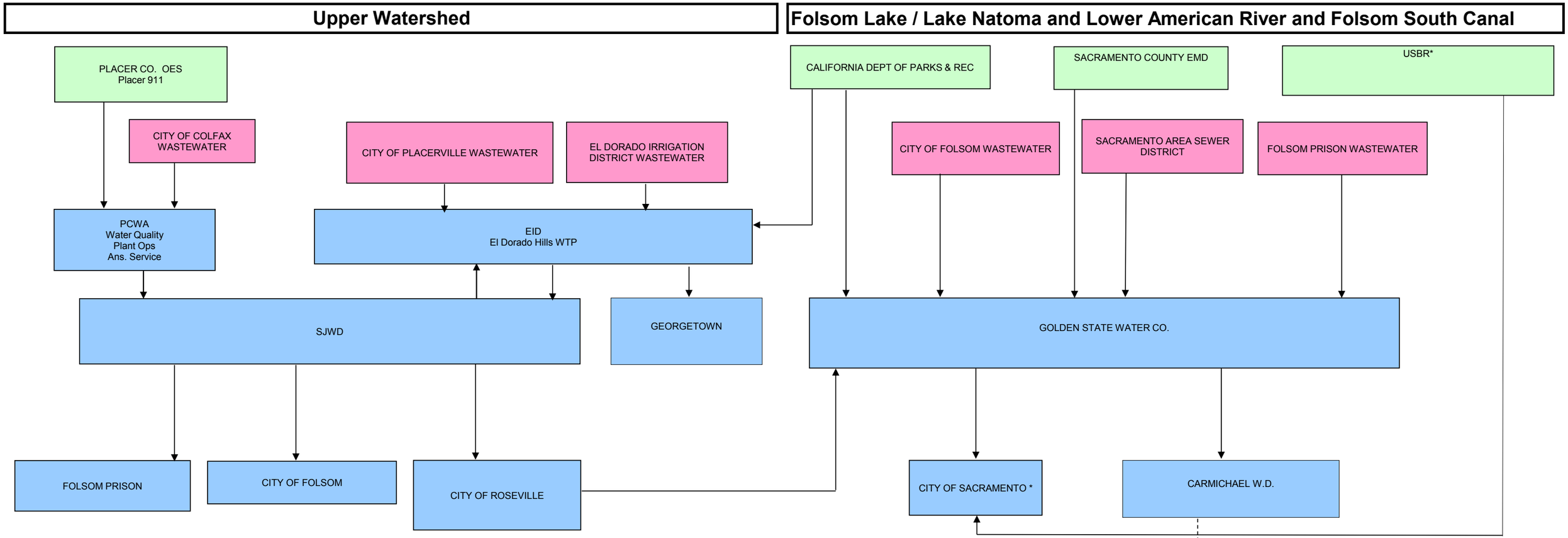
OES Spills Tributary to the American River, 2008 - 2012

Date	Location/County	Agency Notifying	Type of Spill	Amount Spilled (Gal(S))	Contained Before Enter Waterway?	Waterway Entered
1/16/2011	EL DORADO COUNTY	CITY OF PLACERVILLE	SEWAGE	300	NO	HANKTOWN CREEK
1/31/2011	PLACER COUNTY	CITY OF COLFAX	SEWAGE	1,000	NO	BUNCH CREEK
2/1/2011	PLACER COUNTY	CITY OF COLFAX	SEWAGE	100/80	PARTIAL	STORM DRAIN
2/1/2011	PLACER COUNTY	CARMICHAEL WATER	SEWAGE	3,000	NO	UNKNOWN WATERWAY
2/3/2011	EL DORADO COUNTY	CITY OF PLACERVILLE	SEWAGE	300	NO	CEDAR CREEK
2/8/2011	EL DORADO COUNTY	CITY OF PLACERVILLE	SEWAGE	180	NO	HANGTOWN CREEK
2/22/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	300	NO	DRAINAGE CANAL
2/25/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	2,330	NO	STORM DRAIN
2/26/2011	PLACER COUNTY	PLACER COUNTY UTILITIES	SEWAGE	900	NO	FOLSOM LAKE
3/7/2011	PLACER COUNTY	CITY OF COLFAX	SEWAGE	4,000	NO	BUNCH CREEK
3/8/2011	PLACER COUNTY	PLACER COUNTY ENV UTILITIES	SEWAGE	1,000	NO	STORM DRAIN
3/15/2011	EL DORADO COUNTY	CITIZEN	CHEMICAL	UNKNOWN	UNKNOWN	WEBBER CREEK
3/16/2011	PLACER COUNTY	Placer Co Facility Svcs Dept	OTHER	800,000	NO	CLIPPER CREEK
3/17/2011	EL DORADO COUNTY	EL DORADO ENV MANAGEMENT	UNKNOWN MATERIAL	20 gpm	NO	HANGTOWN CREEK
3/24/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	1,000	UNKNOWN	STORM DRAIN
3/24/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	1,000	NO	STORM DRAIN
4/13/2011	PLACER COUNTY	Tahoe National Forest	PETROLEUM	UNKNOWN	NO	North Fork American River
4/23/2011	EL DORADO COUNTY	CITIZEN	UNKNOWN MATERIAL	UNKNOWN	NO	WEBBER CREEK
5/19/2011	EL DORADO COUNTY	CITY OF PLACERVILLE	SEWAGE	1,331	NO	HANGTOWN CREEK
6/6/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	11,250	NO	CRIPPLE CREEK
7/26/2011	EL DORADO COUNTY	FOLSOM LAKE MARINA	CHEMICAL	1'X300' SHEEN	NO	FOLSOM LAKE
8/8/2011	EL DORADO COUNTY	EL DORADO COUNTY OF SHERIFFS DISPATCH	PETROLEUM	UNKNOWN	UNKNOWN	AMERICAN RIVER
8/20/2011	EL DORADO COUNTY	EL DORADO IRRIGATION DIST	OTHER	900	NO	UNKNOWN WATERWAY/ FOLSOM LAKE
9/14/2011	EL DORADO COUNTY	CITIZEN	SEWAGE	UNKNOWN	NO	CREEK
9/28/2011	EL DORADO COUNTY	CAL FIRE	PETROLEUM	5	UNKNOWN	HANGTOWN CREEK
10/19/2011	EL DORADO COUNTY	CITY OF PLACERVILLE	SEWAGE	150	NO	STORM DRAIN
10/11/2012	EL DORADO COUNTY	EL DORADO IRRIGATION DIST	OTHER	10	NO	STORM DRAIN
11/4/2011	PLACER COUNTY	CITY OF AUBURN	SEWAGE	3,960	NO	STORM DRAIN
11/16/2011	EL DORADO COUNTY	EL DORADO COUNTY ENV MANAGEMENT	PETROLEUM	15	UNKNOWN	HANGTOWN CREEK
11/23/2011	PLACER COUNTY	PLACER COUNTY ENV HEALTH	SEWAGE	500	NO	STORM DRAIN
11/24/2011	SACRAMENTO COUNTY	SACRAMENTO SEWER DIST	SEWAGE	15,400	NO	CHANNEL-ARCADE CREEK
1/1/2012	El Dorado County	El Dorado Irrigation District	Water	18,000	NO	Tennessee Creek
1/5/2012	Sacramento County	CDCR - Folsom	Sewage	200	NO	Storm Drain
1/8/2012	Sacramento County	Sacramento Area Sewer District	Sewage	Unknown	NO	Concrete Canal
1/12/2012	El Dorado County	Carmichael Water/City of Placerville	Sewage	120	NO	Immigrant Creek
1/25/2013	El Dorado County	City of Placerville Public Works	Sewage	40	NO	Hangtown Creek
2/10/2012	Placer County	Norcom	Petroleum	1 to 3	NO	Folsom Lake
2/11/2012	El Dorado County	City of Placerville	Petroleum	1 Qt	NO	Hangtown Creek
2/14/2012	Sacramento County	CDCR - Folsom	Sewage	750	NO	Storm Drain
2/21/2012	Sacramento County	Sac Metro Fire	Chemical	4 Qts	NO	Storm Drain
2/22/2012	Sacramento County	Sacramento Area Sewer Dist	Sewage	1,000	NO	Strong Ranch Slough
3/9/2012	Sacramento County	City of Folsom	Water	100,000	NO	Storm Drain
3/16/2012	Sacramento County	CDCR - Folsom	Sewage	70	NO	Storm Drain
3/20/2012	Sacramento County	Sacramento Area Sewer District	Sewage	Unknown	NO	Unnamed Creek
3/28/2012	Placer County	City of Colfax	Sewage	4,000	NO	Bunch Creek
3/30/2012	Placer County	Placer County Utilities	Sewage	200	NO	Season Drainage Ditch
4/3/2012	Sacramento County	Citizen	Sewage	3,000	NO	Storm Drain
4/9/2012	El Dorado County	CHP Sacramento	Petroleum	10	NO	Drainage Basin
4/13/2012	Sacramento County	Sacramento Area Sewer Dist	Sewage	270	NO	Storm Drain-Drainage Channel
4/19/2012	El Dorado County	City of Placerville	Sewage	5	NO	Hangtown Creek
5/9/2012	El Dorado County	El Dorado Irrigation District	Sewage	360	NO	Unknown Creek
5/11/2012	Sacramento County	City of Folsom	Sewage	1,000	NO	Storm Drain

OES Spills Tributary to the American River, 2008 - 2012

Date	Location/County	Agency Notifying	Type of Spill	Amount Spilled (Gal(S))	Contained Before Enter Waterway?	Waterway Entered
5/29/2012	El Dorado County	Georgetown Divide Public Utility District	Petroleum	4 Qts	NO	Stumpy Meadows Lake
6/16/2012	El Dorado County	Shimmick Construction	Petroleum	150-200	NO	Drainage Ditch
6/25/2012	El Dorado County	Citizen	Petroleum	2	NO	Drainage Ditch
7/6/2012	Placer County	USFS Grass Valley	Petroleum	Unknown	NO	French Meadows Reservoir
7/17/2012	Placer County	Citizen	Other	Unknown	NO	Indian Creek
8/6/2012	El Dorado County	USFS El Dorado National Forest	Petroleum	Unknown	NO	Stumpy Meadows Lake
9/11/2012	El Dorado County	El Dorado Irrigation Dist	Other	73	NO	Storm Drain
9/12/2012	El Dorado County	El Dorado Irrigation Dist	Other	48	NO	Storm Drain
9/28/2012	El Dorado County	Citizen	Other	Unknown	NO	Hangtown Creek
10/7/2012	El Dorado County	City of Placerville	Sewage	20	NO	Hangtown Creek
10/9/2012	El Dorado County	Citizen	Other	Unknown	NO	American River
10/11/2012	Sacramento County	CDCR - Folsom	Sewage	400	NO	Storm Drain
10/22/2012	Sacramento County	SMUD	Petroleum	15	NO	Storm Drain
10/26/2012	El Dorado County	El Dorado Irrigation Dist	Other	15	NO	Storm Drain
11/1/2012	El Dorado County	City of Placerville Public Works	Sewage	20-50	NO	Hangtown Creek
11/18/2012	El Dorado County	NRC	Petroleum	4.00	NO	Drainage Creek
11/18/2012	El Dorado County	El Dorado Irrigation Dist	Other	233	NO	Storm Drain, runs to Folsom Lake
11/30/2012	El Dorado County	El Dorado Irrigation Dist	Sewage	2,800	NO	Unnamed Creek
12/2/2012	El Dorado County	El Dorado Irrigation District	Sewage	138	NO	Storm Drain
12/4/2012	El Dorado County	City of Placerville	Sewage	1,000	NO	Hangtown Creek
12/26/2012	El Dorado County	City of Placerville Public Works	Sewage	75	NO	Hangtown Creek
12/28/2012	Sacramento County	City of Folsom	Sewage	Unknown	NO	Storm Drain

AMERICAN RIVER WATER UTILITIES
VOLUNTARY EMERGENCY NOTIFICATION CHART



Emergency Response & State Parks
Wastewater Systems
American River Water Utilities
DPH - State OES
c - Cellular Number
p - Pager Number
h - Home Number
--- Coordination Notification

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH - DRINKING WATER PROGRAM

(ONLY CONTACT IN CASE OF POTENTIAL OR ACTUAL THREAT TO WATER – NOT FOR TEST RUNS)

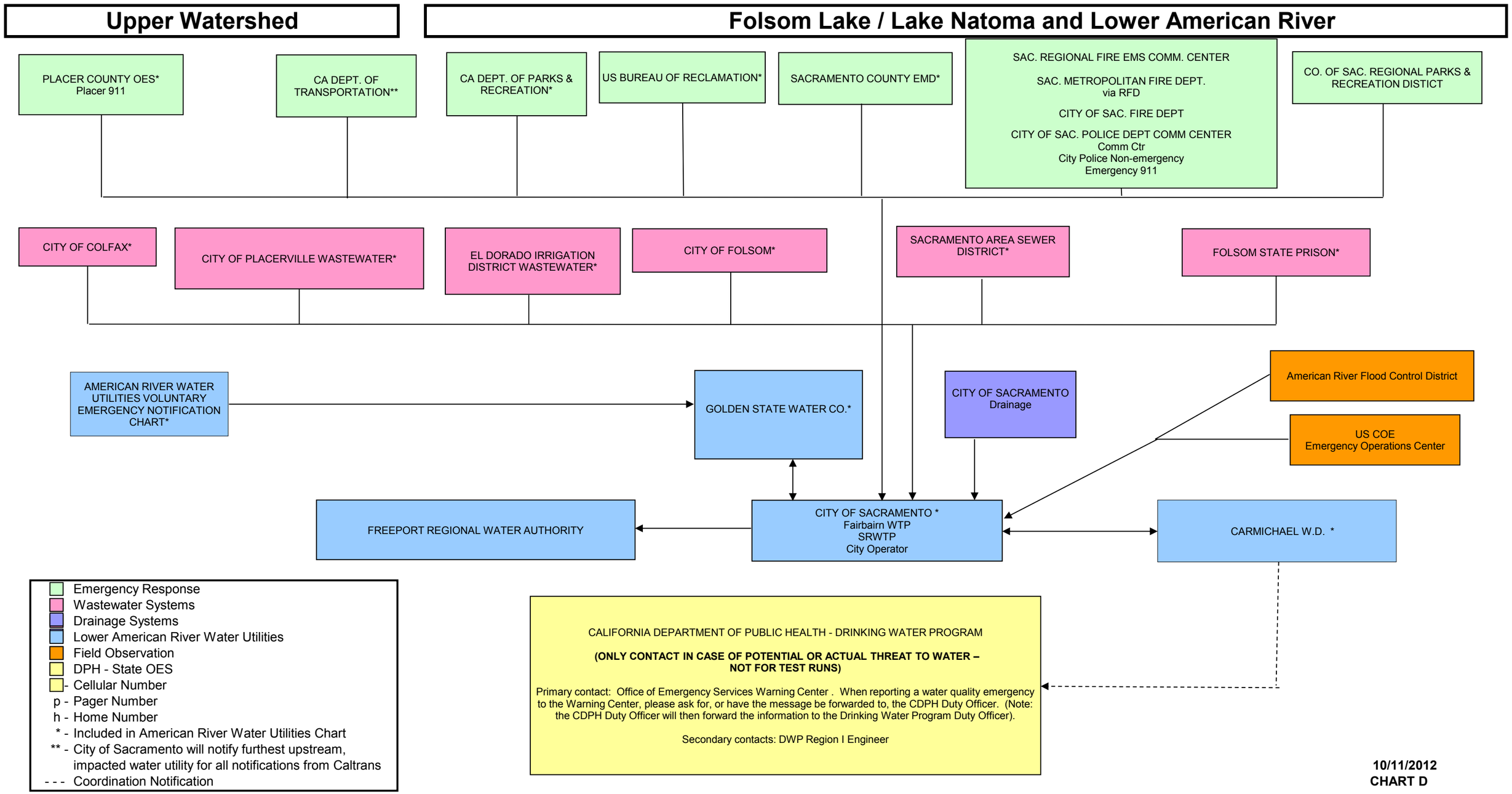
Primary contact: Office of Emergency Services Warning Center. When reporting a water quality emergency to the Warning Center, please ask for, or have the the message be forwarded to, the CDPH Duty Officer. (Note: the CDPH Duty Officer will then forward the information to the Drinking Water Program Duty Officer).

Secondary contacts: DWP Region I Engineer
DPH Redding Office District 02

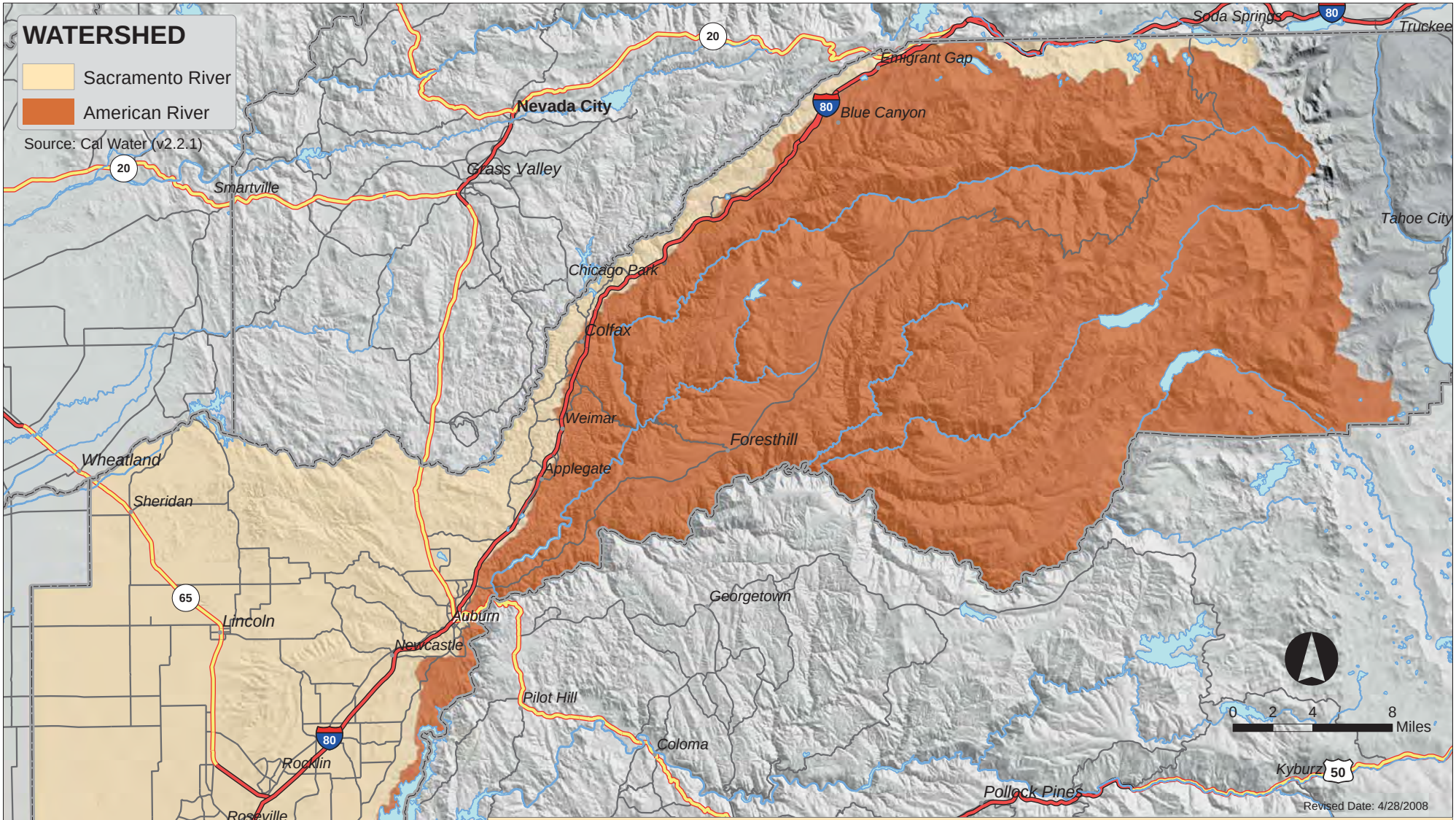
* City of Sacramento will call SJWD for all notifications from the USBR

9/4/2012
Chart C

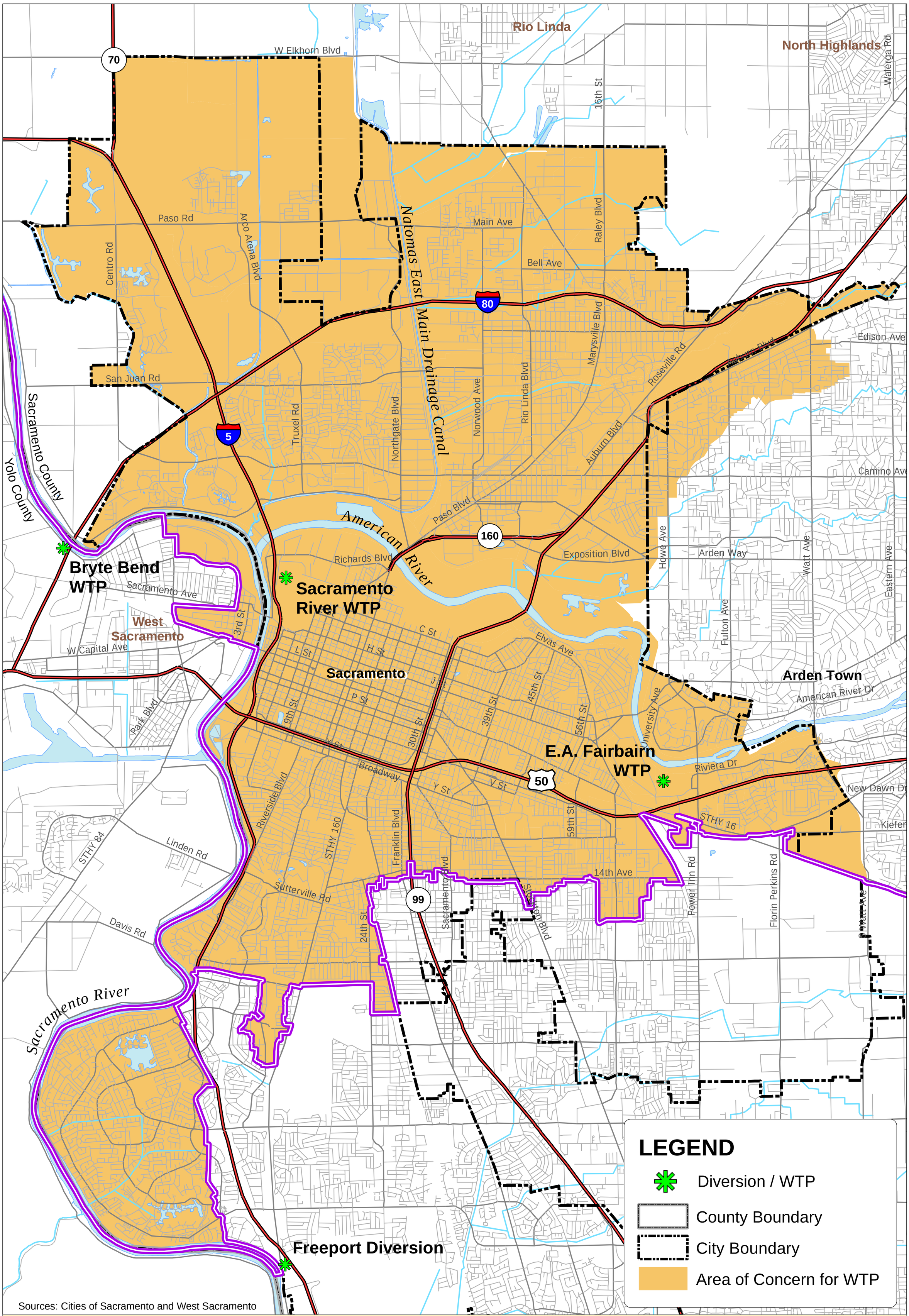
LOWER AMERICAN RIVER WATER UTILITIES
VOLUNTARY EMERGENCY NOTIFICATION CHART



10/11/2012
CHART D



American River Water Utilities - Placer County Watershed Map

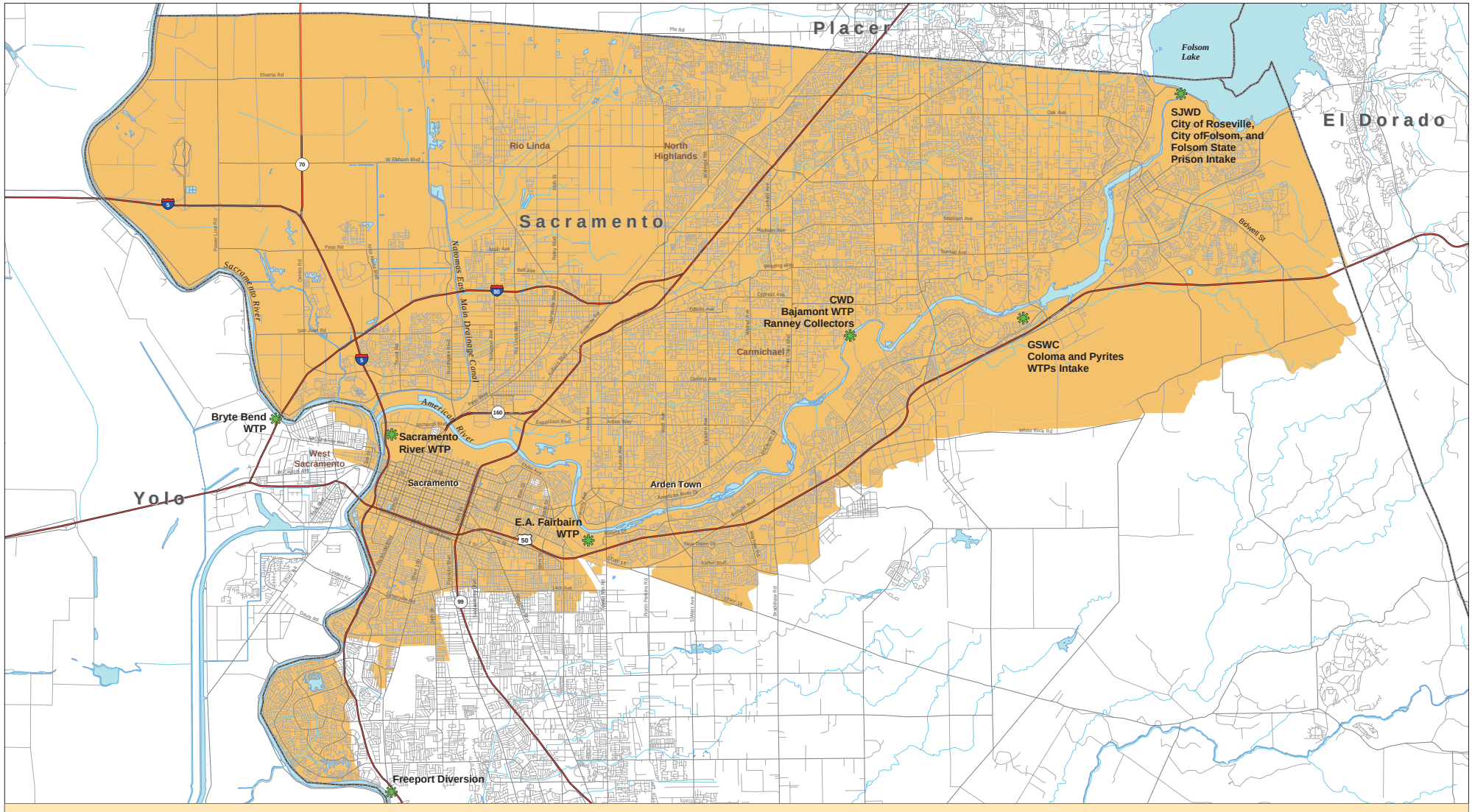


0 0.5 1 2 Miles

Voluntary Spill Notification Program for the Drinking Water Treatment Plants

Areas of Concern in the Cities of Sacramento and West Sacramento

Prepared for Lower American River and Sacramento River Voluntary Spill Notification Programs
See Map for Sacramento County for Additional Areas of Concern



Voluntary Spill Notification Program for the Drinking Water Treatment Plants
Areas of Concern in Sacramento County

Prepared for Lower American River and Sacramento River Voluntary Spill Notification Programs

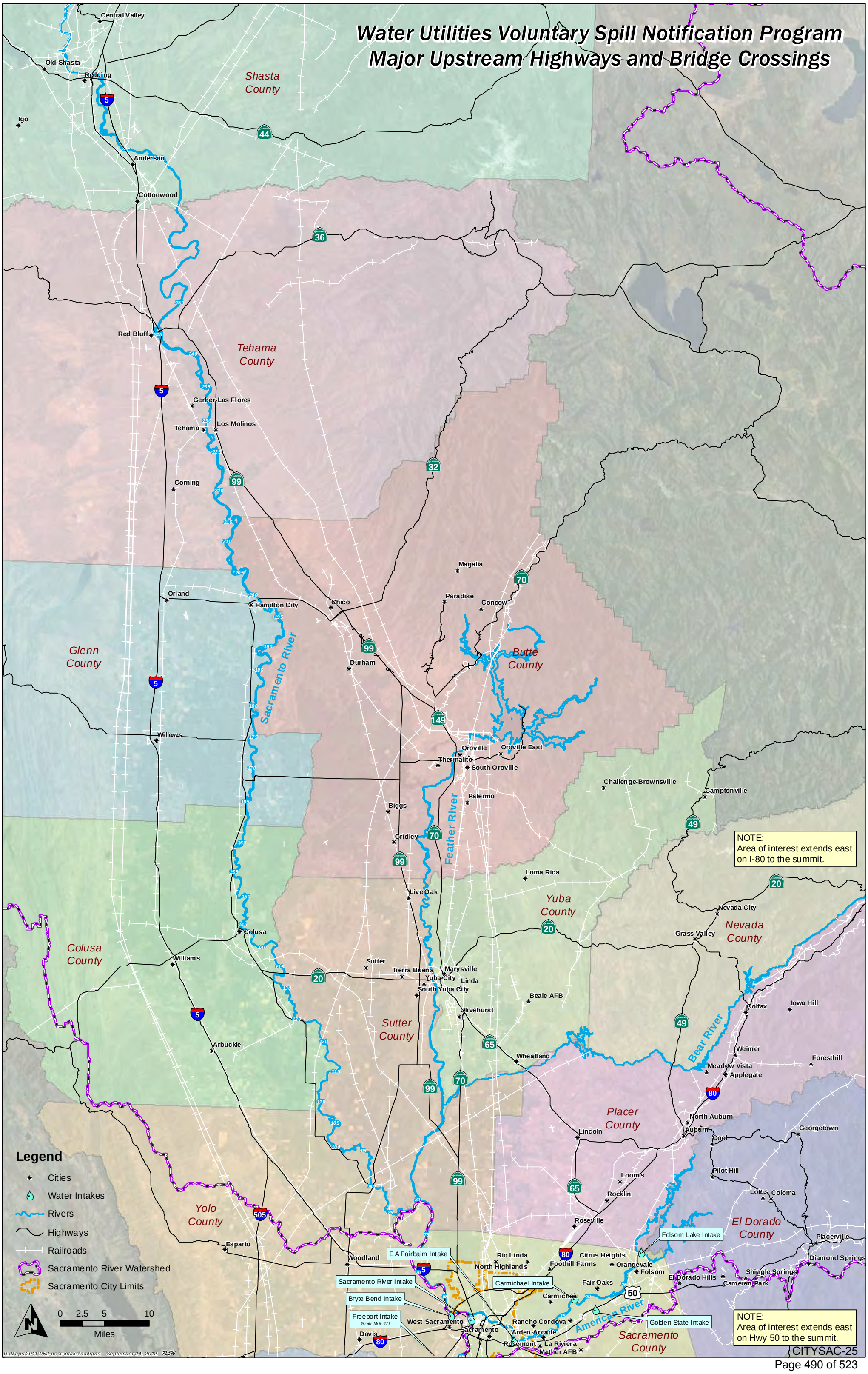
0 0.5 1 2 Miles

Diversion / WTP
County Boundary
Area of Concern for WTP

Source: Cities of Sacramento and West Sacramento

Revised Date: 10/7/2010

Water Utilities Voluntary Spill Notification Program
Major Upstream Highways and Bridge Crossings



CITYSAC-25

Sacramento Joint Source Water Protection Program
Summary of Fire Department Contact and Fire Alarms

There are 11 fire districts in Sacramento County. Three of those cover portions of the County located upstream of the Joint Source Water Protection Program water treatment plants; City of Sacramento, City of Folsom, and Sacramento Metropolitan Fire District.

The Joint Voluntary Spill Notification Program includes direct notification from the City of Sacramento Fire Department and Sacramento Metropolitan Fire District for hazardous materials spills and large fire flow waters entering the Lower American and Sacramento Rivers or their tributaries.

The City of Sacramento Fire Department was contacted to gain a better understanding of the fire department standard procedures for alarm types and levels. Captain Jerry Apodaca provided clarification on the general types of events and alarms. He noted that each fire department has its own alarm levels and procedures and it cannot be assumed that these levels apply to other departments. It should be noted that all alarms are either threats (possible event) or incidents (confirmed event).

There are five major categories of alarms:

- Residential
- Commercial
- High Risk Commercial (large public exposure)
- Vehicular Accident
- Big Rig Accident

Within each of these categories are multiple levels of further breakdown, including;

- Hazardous materials involved
- Discharge to waterway
- Intensity of fire

Upon assessment of these categories and breakdown details the Incident Commander will set an alarm level for an incident. This includes 1st level alarm, 2nd level alarm, and 3rd level alarm. The level of the alarm determines the amount of resources required to mitigate the event, with 3rd alarms requiring the most resources. Any hazardous material spill entering a waterway is automatically assigned a minimum level of Hazardous Material 2nd alarm.

Sacramento Regional Communications Center is used to dispatch calls and communications between the public and fire districts. For each fire department they have call lists for each type and level of alarm. The lists for the City of Sacramento Fire Department include contacting the City's water treatment plants for Hazardous Materials 2nd and 3rd level alarms as well as Fire 3rd alarms.

Prepared by Bonny Starr. Starr Consulting
April 2012

FACT SHEET FOR DIAZINON

General Information and Pesticide Registration

- Diazinon is an organophosphate insecticide, and was one of the most widely used insecticides in the United States for household and agricultural pest control. Diazinon is used to control foliage and soil insects and pests of many fruit, nut, vegetable, and ornamental crops. The past sources of diazinon found in the Sacramento River were urban and agricultural applications (CVWQCB, 2007). However, agriculture will be the only source of diazinon as the USEPA banned the sale of all non-agricultural uses of diazinon in 2004. In the Central Valley, diazinon is used to exterminate destructive foliage and soil insects of many fruit, nut, and vegetable crops.

- Diazinon is moderately mobile and persistent in the environment. Due to its moderate solubility and low to moderate tendency to absorb to soil, it can move off crops, soil and other surfaces and into surface water in runoff from rainfall and irrigation runoff. Sediment transport is not a primary mechanism of transport for diazinon, as approximately 98 percent of the diazinon in San Francisco Bay is reported to occur in the dissolved phase (Kuivila, 1993). Additionally, atmospheric transport and deposition of diazinon can significantly affect surface water concentrations in the Central Valley (Majewski et al., 2005).

- The USEPA has assessed the risks of diazinon and reached an Interim Reregistration Eligibility Decision (IRED) in 2002. USEPA also completed an assessment of the cumulative risks from the organophosphate class of pesticides in 2006. The IRED completed in 2002 indicated that diazinon residues in food and drinking water resulting from agricultural uses do not pose human dietary risks of concern. Risks to agricultural workers, birds, and other wildlife are of concern to the USEPA. The IRED included provisions to phase out and cancel certain agricultural crop uses, the granular formulation, and aerial applications.

- In 2006, the California Department of Pesticide Regulation (CDPR) further controlled the primary diazinon use in the Sacramento River watershed by instituting special requirements for dormant spraying to reduce the amount of diazinon reaching surface water. No dormant spray application is allowed if the soil is already saturated with water, or field runoff is likely to occur if it rains and the National Oceanic and Atmospheric Administration or National Weather Service has forecast a storm to occur within 48 hours after a scheduled dormant spray application.

Pesticide Use Patterns in the Sacramento River Watershed

- The use of diazinon in the Sacramento River watershed appears to be decreasing, as shown in **Table 1**. The Sacramento watershed is defined to include the counties discharging to the Sacramento River, and its tributaries, upstream of the Freeport Regional Water Authority intake structure near River Mile 47. As shown in **Table 1**, the amount of diazinon applied in 2004 compared to 2010, shows a decrease of 59 percent.

Table 1
Use of Diazinon in the Sacramento River Watershed
2004-2010

Year	Pounds of Diazinon applied
2004	56,086
2005	41,815
2006	45,121
2007	34,241
2008	26,153
2009	25,673
2010	23,217

Note: Information Obtained from CDPR's Pesticide Use Report Database

- Usage of diazinon in the Sacramento Valley is primarily during the dormant season, from December through February. During the dormant spray season, dormant orchards are sprayed with a mixture of pesticides, including dormant oils, to limit crop and tree damage from pests. Based on diazinon usage data between 2000 and 2004, 98 percent of the reported uses during the study were plum (41 percent), peach (23 percent), almond (15 percent), walnut (9 percent) and tomato (8 percent) [CVWQCB, 2007].

Water Quality Standards and Guidances

- There is no drinking water standard for diazinon. Diazinon has a Notification Level, which was recently reduced from 6 µg/L to 1.2 µg/L.

- Due to elevated levels of diazinon and resulting aquatic toxicity, four waterways (Sacramento River from Knights Landing to the Delta, Lower Feather River from Oroville Dam to Sacramento River, Sacramento Slough and Sutter Bypass) were added to the 1994 303(d) List of Impaired Waters. By 2002, the Central Valley Regional Water Quality Control Board (Regional Board) had identified diazinon impairments in eleven Sacramento and Feather River waterways covering 196 River Miles, as shown in **Map 1**.

- Beginning in 2003, a TMDL for diazinon and chlorpyrifos was implemented through the Regional Board's Irrigated Lands Program and a conditional waiver

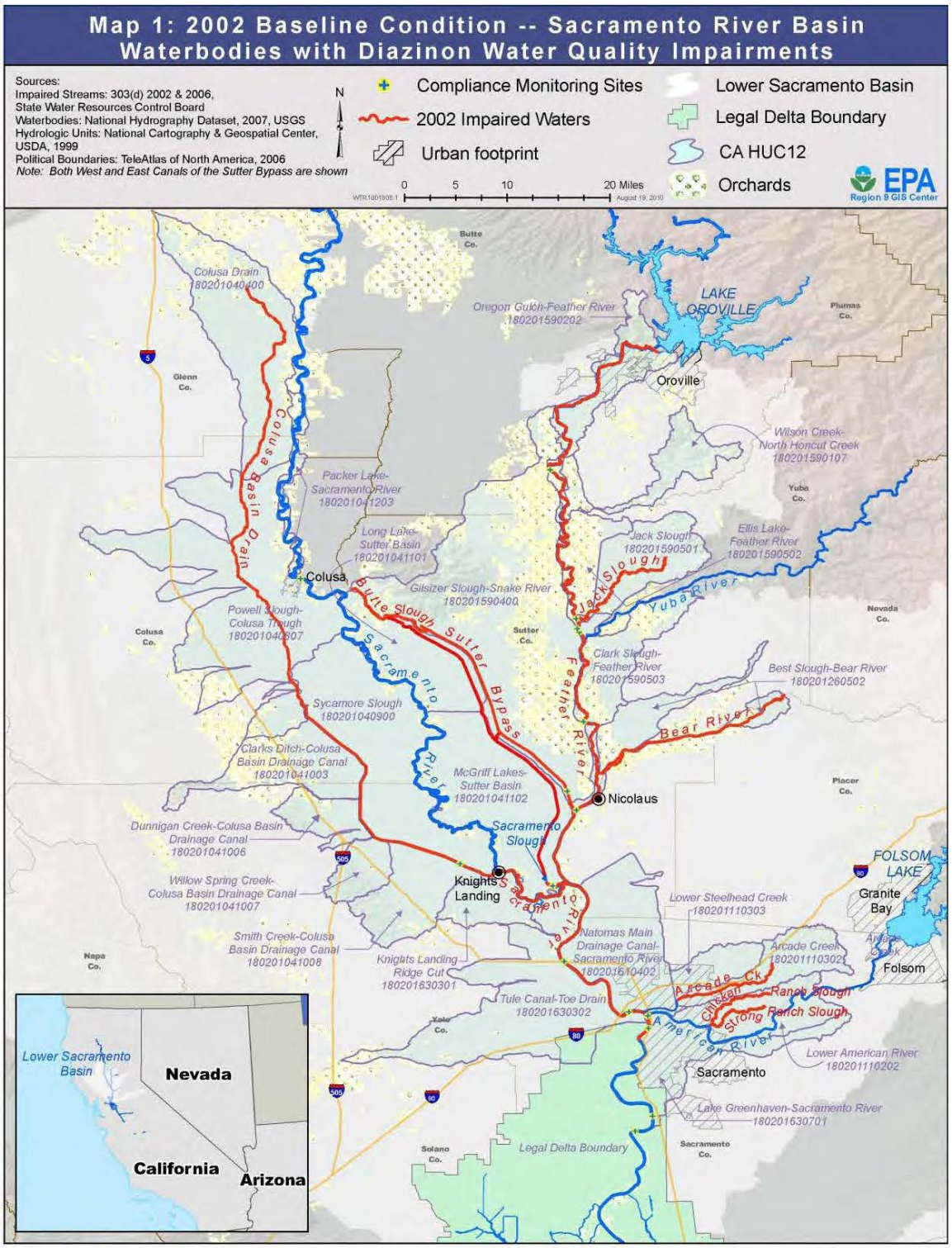
of waste discharge requirements held by the Sacramento Valley Water Quality Coalition (SVWQC).

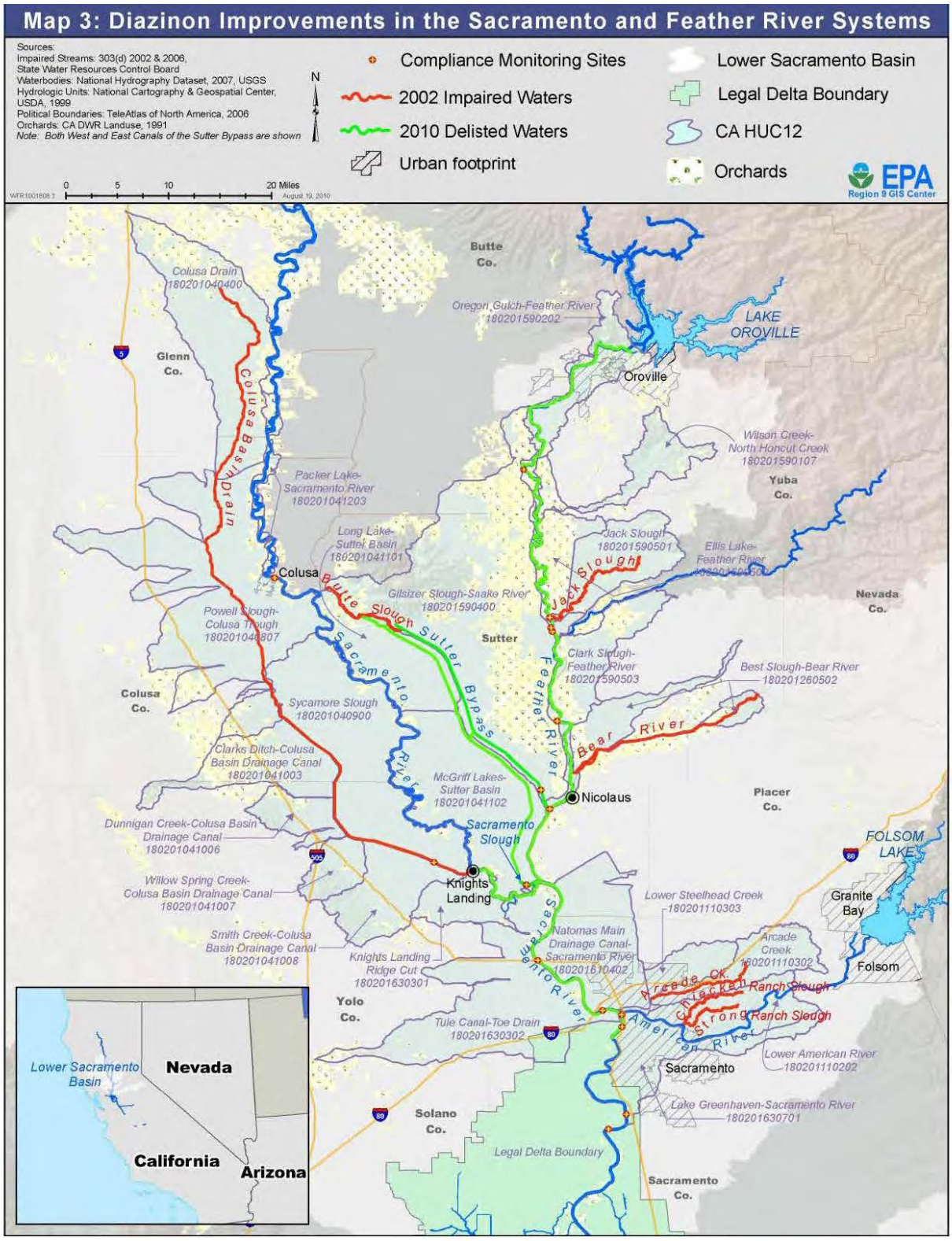
- The combined efforts of community, business, education, research and regulatory activities resulted in the reduction of diazinon concentrations in the Sacramento and Feather Rivers. Diazinon concentrations were found to be below the Basin Plan water quality objectives. Their efforts resulted in the removal of 79 River Miles from the 303(d) List in 2010, as shown in **Map 3**. Therefore, diazinon has been de-listed from the 303(d) List for the Sacramento River from Knights Landing to the Delta, Sacramento Slough, Sutter Bypass, and Feather River from Oroville Dam to Sacramento River.

- Despite these improvements, the Water Board has determined that diazinon and chlorpyrifos continue to pose a threat to aquatic organisms in many Central Valley surface waters. Consequently, the Regional Board is currently working on an amendment to the Basin Plan that would establish diazinon and chlorpyrifos water quality objectives for a large fraction of surface waters in the region, including many upstream tributaries of the Sacramento River. According to Regional Board staff, the Basin Plan amendment aims to look further upstream in the Sacramento River watershed to monitor diazinon and chlorpyrifos levels, and it is likely that diazinon and chlorpyrifos monitoring will decrease in the areas de-listed in 2010 (Personal Communication, Daniel McClure, Central Valley Regional Board). A public review of the draft Basin Plan Amendment is expected to occur at a Water Board workshop in spring 2013, which will likely be followed by adoption of the amendment in summer 2013.

- Currently, the Basin Plan contains a numerical water quality objective for diazinon that applies only to water bodies with TMDLs, which is:

    - 0.16 µg/L as a 1-hour average (acute) maximum concentration and 0.10 µg/L as a 4-day average (chronic) maximum concentration, not to be exceeded more than once in three years.


Map 1: 2002 Baseline Condition -- Sacramento River Basin
Waterbodies with Diazinon Water Quality Impairments
Sources:
Impaired Streams: 303(d) 2002 & 2006,
State Water Resources Control Board
Waterbodies: National Hydrography Dataset, 2007, USGS
Hydrologic Units: National Cartography & Geospatial Center, USDA, 1999
Political Boundaries: TeleAtlas of North America, 2006
Note: Both West and East Canals of the Sutter Bypass are shown
N
Compliance Monitoring Sites
2002 Impaired Waters
Urban footprint
Lower Sacramento Basin
Legal Delta Boundary
CA HUC12
Orchards
0 5 10 20 Miles
EPA
Region 9 GIS Center
Colusa Drain 180201040400
Oregon Gulch-Feather River 180201590202
LAKE OROVILLE
Oroville
Wilson Creek-North Honcut Creek 180201590107
Packer Lake-Sacramento River 180201041203
Long Lake-Sutter Basin 180201041101
Jack Slough 180201590501
Ellis Lake-Feather River 180201590502
Colusa
Gilsizer Slough-Snake River 180201590400
Powell Slough-Colusa Trough 180201040307
Clark Slough-Feather River 180201590503
Best Slough-Bear River 180201260502
Sycamore Slough 180201040900
Clarks Ditch-Colusa Basin Drainage Canal 180201041003
McGriff Lakes-Sutter Basin 180201041102
Nicolaus
Sacramento Slough
Dunnigan Creek-Colusa Basin Drainage Canal 180201041006
Willow Spring Creek-Colusa Basin Drainage Canal 180201041007
Knights Landing
Lower Steelhead Creek 180201110303
FOLSOM LAKE
Granite Bay
Smith Creek-Colusa Basin Drainage Canal 180201041008
Knights Landing Ridge Cut 180201630301
Natomas Main Drainage Canal-Sacramento River 180201610402
Arcade Creek 180201110302
Folsom
Tule Canal-Toe Drain 180201630302
Lower American River 180201110202
Sacramento
Lake Greenhaven-Sacramento River 180201630701
Legal Delta Boundary
Colusa Basin Drain
Butte Slough
Sutter Bypass
Sacramento River
Feather River
Jack Slough
Yuba River
Bear River
Arcade Ck
Chicken Ranch Slough
Strong Ranch Slough
American River
Butte Co.
Plumas Co.
Glenn Co.
Yuba Co.
Nevada Co.
Colusa Co.
Sutter Co.
Placer Co.
Napa Co.
Yolo Co.
Solano Co.
Sacramento Co.
Lower Sacramento Basin
Nevada
California
Arizona


Map 3: Diazinon Improvements in the Sacramento and Feather River Systems
Sources:
Impaired Streams: 303(d) 2002 & 2006, State Water Resources Control Board
Waterbodies: National Hydrography Dataset, 2007, USGS
Hydrologic Units: National Cartography & Geospatial Center, USDA, 1999
Political Boundaries: TeleAtlas of North America, 2006
Orchards: CA DWR Landuse, 1991
Note: Both West and East Canals of the Sutter Bypass are shown
N
Compliance Monitoring Sites
2002 Impaired Waters
2010 Delisted Waters
Urban footprint
Lower Sacramento Basin
Legal Delta Boundary
CA HUC12
Orchards
0 5 10 20 Miles
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Region 9 GIS Center
Butte Co.
Colusa Drain 180201040400
Oregon Gulch-Feather River 180201590202
LAKE OROVILLE
Glenn Co.
Colusa Basin Drain
Oroville
Wilson Creek-North Honcut Creek 180201590107
Yuba Co.
Packer Lake-Sacramento River 180201041203
Long Lake-Sutter Basin 180201041101
Jack Slough 180201590501
Ellis Lake-Feather River
Colusa
Butte Slough
Gilsizer Slough-Snake River 180201590400
Jack Slough
Nevada Co.
Powell Slough-Colusa Trough 180201041807
Sutter
Sacramento River
Sutter Bypass
Feather River
Clark Slough-Feather River 180201590503
Best Slough-Bear River 180201260502
Colusa Co.
Sycamore Slough 180201040900
Bear River
Clarks Ditch-Colusa Basin Drainage Canal 180201041003
McGriff Lakes-Sutter Basin 180201041102
Nicolaus
Placer Co.
Dunnigan Creek-Colusa Basin Drainage Canal 180201041006
Sacramento Slough
FOLSOM LAKE
Willow Spring Creek-Colusa Basin Drainage Canal 180201041007
Knights Landing
Lower Steelhead Creek 180201110303
Granite Bay
Smith Creek-Colusa Basin Drainage Canal 180201041008
Natomas Main Drainage Canal-Sacramento River 180201610402
Arcade Creek 180201110302
Knights Landing Ridge Cut 180201630301
Sacramento River
Folsom
Arcade Ck.
Chicken Ranch Slough
Yolo Co.
Tule Canal-Toe Drain 180201630302
Strong Ranch Slough
American River
Lower American River 180201110202
Sacramento
Lower Sacramento Basin
Nevada
California
Arizona
Solano Co.
Lake Greenhaven-Sacramento River 180201630701
Legal Delta Boundary
Sacramento Co.

Monitoring Data

- Diazinon is monitored by the SVWQC to meet the requirements of the Regional Board's Irrigated Lands Regulatory Program. Diazinon data from 2007 through 2011 were examined, and out of the 528 samples collected for diazinon, there were no samples above the California Department of Public Health (CDPH) notification level of 1.2 µg/L. There were only three samples higher than 10 percent of the human health benchmark, as shown in **Table 2**.

Table 2
Detectable Levels of Diazinon in the Sacramento River Watershed
2007-2011

Sample Location	Date	Sample Result (µg/L)	CDPH Notification Level (µg/L)	10% of Notification Level (µg/L)
Churn Creek at Knighton Rd.	2/8/07	0.0584	1.2	0.12
Colusa Basin Drain above Knights Landing	2/9/07	0.0082	1.2	0.12
Colusa Basin Drain above Knights Landing	3/28/07	0.0475	1.2	0.12
Feather River near Nicolaus	2/10/07	0.0125	1.2	0.12
Gilsizer Slough at So. George Washington Rd.	2/11/07	0.101	1.2	0.12
Gilsizer Slough at So. George Washington Rd.	8/22/07	0.005	1.2	0.12
Lower Snake River at Nuestro Road	2/10/07	0.061	1.2	0.12
Lurline Creek at 99W	9/18/07	0.035	1.2	0.12
North Canyon Creek	4/17/07	0.017	1.2	0.12
Sacramento Slough	2/10/07	0.0179	1.2	0.12
Shag Slough at Liberty Island Bridge	4/17/07	0.014	1.2	0.12
Sweany Creek at Weber Rd.	12/19/07	0.154	1.2	0.12
Ulatis Creek at Brown Road	2/12/07	0.0381	1.2	0.12
Ulatis Creek at Brown Road	4/17/07	0.006	1.2	0.12
Ulatis Creek at Brown Road	12/19/07	0.017	1.2	0.12
Walker Creek at County Road 48	4/17/07	0.014	1.2	0.12
Colusa Basin Drain above Knights Landing	1/29/08	0.016	1.2	0.12
Colusa Basin Drain above Knights Landing	3/12/08	0.0564	1.2	0.12
Coyote Creek at Tyler Road	1/28/08	0.0023	1.2	0.12
Lower Snake River at Nuestro Road	1/29/08	0.025	1.2	0.12
Sacramento Slough Bridge near Kamak	1/29/08	0.021	1.2	0.12
Shag Slough at Liberty Island Bridge	1/28/08	0.0121	1.2	0.12
Ulatis Creek at Brown Road	1/28/08	0.0098	1.2	0.12
Walker Creek at County Road 48	1/28/08	0.0132	1.2	0.12
Willow Slough Bypass at Pole Line	1/28/08	0.01	1.2	0.12

Sample Location	Date	Sample Result (µg/L)	CDPH Notification Level (µg/L)	10% of Notification Level (µg/L)
Freshwater Creek at Gibson Rd.	4/22/08	0.0174	1.2	0.12
Freshwater Creek at Gibson Rd.	5/21/08	0.0197	1.2	0.12
Lurline Creek at 99W	5/21/08	0.0062	1.2	0.12
Shag Slough at Liberty Island Bridge	4/21/08	0.0042	1.2	0.12
Gilsizer Slough at So. George Washington Rd.	1/27/09	0.6007	1.2	0.12
Gilsizer Slough at So. George Washington Rd.	2/18/09	0.0931	1.2	0.12
Gilsizer Slough at So. George Washington Rd.	2/18/09	0.0859	1.2	0.12
Lower Honcut Creek at Hwy 70	1/27/09	0.0103	1.2	0.12
GILSL	1/21/10	0.0628	1.2	0.12
Grand Island Drain near Leary Rd.	10/19/11	0.0859	1.2	0.12
Grand Island Drain near Leary Rd.	10/19/11	0.0807	1.2	0.12
Grand Island Drain near Leary Rd.	10/19/11	0.102	1.2	0.12
Grand Island Drain near Leary Rd.	5/17/11	0.0185	1.2	0.12
GILSL	2/16/11	0.1352	1.2	0.12
GILSL	2/16/11	0.0195	1.2	0.12
Lower Snake River at Nuestro Road	1/18/11	0.024	1.2	0.12
Shag Slough at Liberty Island Bridge	2/15/11	0.0104	1.2	0.12
Shag Slough at Liberty Island Bridge	2/15/11	0.0062	1.2	0.12
Ulatis Creek at Brown Road	2/15/11	0.0125	1.2	0.12

Source: Sacramento Valley Water Quality Coalition

- The Sacramento Stormwater Quality Partnership conducts dry and wet weather river monitoring as required by the National Pollutant Discharge Elimination System (NPDES) stormwater permit for the City and County of Sacramento, the cities of Folsom, Citrus Heights, Elk Grove and Galt. This monitoring is conducted through the Sacramento Regional County Sanitation District's Coordinated Monitoring Program (CMP). Monitoring sites of interest are the Sacramento River at Veterans Bridge, Sacramento River at Freeport Marina, American River at Nimbus Dam, American River at Highway 80 crossing, and American River at Discovery Park (just above confluence of Sacramento River). CMP Data from 2006 to 2011 were evaluated, and of the 139 samples collected for diazinon, there were three samples with detectable levels. However, all detectable levels were lower than the 10 percent of the human health benchmark. Two of the three detectable samples were collected at Sacramento River at Veteran's Bridge at the following concentrations: 0.0026 µg/L in 2009 and 0.0065 µg/L in 2010. The remaining detectable sample was collected at Freeport Marina at 0.0048 µg/L in 2010.

- The CDPR completed an extensive study of organophosphate pesticides in the San Joaquin and Sacramento Rivers in 2011. From December 2005 to November 2007, surface water samples were collected on a weekly basis. In addition to weekly sampling, samples were collected during rain events for approximately ten consecutive days starting on the first day of the storm. Out of the 201 diazinon samples collected at Sacramento River at Freeport, there were only six detectable samples, with no detects above 10 percent of the human health benchmark. Out of the twenty-nine samples collected at the Knights Landing Ridge Cut, there were 13 detects, but no detects above 10 percent of the human health benchmark.

- The California Rice Commission (CRC) conducted special monitoring for diazinon in 2007. A total of three samples were collected at Butte Slough, Colusa Basin Drain, and Sacramento Slough Bridge. All samples were non-detectable.

- The Regional Board also examined diazinon data collected from numerous studies from 1994 to 2006.
    - Data collected at the Sacramento River at Alamar/Veterans Bridge showed a limited number of individual samples exceeding 10 percent of the human health benchmark (0.12 µg/L), but none of these samples exceeded the human health benchmark of 1.2 µg/L. The maximum concentration was 0.22 µg/L from a single sample in 2004.
    - Data collected at the Sacramento River at Sacramento showed a limited number of individual samples exceeding 10 percent of the human health benchmark (0.12 µg/L), but none of these samples exceeded the human health benchmark of 1.2 µg/L. The maximum concentration was 0.307 µg/L from a single sample in 1993.

Conclusions and Recommendations

- Since 2006, more than 900 surface water samples have been collected in the Sacramento River watershed, none of which exceeded the drinking water benchmark, and less than 0.5 percent exceeded 10 percent of the benchmark. Since 2006, there have been 22 detections in the Sacramento River main stem, yet all were less than 10 percent of the benchmark.

- No further source water protection activities are warranted as diazinon levels are well below the drinking water benchmark. Additionally, the Regional Board's Central Valley Diazinon and Chlorpyrifos Basin Plan Amendment will address diazinon for aquatic life protection which is at even lower levels of concern than the human health benchmark.

REFERENCES

Sacramento River Source Water Protection Program Pesticide Tracking Update and Future Planning Memorandum, September 2012. Prepared by Starr Consulting.

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Kuivila, K.M., and Foe, C. 1995. Concentrations, transport and biological effects of dormant spray pesticides in the San Francisco estuary, California. Environmental Toxicology and Chemistry, Vol. 14, No. 7, pp. 1141-1150.

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http://www.epa.gov/region9/water/watershed/measurew/feather-sac/2010SacFeatherRiverSP12final-Rpt.pdf

FACT SHEET FOR CHLORPYRIFOS

General Information and Pesticide Registration

- Chlorpyrifos is an organophosphate insecticide and acaricide used to control foliage and soil insect and mite pests on a variety of food and feed crops. The past sources of chlorpyrifos found in the Sacramento River were urban and agricultural applications (CVWQCB, 2007). However, agriculture will be the dominant source of chlorpyrifos as the USEPA banned almost all non-agricultural uses of chlorpyrifos in 2005. In the Central Valley, chlorpyrifos is used to exterminate destructive pests of many fruit, nut, and forage crops.

- Chlorpyrifos can pollute surface water via spray drift at the time of application or as runoff up to several months after application (USEPA, 2000a). Chlorpyrifos has a greater tendency than diazinon to adsorb to soil and sediment. Available data indicate that most chlorpyrifos runoff is generally via adsorption to eroding soil rather than by dissolution in runoff water (USEPA, 2000a). Atmospheric transport and deposition of chlorpyrifos can significantly affect surface water concentrations in the Central Valley (Majewski et al., 2005).

- The USEPA has assessed the risks of chlorpyrifos and reached an Interim Reregistration Eligibility Decision (IRED) for chlorpyrifos in 2001. USEPA also completed an assessment of the cumulative risks from the organophosphate class of pesticides in 2006. The IRED completed in 2001 indicates that chlorpyrifos residues in food and drinking water do not pose risk concerns. Specifically, drinking water risk estimates based on screening models and monitoring data from both ground and surface water for acute and chronic exposures are not of concern. Occupational exposure to chlorpyrifos is of concern to the USEPA. Exposures of concern include mixing/loading liquids for aerial and groundboom application, application by backpack sprayer, or hand-held sprayer or duster. The IRED states that no-spray buffers around surface water bodies will be implemented as a result of the IRED.

Pesticide Use Patterns in the Sacramento River Watershed

- The use of chlorpyrifos in the Sacramento River watershed appears to be decreasing, as shown in **Table 1**. The Sacramento watershed is defined to include the counties discharging to the Sacramento River, and its tributaries, upstream of the Freeport Regional Water Authority intake structure near River Mile 47. As shown in **Table 1**, the amount of chlorpyrifos applied in 2004 compared to 2010, shows a decrease of 16 percent.

Table 1
Use of Chlorpyrifos in the Sacramento River Watershed
2004-2010

Year	Pounds of Chlorpyrifos applied
2004	151,277
2005	199,367
2006	157,935
2007	179,586
2008	144,682
2009	137,945
2010	127,454

Note: Information Obtained from CDPR's Pesticide Use Report Database

- Usage of chlorpyrifos in the Sacramento Valley is primarily during the irrigation season, from March through November. Based on chlorpyrifos usage data between 2000 and 2004, 91 percent of the reported uses during the study were walnut (65 percent), almond (19 percent), and alfalfa (7 percent). The other uses were plum, peach, cotton, sugar beet, apple and corn (CVWQCB, 2007).

Water Quality Standards and Guidances

- Chlorpyrifos does not have a drinking water standard. Chlorpyrifos has a USEPA Lifetime Health Advisory set at 2 µg/L.

- Beginning in 2003, a TMDL for diazinon and chlorpyrifos was implemented through the Central Valley Regional Water Quality Control Board's (Regional Board) Irrigated Lands Program and a conditional waiver of waste discharge requirements held by the Sacramento Valley Water Quality Coalition (SVWQC). Although chlorpyrifos was never listed on the 303(d) List of Impaired Waters, it was included in the development of the TDML for diazinon due to the additive toxicity of diazinon when present with chlorpyrifos.

- The Regional Board is currently working on an amendment to the Basin Plan that would establish diazinon and chlorpyrifos water quality objectives for a large fraction of surface waters in the region, including many upstream tributaries of the Sacramento River. According to Regional Board staff, the Basin Plan amendment aims to look further upstream in the Sacramento River watershed to monitor diazinon and chlorpyrifos levels, and it is likely that diazinon and chlorpyrifos monitoring will decrease in the areas de-listed in 2010 (Personal Communication, Daniel McClure, Central Valley Regional Board). A public review of the draft Basin Plan Amendment is expected to occur at a Water Board workshop in spring 2013, which will likely be followed by adoption of the amendment in summer 2013.

- The Basin Plan currently contains a numerical water quality objective for chlorpyrifos that applies only to water bodies with TMDLs, which is:

    - 25 ng/L as a 1-hour average (acute) maximum concentration and 15 ng/L as a 4-day average (chronic) maximum concentration, not to be exceeded more than once in three years.

Monitoring Data

- Chlorpyrifos is monitored by the SVWQC to meet the requirements of the Regional Board's Irrigated Lands Regulatory Program. Chlorpyrifos data from 2007 through 2011 were examined, and out of the 528 samples collected for chlorpyrifos, there were no samples above the U.S. EPA lifetime Health Advisory set at 2 µg/L. There was only one sample higher than 10 percent of the human health benchmark, as shown in **Table 2**.

Table 2
Detectable Levels of Chlorpyrifos in the Sacramento River Watershed 2007-2011

Sample Location	Date	Sample Result (µg/L)	USEPA Health Advisory (µg/L)	10% of Health Advisory (µg/L)
Pine Creek at Nord-Gianella Rd.	8/21/07	0.038	2	0.2
Walker Creek at County Road	8/21/07	0.05	2	0.2
Walker Creek at County Road	9/18/07	0.017	2	0.2
Willow Slough Bypass at SP	4/17/07	0.083	2	0.2
Willow Slough Bypass at SP	5/15/07	0.013	2	0.2
Willow Slough Bypass at SP	8/21/07	0.023	2	0.2
Willow Slough North Fork	9/19/07	0.021	2	0.2
Colusa Basin Drain above Knights Landing	1/29/08	0.008	2	0.2
Grand Island Drain near Leary Road	1/28/08	0.0094	2	0.2
Ulatis Creek at Brown Road	1/28/08	0.0089	2	0.2
Walker Creek at County Road	1/28/08	0.0035	2	0.2
Lower Snake River at Nuestro Road	7/15/08	0.0323	2	0.2
Lower Snake River at Nuestro Road	8/19/08	0.0343	2	0.2
Pine Creek at Nord-Gianella Rd.	6/18/09	0.0132	2	0.2
Walker Creek near 99W and CR 33	6/18/09	0.0137	2	0.2
Walker Creek near 99W and CR 33	7/22/09	0.0217	2	0.2
Willow Slough Bypass at Pole Line	8/17/10	0.0471	2	0.2
Anderson Creek on Ash Creek Road	8/17/11	0.0138	2	0.2
Anderson Creek on Ash Creek Road	9/21/11	0.003	2	0.2
Coon Creek at Brewer Road	8/17/11	0.017	2	0.2
Coon Creek at Striplin Rd.	4/21/11	0.0142	2	0.2

Coon Creek at Striplin Rd.	5/17/11	0.0213	2	0.2
Colusa Basin Drain above Knights Landing	8/17/11	0.0032	2	0.2
Grand Island Drain near Leary Road	4/20/11	0.0027	2	0.2
Lower Honcut Creek at Hwy 70	9/21/11	0.0061	2	0.2
Lower Snake River at Nuestro Road	9/21/11	0.0037	2	0.2
Pine Creek at Nord-Gianella Rd.	7/20/11	0.248	2	0.2
Sample Location	**Date**	**Sample Result (µg/L)**	**USEPA Health Advisory (µg/L)**	**10% of Health Advisory (µg/L)**
Pine Creek at Nord-Gianella Rd.	7/20/11	0.119	2	0.2
Pine Creek at Nord-Gianella Rd.	8/17/11	0.0825	2	0.2
Pine Creek at Nord-Gianella Rd.	9/21/11	0.0885	2	0.2
SSKNR	9/20/11	0.0022	2	0.2
Ulatis Creek at Brown Road	5/17/11	0.0368	2	0.2
Ulatis Creek at Brown Road	5/17/11	0.047	2	0.2
Ulatis Creek at Brown Road	9/20/11	0.0162	2	0.2
Walker Creek near 99W and CR 33	7/20/11	0.005	2	0.2
Walker Creek near 99W and CR 33	7/20/11	0.006	2	0.2
Willow Slough Bypass at Pole Line	5/17/11	0.0082	2	0.2

Source: Sacramento Valley Water Quality Coalition

- The Sacramento Stormwater Quality Partnership conducts dry and wet weather river monitoring as required by the National Pollutant Discharge Elimination System (NPDES) stormwater permit for the City and County of Sacramento, the cities of Folsom, Citrus Heights, Elk Grove and Galt. This monitoring is conducted through the Sacramento Regional County Sanitation District's Coordinated Monitoring Program (CMP). Monitoring sites of interest are the Sacramento River at Veterans Bridge, Sacramento River at Freeport Marina, American River at Nimbus Dam, American River at Highway 80 crossing, and American River at Discovery Park (just above confluence of Sacramento River). CMP Data from 2006 to 2011 were evaluated, and of the 139 samples collected for chlorpyrifos, there were no samples with detectable levels.

- The California Department of Pesticide Regulation (CDPR) completed an extensive study of organophosphate pesticides in the San Joaquin and Sacramento Rivers in 2011. From December 2005 to November 2007, surface water samples were collected on a weekly basis. In addition to weekly sampling, samples were collected during rain events for approximately ten days per event. Out of the 201 chlorpyrifos samples collected at Sacramento River at Freeport, there were only three detectable samples, with no detects above 10 percent of the human health benchmark. Out of the twenty-nine samples collected at the Knights Landing Ridge Cut, there were no detects.

- The California Rice Commission (CRC) conducted special monitoring for chlorpyrifos in 2007. A total of three samples were collected at Butte Slough, Colusa Basin Drain, and Sacramento Slough Bridge. All samples were non-detectable.

- The Regional Board also examined chlorpyrifos data collected from numerous studies from 1994 to 2006.
    - Data collected at the Sacramento River at Alamar/Veterans Bridge showed that no individual samples exceeded 10 percent of the human health benchmark. In fact, the 90th percentile for all years, except for 2003 and 2004 were ND. The maximum concentration was 0.035 µg/L from a single sample in 2004.
    - Data collected at the Sacramento River at Sacramento showed that no individual samples exceeded 10 percent of the human health benchmark. In fact, the 90th percentile for all years, except for 2000 and 2004 were ND. The maximum concentration was 0.030 µg/L from a single sample in 2004.

Conclusions and Recommendations

- Since 2006, more than 900 surface water samples have been collected in the Sacramento River watershed, none of which exceeded the drinking water benchmark, and less than 0.2 percent exceeded 10 percent of the benchmark. Since 2006, there have been no detections in the Sacramento River main stem.

- No further source water protection activities are warranted as chlorpyrifos levels are well below the drinking water benchmark. Additionally, the Regional Board's Central Valley Diazinon and Chlorpyrifos Basin Plan Amendment will address chlorpyrifos for aquatic life protection which are at even lower levels of concern than the human health benchmark.

REFERENCES

Basin Plan Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento and Feather Rivers, prepared by Central Valley Regional Water Quality Control Board, May 2007 Final Staff Report.

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http://www.epa.gov/region9/water/watershed/measurew/feather-sac/2010SacFeatherRiverSP12final-Rpt.pdf

WDID	Billing Month	Operator Owner Name	Operator Address	Operator City_State	Operator Contact	Operator Phone	Facility Name	Facility Location	Facility City_State	Facility Contact	Facility Phone	Billing Name	Billing Address	Billing City_State	Billing Contact	Facility Size	Facility Size Unit
5S46I018735	April	North Fork Mining Corp	PO Box 106	Reno, NV 89509	Tim Callaway	775-324-4881	North Fork Mine	North Fork Mine Site	Alleghany, CA 95910	Tim Callaway	530-227-8691	North Fork Mining Corp	P.O. Box 106	French Gulch, CA 96033	Brian Sharp	1	Acres
5S09I018383	July	Sierra Pacific Industries Camino 5S	PO Box 680	Camino, CA 95709	GREG Mccoy	530-644-2311	Sierra Pac Industries	3950 Carson Rd	Camino, CA 95709	Steve Thornbrugh	530-644-2311	Sierra Pacific Industries Camino 5S	PO Box 680	Camino, CA 95709	Brian Coyle	83	Acres
5S09I006522	April	Camino School District	3060 Snows Rd	Camino, CA 95709	ROB Schamberg	530-644-4552	Camino Sch Dist	3060 Snows Rd	Camino, CA 95709	ROB Schamberg	5306444552	Camino School District	3060 Snows Rd	Camino, CA 95709	ROB Schamberg	18	Acres
5S31I021509	January	Granite Construction Co - Santa Clara	PO Box 15287	Sacramento, CA 95851	Brian Roll	775-233-5022	Temporary Materials Plant	85 Cisco Rd	Cisco Grove, CA 95728	Brian Roll	775-233-5022	Granite Construction Co - Santa Clara	PO Box 2087	Sparks, NV 89432	Jessica Rush	2	Acres
5S09I017154	January	Teichert Aggregates	PO Box 15002	Sacramento, CA 95851	Robert Lucchesi	916-484-3371	Teichert Aggregates Cool Cave	2601 Hwy 49	Cool, CA 95614	Ed Herrnberger	530-885-4244	Teichert Aggregates	PO Box 15002	Sacramento, CA 95851	Robert Lucchesi	556	Acres
5S09I015039	April	El Dorado Cnty Transit Authority	6565 Commerce Way	Diamond Springs, CA 95619	MINDY Jackson	530-642-5383	El Dorado Cnty Transit Auth	6565 Commerce Way	Diamond Springs, CA 95619	MINDY Jackson	5306425383	El Dorado Cnty Transit Authority	6565 Commerce Way	Diamond Springs, CA 95619	MINDY Jackson	3	Acres
5S09I020631	January	Waste Connections of California Inc	35 Iron Pt Circle	Folsom, CA 95630	James Little	916-608-8200	El Dorado Disposal Services	3940 Hwy 49	Diamond Springs, CA 95619	Sue Farris		Waste Connections of California Inc	35 Iron Pt Circle	Folsom, CA 95630	James Little	1.98	Acres
5S09I017856	January	El Dorado Union HSD	4675 Missouri Flat Rd	Placerville, CA 95667	Dennis Vanderpool	530-622-3606	El Dorado Union HSD	4675 Missouri Flat Rd	Diamond Springs, CA 95619	Dennis Vanderpool	530-622-6306	El Dorado Union High School District	4675 Missouri Flat Rd	Placerville, CA 95667	Dennis Vanderpool	57000	Sq.Feet
5S09I018773	April	Doug Veerkamp General Engineering Inc	2585 Cold Springs Rd	Placerville, CA 95667	Rick Ferriera	916-933-7077	Doug Veerkamp General Engineering Inc	2000 Wetsel Oviatt Rd	El Dorado Hills, CA 95762			Doug Veerkamp General Engineering Inc	2585 Cold Springs Rd	Placerville, CA 95667	Bob Petrosky	70	Acres
5S09I017471	July	El Dorado ID	2890 Mosquito Rd	Placerville, CA 95667	Vickie Caulfield	530-642-4058	El Dorado Irrig Dist WWTP	4625 Latrobe Rd	El Dorado Hills, CA 95762	Larry Olson	916-933-6953	El Dorado ID	2890 Mosquito Rd	Placerville, CA 95667	Vickie Caulfield	17	Acres
5S09I020466	July	ITW Rippey Corp	5000 Hillsdale Circle	El Dorado Hills, CA 95762	Jim Innes	916-939-4332	ITW Rippey Corp	5000 Hillsdale Circle	El Dorado Hills, CA 95762			ITW Rippey	5000 Hillsdale Circle	El Dorado Hills, CA 95762	Dave Hakala	2	Acres
5S34I000185	April	Intel	1900 Prairie City Rd	Folsom, CA 95630	BARBARA Bos	916-356-5462	Intel Corp Fm4 124	1900 Prairie City Rd	Folsom, CA 95630	Barbara Bos	9163565462	Intel Corp SC12-324	2200 Mission College Blvd.	Santa Clara, CA 95054	Jim Charley	234	Acres
5S34I017520	October	Folsom Auto Mall Dealers Association	12755 Folsom Blvd	Folsom, CA 95630	Jon Sears	916-353-2000	Folsom Auto Mall Dealers Assoc	Auto Mall Drive	Folsom, CA 95630	BARNEY Cutler	9167974822	Folsom Auto Mall Dealers Association	805 University Ave	Sacramento, CA 95825	Jim Mcdonald	45	Acres
5S34I016266	October	Folsom City	50 Natoma St	Folsom, CA 95630	Richard Lorenz	916-355-7272	Folsom City Corp Yard	Western End Of Leidesdorff St	Folsom, CA 95630	Bob Horn	916-355-8340	Folsom City	50 Natoma St	Folsom, CA 95630	Richard Lorenz	18	Acres
5S34I004590	April	Teichert Readymix	PO BOX 15002	Sacramento, CA 95851	Robert Lucchesi	916-484-3371	Teichert Folsom Readymix Plant	1209 Levy Rd	Folsom, CA 95630	David Barnett	916-386-6999	Teichert Readymix	PO BOX 15002	Sacramento, CA 95851	Robert Lucchesi	9	Acres
5S34I004925	April	Sake Gekkeikan	1136 Sibley St	Folsom, CA 95630	William Piper	916-985-3111	Gekkeikan Sake	1136 Sibley St	Folsom, CA 95630			Sake Gekkeikan	1136 Sibley St	Folsom, CA 95630	William Piper	1	Acres
5S31I009012	October	Placer Cnty Dept Of Facility Services	11476 C Ave	Auburn, CA 95603	Bill Zimmerman	415-892-4748	Placer Cnty Waste Mgt Foresthi	6699 Patent Road	Foresthill, CA 95631	Bill Zimmerman	415-892-4748	Placer Cnty Dept Of Facility Services	11476 C Ave	Auburn, CA 95603	Bill Zimmerman	13	Acres
5S31I020395	July	Richard Sykora	PO Box 622	Foresthill, CA 95631	Richard Sykora	530-367-4067	Red Ink Maid & Big Seam Claims	6 Mi Down USFS Hwy 96	Foresthill, CA 95631	Richard Sykora	530-360-4067	Richard Sykora	PO Box 622	Foresthill, CA 95631	Richard Sykora	2.3	Acres
5S31I017899	January	Foresthill Union School District	24750 Main St	Foresthill, CA 95631	Jim Roberts	530-367-2966	Foresthill Union School District Elementary School	24750 Main St	Foresthill, CA 95631	Cindy Pascoe	530-367-2211	Foresthill Union School District	24750 Main St	Foresthill, CA 95631	Jim Roberts	1	Acres
5S09I001185	April	El Dorado Cnty	2850 Fairlane Ct	Placerville, CA 95667	Janet L Atwood	530-622-0459	El Dorado Cnty Georgetown Airp	Dry Diggins Road	Georgetown, CA 95634	Janet L Atwood	5306220459	El Dorado Cnty	PO Box 85	Placerville, CA 95667	Janet L Atwood	154	Acres
5S09I002883	April	Black Oak Mine School District	PO Box 4510	Georgetown, CA 95634	JOAN Priolo	530-333-8300	Black Oak Mine Sch Dist Trans	6540 Wentworth Springs Rd	Georgetown, CA 95634	RONALD Gfell	5303338325	Black Oak Mine School District	PO Box 4510	Georgetown, CA 95634	JOAN Priolo	2	Acres
5S31I010449	October	Jim Dobbas Inc	PO Box 177	Newcastle, CA 95658	SHERYL Mckelvey	916-663-3363	Jim Dobbas Inc	280 Taylor Rd	Newcastle, CA 95658	SHERYL Mckelvey	9166633363	Jim Dobbas Inc	PO Box 177	Newcastle, CA 95658	SHERYL Mckelvey	28	Acres

WDID	Billing Month	Operator Owner Name	Operator Address	Operator City_State	Operator Contact	Operator Phone	Facility Name	Facility Location	Facility City_State	Facility Contact	Facility Phone	Billing Name	Billing Address	Billing City_State	Billing Contact	Facility Size	Facility Size Unit
5S31I013581	January	A & A Stepping Stone Manufacturing Inc	10291 Ophir Rd	Newcastle, CA 95658	KEITH Arellano	530-885-7481	A & A Stepping Stone Manufacturing Inc	10291 Ophir Rd	Newcastle, CA 95658	KEITH Arellano	5308857481	A & A Stepping Stone Manufacturing Inc	10291 Ophir Rd	Newcastle, CA 95658	KEITH Arellano	50000	Sq.Feet
5S09I001157	April	Tom Celio	2441 Headington Rd	Placerville, CA 95667	Michele Smith	530-642-4937	El Dorado Cnty Dept Trans	2441 Headington Rd	Placerville, CA 95667	Michele Smith	530-642-4937	Tom Celio	2441 Headington Rd	Placerville, CA 95667	Michele Smith	83400	Acres
5S09I021987	January	Rick Churches	2261 Donovan Ranch Rd	Placerville, CA 95667	Rick Churches	530-765-0558	Big Cut Mine	2261 Donovan Ranch Rd	Placerville, CA 95667	Rick Churches	530-765-0558	Rick Churches	2261 Donovan Ranch Rd	Placerville, CA 95667	Rick Churches	13134	Acres
5S09I001215	April	El Dorado Cnty	2850 Fairlane Ct	Placerville, CA 95667	Janet L Atwood	530-622-0459	El Dorado Cnty Placerville Air	3501 Airport Rd	Placerville, CA 95667	Janet L Atwood	5306220459	El Dorado Cnty	PO Box 85	Placerville, CA 95667	Janet L Atwood	253	Acres
5S09I012499	October	Placerville Industries Inc	3230 Ahwahnee Wy	Cool, CA 95614	Brett Davis	919-303-6519	Placerville Industries Inc Chi	11380 State Highway 193	Placerville, CA 95667	Brett Davis	5306224234	Placerville Industries Inc	580 Pearson Dr	Brentwood, CA 94513	Brett Davis	40	Acres
5S09I008022	July	Placerville City	3101 Center St	Placerville, CA 95667	Randy Pesses	530-642-5252	Hangtown Creek WRF	2300 Coolwater Creek Rd	Placerville, CA 95667	Wylie Henderson	530-642-5557	Placerville City	3101 Center St	Placerville, CA 95667	Randy Pesses	22	Acres
5S09I016055	July	Snows Quarry Product	4001 Snows Rd	Placerville, CA 95667	MICHAEL Palmer	530-644-6940	Snows Quarry Prod	4001 Snows Rd	Placerville, CA 95667	MICHAEL Palmer	5306446940	Cobalt Crushing at Snows Quarry	16249 Buzzard Roost Rd	Oak Run, CA 96069	Judy Hoffman	16	Acres
5S09I020632	January	Waste Connections of California Inc	35 Iron Pt Circle	Folsom, CA 95630	Jamel Little	916-608-8200	Western El Dorado Recovery Systems	4100 Throwita Wy	Placerville, CA 95667	James Little	530-626-4141	Waste Connections of California Inc	35 Iron Pt Circle	Folsom, CA 95630	Jamel Little	10.14	Acres
5S09I014115	July	Lava Cap Winery	2221 Fruitridge Rd	Placerville, CA 95667	DAVID Jones	530-621-0175	Lava Cap Winery	2221 Fruitridge Rd	Placerville, CA 95667	DAVID Jones	5306210175	Lava Cap Winery	2221 Fruitridge Rd	Placerville, CA 95667	Jeanne Jones	1	Acres
5S09I013650	January	Sweet Septic System Inc	5701 Mother Lode Dr	Placerville, CA 95667	CHARLES Sweet	530-622-8768	Sweet Septic Sys Inc	5701 Mother Lode Dr	Placerville, CA 95667	CHARLES Sweet	5306228768	Sweet Septic System Inc	5701 Mother Lode Dr	Placerville, CA 95667	CHARLES Sweet	1	Acres
5S09I017872	January	Mother Lode Unified School District	3783 Forni Rd	Placerville, CA 95667	Mark Culver	530-622-6464	Mother Lode Usd	3783 Forni Rd	Placerville, CA 95667	Dennis Webster	5306264831	Mother Lode Unified School District	3783 Forni Rd	Placerville, CA 95667	Joe Grossman	1	Acres
5S09I017870	January	Gold Oak School	3171 Pleasant Valley Rd	Placerville, CA 95667	Carolyn Hague	530-626-3150	Gold Oak Sch	3171 Pleasant Valley Rd	Placerville, CA 95667	Carolyn Hague	5306263150	Gold Oak School	3171 Pleasant Valley Rd	Placerville, CA 95667	Carolyn Hague	62118	Sq.Feet
5S09I014311	October	Boeger Winery	1709 Carson Rd	Placerville, CA 95667	Greg Boeger	530-622-8094	Boeger Winery	1709 Carson	Placerville, CA 95667	Greg Boeger	530-622-8094	Boeger Winery	1709 Carson Rd	Placerville, CA 95667	Greg Boeger	12000	Sq.Feet
5S09I021560	April	Rolling Frito Lay Sales LP	4029 Leckron Rd	Modesto, CA 95357	Matthew Ray	209-544-5475	Placerville Bin	4003 Stage Court	Placerville, CA 95667	Matthew Ray	209-544-5475	Rolling Frito Lay Sales LP	4029 Leckron Rd	Modesto, CA 95357	Matthew Ray	5500	Sq.Feet
5S09I018174	April	Placerville Union School District	1032 Thompson Way	Placerville, CA 95667	LAREE Uchida	530-622-7216	P U S D Trans Dept	2877 Schnell School Rd	Placerville, CA 95667	LAREE Uchida	5306267636	P USD Transportation Dept	2877 Schnell School Rd	Placerville, CA 95667	Laree Uchida	62000	
5S09I017873	January	Pollock Pines School District	6181 Pine St # A	Pollock Pines, CA 95726	Phil Karnitz	530-644-5416	Pollock Pines Sch Trans	2702 Amber Trl	Pollock Pines, CA 95726	Phil Karnitz	5306443750	Pollock Pines School District	2701 Amber Trail	Pollock Pines, CA 95726	* Accounts Payable	55000	Sq.Feet
5S34I009649	January	Foremost Interiors Inc	2318 Gold River Rd	Rancho Cordova, CA 95670	RANDY Mertes	916-635-1423	Foremost Interiors Inc	2318 Gold River Rd	Rancho Cordova, CA 95670	RANDY Mertes	9166351423	Foremost Interiors Inc	2318 Gold River Rd	Rancho Cordova, CA 95670	RANDY Mertes	21780	Sq.Feet
5S34I005978	April	Fed Ex	11140 Sun Center Dr	Rancho Cordova, CA 95670			Fed Ex	11140 Sun Center Dr	Rancho Cordova, CA 95670	Bill Gebhart	901-434-8457	Fed Ex	3620 Hacks Cross Rd Bldg B 2nd Fl	Memphis, TN 38125	Bill Gebhart	2000	Sq.Feet
5S34I003368	April	Schnitzer Steel Industries Inc	PO Box 747	Oakland, CA 94604	MARC Madden	510-444-3919	Schnitzer Steel Prod	12000 Folsom Blvd	Rancho Cordova, CA 95742	TJ Sturgeon	916-985-4810	Schnitzer Steel Industries Inc	12000 Folsom Blvd	Rancho Cordova, CA 95742	TJ Sturgeon	6	Acres
5S34I021410	January	Resource Building Materials	12137 Folsom Blvd	Rancho Cordova, CA 95742	Rachele Clark	916-985-2625	Resource Building Materials	12137 Folsom Blvd	Rancho Cordova, CA 95742	Rachele Clark	916-985-2625	Resource Building Materials	12137 Folsom Blvd	Rancho Cordova, CA 95742	Rachele Clark	2	Acres
5S34I019931	October	George Feigl	2616 Mercantile Dr	Rancho Cordova, CA 95742	Dwayne Nash	916-635-8521	Adema Technologies	2616 Mercantile Dr	Rancho Cordova, CA 95742	Dwayne Nash	916-635-8521	Adema Technologies	2616 Mercantile Dr	Rancho Cordova, CA 95742	Dwayne Nash	40946	Sq.Feet
5S34I001227	April	CA Dept of Corrections	PO Box 71	Represa, CA 95671	JOE Franz	916-351-3020	CA Dept Corrections Folsom	100 Prison Rd # 300	Represa, CA 95671	JOSEPH Franz	963513028	CA Dept of Corrections	PO Box 71	Represa, CA 95671	JOE Franz	1200	Acres

WDID	Billing Month	Operator Owner Name	Operator Address	Operator City_State	Operator Contact	Operator Phone	Facility Name	Facility Location	Facility City_State	Facility Contact	Facility Phone	Billing Name	Billing Address	Billing City_State	Billing Contact	Facility Size	Facility Size Unit
5S09I000233	April	Rescue Unified School District	2390 Bass Lake Rd	Rescue, CA 95672	Janice Araujo	530-672-4300	Rescue Usd Transporation Facil	3880 Green Valley Rd	Rescue, CA 95672	Janice Araujo	5306774766	Rescue Unified School District	2390 Bass Lake Rd	Rescue, CA 95672	Janice Araujo	21000	Sq.Feet
5S34I021305	October	Southwestern Wire Inc	PO Box CC	Norman, OK 73070	David Weinand	405-447-6900	Southwestern Wire Inc	4318 Dudley Blvd 475E	Sacramento, CA 95652	Mike Gonzales	405-447-6900	Southwestern Wire Inc	PO Box CC	Norman, CA 73070	David Weinand	48650	Sq.Feet
5S34I004980	April	Fair Oaks Wrecking Inc	11350 S Bridge St	Gold River, CA 95670	Marvin W Neel	916-635-7602	Fair Oaks Wrecking Inc	11350 S Bridge St	Sacramento, CA 95670	Marvin W Neel	916-635-7602	Fair Oaks Wrecking Inc	11350 S Bridge St	Rancho Cordova, CA 95670	Marvin Neel	2	Acres
5S34I004305	April	US Postal Service	3780 Seaport Blvd	West Sacramento, CA 95799	Larry Paris	916-263-7107	US Postal Ser Vehicle Maint Fa	2000 Royal Oaks Dr	Sacramento, CA 95813	Larry Paris	916-263-7107	US Postal Service Sacramento Vmf	2000 Royal Oaks Dr	Sacramento, CA 95813	Larry Paris	22032	Sq.Feet
5S34I004438	April	Martin Sprocket & Gear	PO Box 91588	Arlington, TX 76015	Mike McClister	817-258-3000	Martin Sprocket & Gear	1199 Vine St	Sacramento, CA 95814	Scott McNeil	916-441-7172	Martin Sprocket & Gear	PO Box 91588	Arlington, TX 76015	Mike Payne	303610	Sq.Feet
5S34I020226	April	CA Exposition & State Fair	P.O. Box 15649	Sacramento, CA 95852	Mark Dannewitz	916-263-0286	Cal Exposition Racing Stables	1600 Exposition Blvd.	Sacramento, CA 95815	Mark Dannewitz	906-263-0286	CA Exposition & State Fair	P.O. Box 15649	Sacramento, CA 95852	Mark Dannewitz	28	Acres
5S34I001003	April	Interstate Brands Corp	1324 Arden Way	Sacramento, CA 95815	Jim Dudley	916-929-9121	Interstate Brands Corp	1324 Arden Way	Sacramento, CA 95815	Cary Krantz	916-561-0135	Interstate Brands Corp	1324 Arden Way	Sacramento, CA 95815	Lydia Raney	7	Acres
5S34I009440	October	Cemex Construction Materials Pacific LLC	PO Box 697	Pleasanton, CA 91761	Louis Shipper	916-941-2920	Cemex	1001 Joellis Way	Sacramento, CA 95815	Elizabeth Bol	916-941-2837	Cemex Construction Materials Pacific LLC	5180 Golden Foothill Pkwy	El Dorado Hills, CA 95762	Louis Shipper	2	Acres
5S34I019316	January	North Sacramento School District	670 Dixieanne Ave	Sacramento, CA 95815	Fadi Daher	916-263-8445	Taft St Yard	2628 Taft St	Sacramento, CA 95815	Fadi Daher	916-263-8445	North Sacramento School District	2591 Edgewater Rd	Sacramento, CA 95815	Accounts payable	2	Acres
5S34I021787	July	A R Business Group Inc	1101 Del Paso Blvd	Sacramento, CA 95815	Riz Mohammed Sadiq	916-925-2736	Chatfields Auto Dismantlers	1101 Del Paso Blvd	Sacramento, CA 95815	Riz Sadiq	916-925-2736	A R Business Group Inc	1101 Del Paso Blvd	Sacramento, CA 95815	Riz Mohammed Sadiq	0.75	Acres
5S34I016812	July	M & M Electric	1600 Auburn Blvd	Sacramento, CA 95815	Ronald Bolton	916-929-0150	M & M Electric	1600 Auburn Blvd	Sacramento, CA 95815	Ronald Bolton	916-929-0150	M & M Electric	1600 Auburn Blvd	Sacramento, CA 95815	Ronald Bolton	250000	Sq.Feet
5S34I020335	July	C&C Paper Recycling Inc	1957 #A Railroad Dr	Sacramento, CA 95815	Craig Sauer	916-920-2673	C&C Paper Recycling Inc	1957 #A Railroad Dr	Sacramento, CA 95815	Craig Sauer	916-920-2673	C&C Paper Recycling Inc	1957 #A Railroad Dr	Sacramento, CA 95815	Craig Sauer	32500	Sq.Feet
5S34I018690	January	Tomra Pacific Inc	40595 Albrae St	Fremont, CA 94538	Adrian White	510-651-6204	Tomra Pacific Sac Recycling	777 Arden Way	Sacramento, CA 95815	Adrian White	510-651-6204	Tomra Pacific Sacramento Recycling	1 Corporate Drive STE 710	Shelton, CT 06484	Evelyn Cope	12750	Sq.Feet
5S34I004477	April	Sacramento City	921 10th St Ste 500	Sacramento, CA 95814	JOHN Olsen	619-397-6121	Sac City Landfill	20 28th St	Sacramento, CA 95816	John Olsen	9162647132	City of Sacramento	2812 Meadowview Rd	Sacramento, CA 95832	JOHN Olsen	113	Acres
5S34I011865	October	Ace Auto Wrecking II Inc	519 1st Ave # 523	Sacramento, CA 95818	THAN Phong	916-443-8299	Ace Auto Wreckers Ii Inc	519 1st Ave # 523	Sacramento, CA 95818	THAN Phong	9164438299	Ace Auto Wreckers II Inc	519 1st Ave # 523	Sacramento, CA 95818	Than Phong	1	Acres
5S34I018840	April	Tomra Pacific Inc	40595 Albrae St	Fremont, CA 94538	Adrian White	510-651-6204	Tomra Pacific Sac 1	8100 Signal Ct	Sacramento, CA 95824	RUSSEL Brown	916-381-6861	Tomra Pacific Inc	40595 Albrae St	Fremont, CA 94538	Adrian White		Acres
5S34I020274	April	Atlas Disposal Industries LLC	3000 Power Inn Road	Sacramento, CA 95826	Nick Sikich	916-455-2800	Atlas Disposal Industries LLC	3000 Power Inn Road	Sacramento, CA 95826	Nick Sikich	916-455-2800	Atlas Disposal Industries LLC	3000 Power Inn Road	Sacramento, CA 95826	Nick Sikich	4.55	Acres
5S34I018100	April	Raynguard	8280 14th Ave	Sacramento, CA 95826	RICH Rayner	916-454-2560	Raynguard	8280 14th Ave	Sacramento, CA 95826	RICH Rayner	9164542560	Raynguard	8280 14th Ave	Sacramento, CA 95826	RICH Rayner	1	Acres
5S34I014772	October	Pacific Adhesives Comany Inc	8670 23rd Ave	Sacramento, CA 95826	Jon Fudim	916-383-1509	Pac Adhesives Comany Inc	8670 23rd Ave	Sacramento, CA 95826	Jon Fudim	916-383-1509	Pacific Adhesives Comany Inc	8670 23rd Ave	Sacramento, CA 95826	Jon Fudim	111300	Sq.Feet
5S34I021564	April	INX International Ink CO INC	150 N Martingale Rd STE 700	Schaumburg, IL 60173	Kevin Facklam	630-382-1859	INX International Ink CO INC	2930 Ramona Ave	Sacramento, CA 95826	Abel Ramirez	916-454-4048	INX International Ink CO INC	2930 Ramona Ave	Sacramento, CA 95826	Abel Ramirez	11400	Sq.Feet
5S34I001355	April	Granite Construction Co	4001 Bradshaw Rd	Sacramento, CA 95827	Laurie Brajkovich	916-855-4400	Granite Const Co Bradshaw Fac	4291 Bradshaw Rd	Sacramento, CA 95827	Laurie Brajkovich		Granite Construction Co Bradshaw Fac	P.O.BOX 15287	Sacramento, CA 95851	Laurie Brajkovich	289	Acres
5S34I022421	October	Sacramento Area Sewer District SASD	10060 Goethe Rd	Sacramento, CA 95827	Maria Cablao	916-875-6862	Sacramento Area Sewer District SASD	10060 Geothe Rd	Sacramento, CA 95827	Maria Cablao	916-875-6862	Sacramento Area Sewer District SASD	10060 Geothe Rd	Sacramento, CA 95827	Maria Cablao	24.3	Acres

NPDES Industrial Stormwater Permittee List for the American River

WDID	Billing Month	Operator Owner Name	Operator Address	Operator City_State	Operator Contact	Operator Phone	Facility Name	Facility Location	Facility City_State	Facility Contact	Facility Phone	Billing Name	Billing Address	Billing City_State	Billing Contact	Facility Size	Facility Size Unit
5S34I021994	January	United Parcel Service	1380 Shore St	West Sacramento, CA 95691	Steven Carter Herman Meyer	916-373-7250	UPS Rancho Cordova	3930 Kristi Ct	Sacramento, CA 95827	Herman Meyer	916-373-7250	United Parcel Service	1380 Shore St	West Sacramento, CA 95691	Steven Carter	14	Acres
5S34I015949	July	United Rentals Northwest Inc	791 East 64th Ave	Denver, CO 80229	Grant Zoldowski	916-922-9895	United Rentals Inc	625 Display Way	Sacramento, CA 95838	MICHAL Gregory	9169229895	United Rentals Inc	PO Box 30129	College Station, TX 77842	Michal Gregory	5	Acres
5S34I021556	April	B&G Delivery System Inc	2549 Harris Ave	Sacramento, CA 95838	Scott Allger	916-921-4401	B&G Delivery System Inc	2549 Harris Ave	Sacramento, CA 95838	Scott Allger	916-921-4401	B&G Delivery System Inc	2549 Harris Ave	Sacramento, CA 95838	Scott Allger	2.25	Acres
5S34I004043	April	Guy, Jeff	716 Bell Ave	Sacramento, CA 95838	JEFF Guy	916-922-8833	A&M Auto Wreckers LLC	716 Bell Ave	Sacramento, CA 95838	JEFF Guy	9169228833	A & M Dismantling Inc	716 Bell Ave	Sacramento, CA 95838	JEFF Guy	2	Acres
5S34I019129	October	Ebara Technologies Inc	51 Main Ave	Sacramento, CA 95838	PRIYA Cooper	916-920-5451	Ebara Technologies Inc	51 Main Ave	Sacramento, CA 95838	PRIYA Cooper	9169205451	Ebara Technologies Inc	51 Main Ave	Sacramento, CA 95838	PRIYA Cooper	353000	Sq.Feet
5S34I001547	April	Robinson, Peggy L	8800 Nimbus Way	Orangevale, CA 95662	PEGGY Robinson	916-929-8833	Great American Stage	3560 Western Ave # A	Sacramento, CA 95838	ROBBIE Robinson	9169298833	Robinson, Peggy L	8800 Nimbus Way	Orangevale, CA 95662	PEGGY Robinson	13250	Sq.Feet
5S34I005979	April	Fed Ex	3950 Development Dr	Sacramento, CA 95838	RICH Frost	916-923-1479	Fed Ex	3950 Development Dr	Sacramento, CA 95838	KEVIN Davis	9169231479	Fed Ex EMD	3620 Hacks Cross Rd Bldg B 2nd Fl	Memphis, TN 38125	Bill Gebhart	2000	Sq.Feet
5S34I016056	July	Sacramento Cnty	10545 Armstrong Ave Ste 200	Mather, CA 95655	Dave Casey	916-875-4209	Sac Cnty Corp Yard	4000 Bradshaw Rd	Sacramento, CA 95842	Dave Casey	916-875-4209	Sacramento Cnty Dept of General Serives	10545 Armstrong Ave Ste 202C	Mather, CA 95655	Yolanda Grigsby	33	Acres
5S29I021447	January	Teichert Construction	PO Box 276830	Sacramento, CA 95828	John Purvis	916-386-6800	Temporary Concrete Batch Plant	19749 Boreal Ridge Rd	Soda Springs, CA 95728	John Purvis	530-426-3240	Teichert Construction	PO Box 276830	Sacramento, CA 95828	John Purvis	12	Acres

UPDATE ON CLIMATE CHANGE
Lower American River Joint Source Water Protection Program
Watershed Sanitary Survey Follow Up

As follow up to the 2008 Update to the American River Watershed Sanitary Survey the Lower American River Joint Source Water Protection Program elected to continue to track developments on climate change impacts and management. This is of critical importance because many of the potential impacts of climate change have the potential to cause long-term changes in the source water of the American River. Possible changes impacting source water quality include; reduced snowpack volume, change in timing of precipitation, increased risk of wildfires, and longer water storage times in reservoirs. Some of these changes may result in treatment challenges or paradigm shifts on processes used to treat surface water in Northern California.

This memorandum provides;

- A general background on climate change,
- Summaries of international and national assessments,
- Specific information on California assessments and management strategies,
- Resources for water utilities to plan for managing impacts, and
- Recommendations for the Joint Source Water Protection Program partners.

CLIMATE CHANGE BACKGROUND

Climate is defined as expected average conditions, plus the characteristic range of variability of those conditions. Therefore, climate change is the expected difference in the likelihood of types of weather events. The climate system includes the atmosphere, oceans, ice, land, vegetation, and freshwaters. A change in any part of the system can cause global and regional changes to climate. The sun is the energy source that drives the climate system. Greenhouse gases (GHGs) include water vapor, carbon dioxide, methane, nitrous oxides, and human-made chemicals such as chlorofluorocarbons. As these GHGs are emitted into the atmosphere they trap infrared radiation in the atmosphere and cause increases in air, land and water temperatures, also known as global warming.

INTERNATIONAL AND NATIONAL ASSESSMENTS

The United Nations Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by two organizations: the World Meteorological Organization and the United Nations Environment Program. The purpose of the IPCC was to evaluate the risk of climate change caused by human activity. Four assessment reports have been completed by the IPCC since its inception. In its Fourth Assessment Report: Climate Change 2007, the IPCC confirms dramatic changes to our water resources and identifies GHG emissions as the predominant contributor to global warming and resulting regional climate change. IPCC is currently conducting its Fifth Assessment Report, expected in October 2014.

The IPCC's Fourth Assessment Report presented the Earth's average temperature data over 140 years. The data showed that since the late 1970s there has been a consistently increasing trend in temperature, about 1.3 degrees Fahrenheit over the 20th century. This increasing trend has been accelerating faster in more recent years. The IPCC concluded in the Report that within 90 percent certainty the warming over the last 50 years is human induced, attributable to the increased level of GHGs in the atmosphere. The IPCC documented seven global temperature models that estimate the Earth's average temperature, with the increase ranging from 2.7 to 8.1 degrees Fahrenheit over the next century. Some regional models show temperatures in California increasing as much as 10.8 degrees Fahrenheit. If Earth's temperature rises, it is expected that water demands would increase and that could result in a longer season of peak treated water demands. It is also possible that increased demands would need to be met through the use of alternate sources, such as recycled water.

National Research Council – No significant updates since June 2011

The National Research council released the fifth and final report for America's Climate Choices, a series of studies requested by Congress. The report advocates for a coordinated national response to climate change, which should be guided by iterative risk management framework. The report concludes that although current efforts by state, local, and private entities are important, these efforts are unlikely to yield outcomes comparable to what could be achieved with a strong federal effort. The report outlines the main components of an effective national response to climate change:

- Substantially reduce greenhouse gas emissions
- Begin mobilizing now for adaptation (develop new tools and institutions to manage climate-related risks)
- Invest in science, technology, and information
- Participate in international climate change response efforts
- Coordinate national response efforts.

United States Geological Survey

The USGS recently published a report entitled "Strengthening the Scientific Understanding of Climate Change Impacts on Freshwater Resources of the United States". The draft report was prepared in response to Section 9506 of Public Law 111-11 and it reviews key issues related to freshwater resource data and climate change. It also identifies next steps to improve the nation's capacity to detect and predict changes in freshwater resources that are likely to result from a changing climate. Those changes include:

- Increases in air and water temperature,
- Variation in annual rainfall and proportion of snowpack,
- Changes in timing of snowmelt runoff,
- Reduction in mass of water in glacier storage,

- Increased intensity of storm events,
- Rising sea level, and
- Changing quality of coastal and ocean waters.

The report includes findings and recommendations for modernizing data collection and management systems to allow for tracking of long-term impacts caused by climate change.

The USGS and other academia completed a climate change assessment for the Bay Delta system in November 2011 entitled "Projected Evolution of California's San Francisco Bay-Delta River System in a Century of Climate Change." The study evaluated two very different scenarios for climate change: one where greenhouse gas emissions are curtailed by 2050 and one where greenhouse gases are continually increasing. The models predicted nine environmental indicators (air temperature, precipitation, sea level, unimpaired runoff, snow melt contribution, Sacramento River temperature, Delta temperature, salinity, and suspended sediment) from 2010 to 2099 under both scenarios. The study found that some indicators were less sensitive to changes in the climate system due to changes in greenhouse gases emissions. For example, salinity increase, snowmelt decline, and suspended sediment were similar in both scenarios; therefore, they are relatively insensitive to predicted changes in greenhouse gas emissions. However, the majority of environmental indicators responded more rapidly to the scenario where greenhouse gases were continually increasing.

Regional planners and resource managers should consider adaptation strategies for increasing air and water temperature, sea level and salinity intrusion, and shifts towards more runoff in winter and less in spring-summer. Model results suggest that the large annual variability of precipitation will persist, even as longer-term trends of warming and possibly drying occur. Therefore, water-resource planning should also include contingencies for longer dry seasons, extended droughts, and extreme floods due to shifts from snow and rain.

There will be an increase in the frequency of extreme events; therefore resource planning will need to develop new probabilistic models to assess environmental changes and their uncertainty.

Bureau of Reclamation

The Bureau of Reclamation (Reclamation) recently released a new report on climate change "SECURE Water Act Section 9503c) – Reclamation Climate Change and Water 2011." The report concludes that projected changes in temperature and precipitation are likely to affect the timing and quantity of runoff in the Sacramento and San Joaquin river basins during the 21st century.

http://www.usbr.gov/climate/SECURE/docs/SECUREWaterReport.pdf

Eight western river basins were studied for the report. For the Sacramento and San Joaquin river basins, annual precipitation is expected to be highly variable over the next century, with runoff expected to decline slightly in the latter half of the century. Mean annual runoff is projected to increase by 2.5 percent in the Sacramento River Basin and a decrease by 8.7 percent in the San Joaquin River Basin by 2050.

According to the report, climate change-related surface water decreases are likely to put significant pressure on groundwater basins, and warmer conditions could place stress on fisheries, reduce salmon habitat, increase demands for instream flows, and increase the prevalence of invasive species. The report concludes that "Based on current reservoir operations constraints, (e.g. capacity, flood control rules), shifts in seasonal runoff likely would lead to reduced water supplies." This expectation is based on current operating conditions that limit storage opportunities during winter runoff. Another important operational concern is that some reservoirs are operated to release cold water during the late summer and early fall months to provide suitable habitat for anadromous fish survival. With climate warming, the quantity of suitable cold water in storage is likely to decrease even as the need for this water, due to higher river water temperatures, is likely to increase. More analysis is required to identify the spectrum of seasonal runoff events relevant to current flood control operations, and how current reservoir operating procedures may or may not be challenged in managing future events.

In response, Reclamation and the California Department of Water Resources (DWR) have begun to coordinate closely on the development of common methods, shared data, and modeling tools along with coordinated stakeholder outreach activities between DWR's California Water Plan and Reclamation's Central Valley Integrated Resource Plan. In the near future, additional coordination with DWR and other partners will likely be expanded to develop climate analysis tools.

In summary, both DWR and Reclamation are well aware that operational changes will need to be made for their respective water systems to address climate change. Specific recommendations are currently being developed.

Reclamation's Research and Development program has also developed a website on developing long-term adaptation options:

http://www.usbr.gov/research/climate/long-term/developing_adaptation_options.html

This page will be updated in the future to include a list of Research and Development activities that relate to developing adaptation options, or improving methods to screen such options. As an example, the Research and Development program is developing methods to: screen candidate facilities to receive retrofits designed to permit pumped storage, develop optimized scheduling of hydropower generation in order to get the most renewable energy out of power plants, and improve water demand forecasts as agricultural growing seasons lengthen and urban heating and cooling needs increase.

CALIFORNIA ASSESSMENTS AND ACTIONS

Since the climate system includes freshwaters, changes to air and land temperatures will have an impact on the timing, amount, type and location of precipitation and runoff in the Sacramento River watershed. In fact, DWR has documented a slight increase in temperature (one degree Fahrenheit) and an increase in annual precipitation (one inch) in the Sacramento River watershed over the 20th century. DWR research from 1901 to 2000 shows that the Sacramento River system runoff volume has remained stable on an annual basis, but there has been a nine percent reduction in runoff from April through July. This is likely the result of increased winter rainfall and less snowpack storage. DWR also estimate that for each one degree Celsius increase in Earth's temperature, the Sierra snowpack will retreat 500 feet. This will mean an increase in wet season runoff and less available storage under current operations.

In June 2005 Governor Schwarzenegger issued Executive Order S-3-05, which established GHG emission targets for 2010 (reduce to 2000 levels), 2020 (reduce to 1990 levels), and 2050 (reduce to 80 percent below 1990 levels). It also required a biennial report on potential climate change effects, including those to water resources, to be prepared by the Governor's Climate Action Team.

California Department of Water Resources (DWR)

In compliance with Executive Order S-3-05, DWR created a Climate Change Technical Advisory Group. The Climate Change Technical Advisory Group prepared information for incorporation into the 2009 Water Plan, identified adaptation strategies for the 2009 Water Plan, and coordinated with the Governor's Climate Action Team.

Climate change was identified in the 2005 Update of the California Water Plan (Bulletin 160-05) as a key consideration in planning for the State's future water management. The 2005 Water Plan update qualitatively described the effects that climate change might have on the State's water supply. It also described efforts that should be taken to quantitatively evaluate climate change effects for the next Water Plan update. As part of the 2009 Water Plan, DWR has identified some anticipated changes on the western slope of the Sierra Nevada, these include:

- Increase in temperature (expected to be at least 2.5 degrees Fahrenheit over the next century),
- Slight increase in annual precipitation, with larger and more intense storms resulting in flood conditions, and longer drought periods,
- Decrease in snowpack at lower elevations (DWR projects a 25 to 40 percent reduction in the Sierra snowpack by 2050),
- Earlier timing for spring season runoff,
- Elevation of sea level,
- Increase in evapotranspiration,
- Changes in flora and fauna, and

- Increase in forest fire risk.

The preliminary modeling results that DWR has conducted for the Central Valley Project indicates that there would be significant shortages of water in drought years in North of the Delta operations. Current flood control operations would prevent the capture of increased winter runoff and operational changes would be required to avoid shortages. For this reason, it is possible that water management in Northern California could be revised and possible impacts on source water quality include:

- Increase in water temperature,
- Increase in nutrient loading and eutrophication, possibly increases in TOC related to increased algae presence,
- Increase in sediment and pathogen transport and non-point source pollution caused by significant storm events, and
- Increased amount of wastewater/runoff into receiving waters.

DWR's 2050 Vision strongly supports the development of Integrated Resource Water Management Plans as well as State-wide water and flood coordination. The 2009 Water Plan's Implementation Plan includes a task to protect water quality. In addition, DWR has highlighted some key adaptation strategies in order to meet the goals in the plan. This includes an Interagency Task Force to evaluate the statewide system re-operation for both state and federal facilities (see discussion below).

DWR Water Plan Follow Up - The DWR Water Plan website was reviewed and there is new information posted on the 2013 Water Plan. The public review draft of Update 2013 is expected to be released in spring 2013. The final draft will be prepared and published at the end of 2013. The website states that Update 2013 will have an improved discussion of climate change, with greater detail and regionally specific climate change information and adaptation and mitigation strategies.

DWR System Reoperation Study - Senate Bill X2 1 (Water Quality, Flood Control, Water Storage, and Wildlife Preservation) directed DWR to conduct feasibility studies to identify potential options for reoperation of the state's flood protection and water supply systems that will optimize the use of existing facilities and groundwater storage capacity. The studies will incorporate appropriate climate change scenarios.

A website for the System Reoperation program (http://www.water.ca.gov/system_reop/) went live in May 2011. However, the website does not currently contain information such as project updates, completed documents, and stakeholder meetings.

A presentation on the System Reoperation Study was given at the Water Plan Plenary Meeting on October 27, 2011. The presentation covered the background and status of the study. There are four phases for the study:

- Phase 1 – Plan of Study
- Phase 2 – Strategies Formulation and Refinement

- Phase 3 – Reconnaissance-level Assessment
- Phase 4 – Feasibility-level Assessment

As of June 2012, Sean Sou (DWR Project Manager) indicated that Phase 2 is expected to be completed within one or two more months. DWR is currently going through the process of ranking and prioritizing twenty or more strategies with system experts such as academia, facility owners and operators, and state and federal agencies. Phase 2 is taking longer than expected as DWR is asking the facility owners to participate directly in the study. The goal of Phase 2 is to select five strategies for reconnaissance-level assessment in Phase 3. The completion date for the study is 2014.

Other DWR Climate Change Activities - In addition to the 2013 Water Plan and the System Reoperation Study, the DWR Climate Change Program recently formed a standing technical advisory group on climate change impacts and adaptation that would serve the Water Plan and all other DWR programs. Other duties of the advisory group are to conduct a scientific review of climate change models and scenarios, interpret scientific information produced by the National Climate Assessment and the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, and informing climate change policies. The 11 member panel was selected in February 2012 and had their first meeting in March 2012.

DWR also released its Draft Greenhouse Gas Emissions Reduction Plan and associated Initial Study and Draft Negative Declaration in March 2012. The plan shows how DWR will make substantial reductions in its GHG emissions in the near and long-term. The near-term goal is to reduce emissions by 50 percent below 1990 levels by 2020, and the long-term goal is to reduce emissions by 80 percent below 1990 levels by 2050. DWR has identified eleven GHG emissions reduction measures which include: DWR's termination of its interest from a coal-fired power plant, efficiency improvements to DWR's existing facilities, purchase and development of renewable and high efficiency electricity supplies, and improvements to DWR's construction practices and business activities.

In November 2011, DWR, USEPA, Resources Legacy Fund, and the US Army Corps of Engineers developed the Climate Change Handbook for Regional Water Planning, which provides a framework for considering climate change in water management planning.

California Climate Adaptation Strategy - No significant updates since June 2011

In November 2008, Governor Schwarzenegger issued Executive Order S-13-08 which requires the State to develop a plan to reduce vulnerability to climate change. The plan is going to focus on mitigation as well as adaptation. The Order required development of a Climate Adaptation Strategy, which incorporates the DWR adaptation strategies developed to meet their Implementation Plan. The 2009 California Climate Adaptation Strategy (CAS) summarizes the best known science on climate change impacts in seven specific sectors (Public Health; Biodiversity and Habitat; Ocean and Coastal

Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure) and provides recommendations on how to manage against those threats.

The CAS Executive Summary outlines some areas/ideas which may impact source water quality:

- Expansion of surface and groundwater storage to address limited water supply.
- State to develop a plan for expanding existing protected areas or altering land and water management practices to minimize adverse effects from climate change phenomena.
- Changes to fire program planning by state firefighting agencies in anticipation of climate change.

The California Natural Resources Agency and participating agencies have developed a first-year progress report on implementation of the 2009 California Climate Adaptation Strategy. Some notable accomplishments completed under the Water Management Sector were:

- In November 2009, the Governor signed the Comprehensive Water Package legislation, which required monitoring of groundwater elevations throughout California, and established a new governance structure for the Sacramento-San Joaquin Delta.
- DWR is developing a Climate Action Plan which will provide for programmatic coverage of most DWR activities for compliance with the new CEQA guidelines for climate change. Also, local water agencies that file Urban Water Management Plans with DWR will need to consider climate change mitigation and adaptation.
- In September 2010, DWR established sustainability targets for all its operations and programs, including a 20 percent reduction in water use and a 50 reduction in carbon emissions by 2020.
- DWR and the State Board are working to develop and post a database for stakeholder information on water conservation, water recycling, and stormwater capture/use.

The State of California partnered with the Pacific Council on International Policy to convene a task force on California's Adaptation to Climate Change. This task force, comprised of 23 prominent business, labor, government and private sector leaders was formed to act as the Climate Adaptation Advisory Panel to the State. The panel was responsible for developing recommendations for consideration by the Governor and his administration, the legislature and other stakeholders to address the long-term challenge that climate change brings. The task force focused on three key hazards that are most likely to have an increasing impact on California as the climate changes:

- Increased wildfires and extended fire seasons
- Rising sea levels along 1,100 miles of coastline

- Reduced availability of water with reduced snowpack in the Sierras and extended periods of drought

The Climate Adaptation Advisory Panel completed a final report "Preparing for the Effects of Climate Change – A Strategy for California" in November 2010. The following are highlights of importance to source water supplies from the report:

- Improve flood management infrastructure, reinforce and update storage and conveyance equipment, re-engineer flood management practices to better respond to changes in the hydrological cycles (timing of run-off), and to develop release criteria to support downstream planning.
- Increase protection of groundwater resources through stricter regulations of chemical and waste disposal containment laws.
- Ensure/expand the capture, storage, and recycling of wastewater, storm water, and flood water.
- Expand surface and groundwater storage and recharge programs. Climate change will reduce the Sierra Nevada snowpack, and this storage must be replaced by surface and groundwater storage.

RESOURCES FOR WATER UTILITIES RELATED TO CLIMATE CHANGE

The USEPA has a National Water Program Strategy: Response to Climate Change which was originally developed in March 2008 and is currently undergoing updating. The current update is discussed below. The USEPA has subsequently developed the Climate Ready Water Utilities initiative to assist water and wastewater utilities in becoming "climate ready." This supports the implementation of plans and adaptation strategies at water and wastewater utilities through the development of tools and other resources that account for potential climate change impacts and build water sector resilience. That is discussed below as well. Finally, USEPA Region 9 has developed some additional options for water systems losing snowpack which is discussed below.

USEPA National Water Program Strategy

The purpose of the National Water Program Strategy is to provide an overview of the impacts of climate change on water resources and the ability to meet clean water and drinking water standards. In addition, it presented an initial effort to evaluate ways to meet clean water and safe drinking water goals in the context of a changing climate.

In March 2012, USEPA published a "National Water Program 2012 Strategy: Response to Climate Change." The 2012 Strategy is an updated version of the strategy developed in 2008. The strategy has a 3 tier framework, with Tier I consisting of five Visions, Tier II consisting of 19 goals, and Tier III consisting of 51 strategic actions. Both Tier I and Tier II are long-term, with implementation 10 to 30 years out, yet Tier III describes the near-term actions that USEPA will take over the next three to eight years to ensure a climate ready national water program. As this outlines a strategy for USEPA, there is

little that is directly implementable at the utility level. However, review of this document provides insight into changes that are underway at the national level.

The five visions pertain to the areas of Infrastructure, Watershed and Wetlands, Water Quality, Coastal and Ocean Waters, and Working with Tribes. The following is a list of USEPA actions that are of interest to the Lower American River Joint Source Water Protection Program.

Under the Infrastructure Vision, the action items outline how the USEPA plans to continue assisting the water sector in achieving public health in light of climate change. Under the Climate Ready Water Utilities initiative, the National Water Program will deploy an upgraded version of the Climate Ready Evaluation and Awareness Tool (CREAT) as well as a comprehensive toolbox of water-related climate resources by the end of 2012. USEPA will also research aquifer storage and recovery practices that do not endanger underground sources of drinking water, encourage water reclamation and reuse, and provide technical assistance to reduce water loss.

Under the Water Quality Vision, a majority of the action items are related to incorporating climate change into future NPDES permits, Total Maximum Daily Loads, and aquatic life criteria. These items appear to be related primarily to the work of the Regional Boards. However, it is noted that the USEPA will work with federal agencies such as the Bureau of Reclamation and the US Army Corps of Engineers to better understand how climate change affects the amount, timing and temperature of water used for hydropower. Also, the USEPA will work to make hydrological and climate data and projections for water resource management available, and will develop and standardize a process to revise precipitation, temperature, and storm event data nationwide. Of particular concern are the storm frequency, duration, and intensity estimates (e.g. 10 year and 24 hour storm events; and 100 year, 24 hour storm events) and low flow conditions in rivers.

The 2012 Strategy also outlines that the long term goals of the USEPA in the Southwest region are to work with federal, State, and local partners to:

- Increase infiltration,
- Protect water quality to reduce stress on the ecosystem,
- Encourage communities and utilities to conduct vulnerability assessments and implement resulting recommendations, and
- Work with partners and stakeholders to evaluate future drought and flood impacts on water resources as well as infrastructure resilience.

USEPA Climate Ready Water Utilities

The USEPA developed the Climate Ready Water Utilities (CRWU) initiative to assist water and wastewater utilities in becoming “climate ready.” CRWU supports the implementation of plans and adaptation strategies at water and wastewater utilities

through the development of tools and other resources that account for potential climate change impacts and build water sector resilience. There are several tools available for the water utilities (http://water.epa.gov/infrastructure/watersecurity/climate/):

- Climate Resilience Evaluation and Assessment Tool (CREAT) – This software allows utilities to evaluate potential impacts of climate change.
- Climate Ready Water Utilities Toolbox – This is a searchable library of resources to help with decision making related to climate change impacts/responses.
- Tabletop Exercise Tool for Water Systems – This planning tool includes a climate change scenario.

In fall 2009, USEPA convened a CRWU Working Group under the National Drinking Water Advisory Council (NDWAC). The final NDWAC report was completed in January 2011. The report includes eleven findings and twelve recommendations, an adaptive response framework to guide climate ready activities, and the identification of needed resources and possible incentives to support and encourage utility climate readiness.

In January 2012, USEPA released an Adaptation Strategies Guide, an interactive guide which assists drinking water and wastewater utilities in gaining a better understanding of what climate-related impacts they may face in their region, and what adaptation strategies can be used to prepare their system for those impacts. The guide also includes examples of utilities implementing adaptation options for their systems. A review of the Climate Region Brief for the Southwest indicated that the most relevant climate change challenges to drinking water utilities in the Southwest are:

- Changes in seasonal runoff and loss of snowpack
- High flow events and flooding
- Increased fire risk and altered vegetation
- Volume and temperature challenges
- Changes in agricultural water demand
- Changes in energy sector needs
- Changes in energy needs of utilities

The guide then provides adaptation strategies for each of the climate change challenges. The adaptation strategies are divided into three categories: 1) planning strategies, 2) operational strategies, and 3) capital/infrastructure strategies. As an example, the guide suggests adaptation strategies for the first climate change challenge listed above: Changes in seasonal runoff and loss of snowpack as shown in **Table 1**, below. Further explanation of each adaptation strategies can be found in the guide. Of course, all of the adaptation strategies many not be applicable. It is suggested that each utility consider using the worksheet in the guide to identify their specific climate change challenges.

USEPA Region 9

USEPA Region 9's primary focus has been on promoting sustainable infrastructure, especially through water and energy efficiency at water and wastewater facilities. This has been accomplished through developing tools, conducting workshops and webinars, and providing energy audits. A water infrastructure website provides case studies of successful energy and water efficiency, conservation, and generation projects.

http://www.epa.gov/region09/waterinfrastructure

Table 1. Adaptation Options to Address Seasonal Runoff and Loss of Snowpack

Planning Strategies	Cost
Develop models to understand potential water quality changes (e.g. increased turbidity) and costs of resultant changes in treatment	$
Use hydrologic models to project runoff and incorporate model results during water supply planning	$
Conduct training for personnel in climate change impacts and adaptation strategies	$
Participate in community planning and regional collaborations related to climate change	$-$$
Operational Strategies	
Monitor current weather conditions, including precipitation and temperature	$
Monitor surface water conditions, including river discharge and snowmelt	$
Finance and facilitate systems to recycle water, including use of greywater in homes and businesses	$$-$$$
Reduce agricultural and irrigation water demand by working with irrigators to install advanced equipment (e.g. drip or other micro-irrigation systems with weather-linked controls).	$$-$$$
Practice water conservation and demand management through water metering, rebates for water conserving appliances/toilets and/or rainwater harvesting tanks	$-$$
Capital/Infrastructure Strategies	
Acquire and manage ecosystems, such as forested watersheds, vegetation strips, and wetlands to regulate runoff	$$$
Build infrastructure needed for aquifer storage and recovery (either for seasonal storage or longer-term water banking)	$$$
Diversify options to complement current water supply, including recycled water, desalination, conjunctive use, and stormwater capture	$$$
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage	$$-$$$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams	$$-$$$
Retrofit intakes to accommodate decreased flow in source waters	$$-$$$
Build or expand infrastructure to support conjunctive use	$$$

RECOMMENDATIONS

Climate change impacts are expected to occur incrementally over a long period of time. The impacts vary by location but are most likely to result in reduced snowpack, a change in reservoir operations, and increased fire risk in the American River watershed. As part of the long-term operations of the water systems, the following tracking items are recommended:

- Continue to investigate climate change as a potential contaminant source in the Watershed Sanitary Surveys and consider an update mid-way between Sacramento and American River watershed sanitary surveys and updates on specific items as needed.
- Continue to coordinate with DWR to track the progress of the System Reoperation Study, checking on Phase 2 in September 2012 and Phase 3 in 2014.
- If the water utilities develop an adaptation or management strategy to address climate change issues then be sure to incorporate information created by the CRWU and USEPA Region 9.
- Consider completing the updated version of CREAT software when available at the end of 2012 to better understand climate change impact on the utility and evaluate adaptive options.