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American River Watershed Sanitary Survey

2003 Update

Prepared by:

ARCHIBALD & WALLBERG CONSULTANTS

In association with:

MWH

December 2003

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PROJECT TEAM

AMERICAN RIVER WATERSHED SANITARY SURVEY TECHNICAL COMMITTEE

Placer County Water Agency .... Craig James
Brian Martin
Wally Cable

El Dorado Irrigation District .... Steve Setoodeh
Lori Grace

City of Folsom .... Gordon Tornberg
Jim Bridges

Folsom State Prison .... Stan Muraki
Donna Kelly

San Juan Water District .... Mike O'Bleness

City of Roseville .... Ed Kriz

Arden Cordova Water Service .... David Lancaster

Carmichael Water District .... Steve Nugent

Sacramento Suburban Water District .... John Valdes

City of Sacramento .... Elissa Callman
Mike Yee
Roland Pang
Ron Myers

County of Sacramento Department of Water Resources .... Forrest Williams

East Bay Municipal Utility District .... David Bruzzone

CONSULTANTS

Archibald & Wallberg Consultants .... Jeanne Wallberg

MWH, Americas .... Bonny Starr

Project Assistant .... Ah'lai Phelps

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LIST OF ACRONYMS AND ABBREVIATIONS

ACWS	Arden Cordova Water Service
ARGET	American River GET
ARWG	American River Watershed Group
ARWTC	American River Watershed Technical Committee
BMP	best management practice
CALFED	consortium of California and federal agencies addressing restoration of the Delta's ecosystem health
Caltrans	California Department of Transportation
CCl4	carbon tetrachloride
CDFG	California Department of Fish and Game
CDO	cease and desist order
CDPR	California Department of Parks and Recreation
CFE	combined filter effluent
CMOM	capacity, management, operation, and maintenance
CMP	Sacramento Coordinated Monitoring Program
CRMP	Coordinated Resources Management Plan
CSUS	California State University at Sacramento
CT	contact time
CUWA	California Urban Water Agencies
CWD	Carmichael Water District
D/DBP	disinfectants/disinfection by-product
DAPI	4'6-diamidino-2-phenylindole
DBP	disinfection by-product
DCA	dichloroethane
DCE	dichloroethene
DHS	California Department of Health Services
DOC	dissolved organic carbon
E. coli	*Escherichia coli*
EBMUD	East Bay Municipal Utility District
EID	El Dorado Irrigation District
EPA	United States Environmental Protection Agency
Folsom	City of Folsom
FSP	Folsom State Prison
GAC	granular activated carbon
GET	groundwater extraction and treatment
GIS	geographic information system

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

HAA	haloacetic acid
HAA5	sum of five haloacetic acids
I & I	infiltration and inflow
ICR	Information Collection Rule
IFE	individual filter effluent
IOC	inorganic chemical
LRAA	locational running annual average
Mather AFB	Mather Air Force Base
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDC	McDonnel Douglas Corporation
MG	million gallons
mg/L	milligrams per liter
MGD	million gallons per day
m-L/mg	meter-liter per milligram
MPN	most probable number
MTBE	methyl tert-butyl ether
MWDSC	Metropolitan Water District of Southern California
NDMA	n-Nitrosodimethylamine
ng/L	nanograms per liter
NIPDWR	National Interim Primary Drinking Water Regulations
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
PAC	polyaluminum chloride
PCE	perchloroethylene
PCR	polymerase chain reaction
PCWA	Placer County Water Agency
PG&E	Pacific Gas and Electric Company
PHG	Public Health Goal
PQL	practical quantitation limit
RAA	running annual average
RCD	Resource Conservation District
Roseville	City of Roseville
RWQCB	Regional Water Quality Control Board

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SFARWG	South Fork American River Watershed Group
SJWD	San Juan Water District
SOC	synthetic organic chemical
SRA	State Recreation Area
SRCSD	Sacramento Regional County Sanitation District
SSO	sanitary sewer overflow
SUVA	specific ultraviolet absorbance
SWTR	Surface Water Treatment Rule
TCD	temperature control device
TCE	trichloroethylene
THM	trihalomethane
TOC	total organic carbon
TTHM	total trihalomethanes
μg/L	microgram per liter
UC Davis	University of California at Davis
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UV254	ultraviolet light at 254 nanometers
VOC	volatile organic chemical
WTP	water treatment plant

EXECUTIVE SUMMARY

Drinking water utilities that use a surface water source are required, under the California Surface Water Treatment Rule (SWTR), to conduct a sanitary survey of that source's watershed. Furthermore, the survey must be updated every five years. The initial sanitary survey of the American River watershed was completed in 1993 and the first update was completed in 1998. This is the second update, covering the period from 1998 through 2002.

The American River water utilities are a diverse group with individual concerns; however, they also have common interests that arise from sharing the same source water:

- Erosion in the upper watershed, recreational use of the river system, and sanitary sewer overflows (SSOs) are of interest to all the water utilities.
- The Folsom Lake water utilities diverting at Folsom Dam have a shared interest in the potential water quality effects of the temperature control device (TCD) now operating at the dam.
- Urban runoff discharges are of increasing interest to the Folsom Lake water agencies and of continued interest to water utilities that divert from the Lower American River.
- The Lower American River water utilities are interested in Aerojet treated groundwater discharges and share concerns about several sanitary issues along the Lower American riparian corridor.

Following the 1998 Update, the American River water utilities continued to meet periodically as a group, called the American River Watershed Technical Committee (ARWTC). As a group, the ARWTC has more influence than as individual utilities to affect source water protection efforts related to their common interests. The ARWTC also collectively has more resources to directly support selected protection efforts. Two outstanding accomplishments of the ARWTC between 1998 and 2002 are the development of spill notification procedures for the water utilities along the entire American River system and implementation of the Pumpout and Restroom Campaign at Folsom Lake and along the Lower American River. Twelve ARWTC members joined together to conduct this 2003 Update.

ARWTC Sponsors of the 2003 Update

Placer County Water Agency	Arden Cordova Water Service
El Dorado Irrigation District	Carmichael Water District
City of Folsom	Sacramento Suburban Water District
Folsom State Prison	City of Sacramento
San Juan Water District	County of Sacramento Department of Water Resources
City of Roseville	East Bay Municipal Utility District

2003 Update Objectives

The overall goal of this 2003 Update, as with the previous surveys, is to assess the ability of the water utilities using American River water to provide drinking water that meets all current and expected drinking water standards. Specific objectives are to identify source water quality characteristics and trends that affect operations at the water treatment plants, assess the effect of watershed activities and discharges on source water quality, and provide current information to assist each of the water utilities in maintaining drinking water quality and treatment regulatory compliance. Accomplishing these objectives involved a review of selected water quality parameters, watershed activities and discharges, and existing and anticipated drinking water regulations. Watershed activities and discharges were selected for review during the scoping phase. During scoping, input was obtained from the participating water utilities and the Department of Health Services.

Summary of Findings

Overall, the American River is an excellent quality source of drinking water. The raw water can be treated to meet all drinking water standards using conventional and direct filtration processes, as well as membranes. No persistently present constituents have been identified in the river that requires additional treatment processes.

Peaks in turbidity levels, numbers of microorganisms, and organic carbon concentrations occur during wet weather and storm events. Watershed runoff and discharges that contribute to these wet weather peaks include general upper watershed runoff, urban runoff, runoff from the Lower American riparian corridor, and occasional SSO spills. The ability to discern the relative contribution of any one wet weather runoff source or discharge from existing data remains limited. This limitation is due to inherent difficulties in obtaining comparable data for all the wet weather runoff sources and discharges that would allow for a valid comparison, and in clearly distinguishing the intermingled wet weather runoff and discharges within the river system.

Stewardship projects in the upper watershed are being formulated and implemented to reduce watershed erosion and thus reduce the solids load from upper watershed runoff. Considerable progress was made on these projects from 1998 through 2002, driven by stakeholder interest and supported by grant funds.

Topics Selected for Review

(As an update, the review focused on new information on issues of recent or continuing interest.)

Water quality parameters: turbidity, coliform, *Giardia* and *Cryptosporidium*, total organic carbon (TOC), organic chemicals, arsenic, hexavalent chromium, and distribution system levels of disinfection by-products.

Watershed activities and discharges: upper watershed stewardship programs, body contact recreation, conditions along the Lower American riparian corridor, urban runoff, Aerojet discharges, and spills.

Drinking water regulations: the Interim or Long Term 1 Enhanced SWTRs, Filter Backwash Rule, Long Term 2 Enhanced SWTR, Stage 1 and Stage 2 Disinfection By-Product Rules, and arsenic and hexavalent chromium regulations.

ARWTC Support of the Pumpout and Restroom Campaign

The Pumpout and Restroom Campaign is a public outreach effort to identify the locations of and promote the use of pumpouts and restrooms at Folsom Lake and river recreation areas in the Sacramento metropolitan area. The campaign centers on distribution of “give-aways” and brochures showing the location of pumpouts and restrooms. The Campaign was originated by the City of Sacramento along the Sacramento River in 2000 and was extended to Folsom Lake in 2001 and the Lower American River in 2002. Sponsoring agencies now include many members of the ARWTC, the City of West Sacramento, the California Department of Parks and Recreation (CDPR), and the County of Sacramento Department of Regional Parks, Recreation and Open Space.

The increasing urban population will continue to increase the total volume of urban runoff discharged to the river and extend the river reach affected by urban runoff further upstream. Urban runoff is the most likely source of most of the occasional low level detections of volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs) in the Lower American River. Urban runoff, as mentioned above, is also one of the wet weather sources of turbidity, microorganisms, and organic carbon. Urban runoff water quality is managed by local storm drainage collection system agencies under National Pollutant Discharge Elimination System (NPDES) permit. The Sacramento Stormwater Management Program covers the storm drainage collection system agencies within Sacramento County. This is a long-established program and includes efforts to specifically target sediment reduction, pesticide reduction, and fecal waste reduction. Smaller urban areas tributary to Folsom Lake are just coming under permit in 2003.

Based on information evaluated for this report, several sanitary issues exist along the Lower American riparian corridor. These include the expanded waterfowl population and the associated goose and duck waste at Lake Natoma, the prevalence and amount of dog waste along sections of the American River Parkway, and the continued (although reduced from previous years) trash and human waste associated with illegal camping in the most downstream reaches of the Lower American River.

A number of SSO spills occurred from 1998 through 2002, some of them quite large. Corrective steps have been taken by the individual sanitary sewer collection system agencies responsible for these spills. The City of Folsom (Folsom) sanitary sewer collection system now implements improvements under an NPDES permit. The pace and scope of other agencies’ collection system improvements will be affected by the requirements of new federal regulations that are expected to bring most sanitary sewer collection systems under NPDES permit.

Bacteria water quality data suggest that recreational use may at times correlate with elevated numbers of bacteria, but there is a limited ability to confirm the extent of any such effect. The effects of recreational use are especially difficult to ascertain since much of the contamination that occurs is within the river and therefore not directly observable. One observable effect occurs near the mouth of the American River, where congregations of boats during summer weekends can result in visible sewage contamination. The increasing urban population is likely to increase recreational use in the future.

Aerojet discharges are also regulated under NPDES permit. Of the principal contaminants of concern at the Aerojet Superfund Site (trichloroethylene [TCE], perchlorate, n-Nitrosodimethylamine [NDMA], and 1,4-dioxane) none have been detected at reportable levels in the American River from 1998 through 2002. Low levels of NDMA below the practical quantitation limit were detected on several occasions in the Folsom South Canal as well as a single low level detection of 1, 4-dioxane. Between 1998 and 2002, Aerojet installed additional facilities to more comprehensively treat the contaminants of concern. The volume of treated groundwater discharged to the American River has increased. Further changes may be determined as the location and volume of discharges continues to be discussed as part of an overall evaluation of groundwater reuse alternatives.

ARWTC Spill Notification Procedures

Over the past five years, ARWTC agencies have established or reinforced direct notification procedures with emergency response agencies, wastewater treatment plants, and other agencies in the American River watershed. The ARWTC also established communication procedures within the group that included (1) development of a phone tree, (2) working towards a standard spill reporting form, and (3) dry runs to test the communication procedures.

Recommendations

Two important recommendations relate to immediate operations at the water treatment plant. First, it is important for plant operators to continue to optimize treatment as per their operations plans to remove solids (thus potentially reducing levels of microorganisms and organic carbon), with optimization being most critical during wet weather and storm events. Second, the number of SSO spills highlights the continued need to maintain spill notification procedures so that water treatment plant operators have accurate and timely information to respond appropriately.

Other recommendations pertain to the water utilities' continued participation as stakeholders or as direct supporters of appropriate watershed efforts, including stakeholder participation in the upper watershed stewardship projects, involvement in operation of the TCD at Folsom Dam, support of efforts to promote a stewardship ethic among recreational users of the river system, support of projects to lessen impacts of several identified sanitary conditions along the Lower American riparian corridor (the State park at Lake Natoma and the County American River Parkway), and input into decisions on the discharge of Aerojet Superfund Site treated groundwater that have the potential to affect source water quality. Stakeholder participation is necessary to ensure that the water utilities' interests are appropriately considered and it is one of the principal means available to the water utilities to ensure that the excellent source quality of the American River is maintained into the future.

The report also makes monitoring recommendations where, for a minimal additional cost, a more comprehensive and consistent data set can be collected, enhancing the content of future watershed sanitary survey updates. These monitoring recommendations pertain to collection of *Giardia* as well as *Cryptosporidium* data, selecting *E. coli* over fecal coliform, and data to evaluate impacts of the Folsom Dam TCD.

Recommendations are more specifically described in Section 5.

Regulatory Considerations

To meet regulatory requirements, all the water utilities should continue to conduct Title 22 monitoring; track and record raw, recycled, individual filter and combined filter effluent turbidity data; collect weekly or monthly raw water coliform data; collect monthly raw and treated water TOC [except for El Dorado Irrigation District (EID) Strawberry Wastewater Treatment Plant (WTP), Folsom State Prison (FSP), Arden Cordova Water Service (ACWS) Coloma WTP, and the Carmichael Water District (CWD) Carmichael WTP]; and monitor the distribution system for total trihalomethanes (TTHMs) and the sum of five haloacetic acids (HAA5).

To meet regulatory requirements, all the water utilities (except EID Strawberry WTP and CWD Carmichael WTP) should submit a Recycle Statement to the California Department of Health Services (DHS) by December 2003. The San Juan Water District (SJWD) and City of Roseville (Roseville) should either return recycle water to the headworks upstream of all chemical feed or discuss alternative plans with the DHS.

The EID and the CWD will need to coordinate with the DHS to identify *Cryptosporidium* log-reduction credit for the Strawberry and Carmichael WTPs, respectively.

Most of the water utilities should prepare for collecting raw water *Cryptosporidium* and *E. coli* data as per the upcoming Long Term 2 Enhanced SWTR. The City of Sacramento should be able to grandfather the recently collected Method 1622/1623 data for the E. A. Fairbairn WTP. The EID Strawberry WTP, FSP, and CWD may opt out of this requirement if the DHS grants at least 5.5-log reduction credit for *Cryptosporidium* at their water treatment plants. Monitoring is to begin within six months of promulgation of the Rule.

All the water utilities that conduct *Cryptosporidium* monitoring should prepare for conducting disinfection profiling benchmarking for *Giardia* and viruses as per the upcoming Long Term 2 Enhanced SWTR.

All the water utilities should prepare for conducting the Initial Distribution System Evaluation as per the upcoming Stage 2 Disinfectants/Disinfection By-Product (D/DBP) Rule. The Placer County Water Agency (PCWA), Roseville, SJWD, and City of Sacramento, as wholesale systems, should coordinate this monitoring with their respective consecutive systems.

Depending on what levels the DHS sets, the DHS' development of a revised state Maximum Contaminant Level (MCL) for arsenic and a new state MCL for hexavalent chromium may affect the water utilities.

SECTION 1
INTRODUCTION

This report presents the findings of the American River Watershed Sanitary Survey 2003 Update, which covers the period 1998 through 2002. In accordance with the California SWTR, watershed sanitary survey updates must be developed every five years. The initial survey was completed in 1993 and the first update was completed in 1998. This is the second update.

This introductory section describes the 2003 Update objectives, lists the participating utilities that funded the update, and describes how the update was conducted.

1.1 2003 Update Objectives

The overall objective of this 2003 Update, as with the previous surveys, is to assess the ability of the water utilities using American River water to provide drinking water that meets all drinking water standards. The initial survey and the first update identified which constituents and watershed activities are of most interest to the American River water utilities from a water quality perspective. This second update describes new information and changes for the period 1998 through 2002 for those previously identified constituents and watershed activities, in the context of the current drinking water regulatory framework. Thus, this 2003 Update serves as a bridge between previous and future work by commenting on the findings of the 1998 Update, describing actions taken that address the 1998 Update recommendations, and providing recommendations (in some cases) that continue or build on previous recommendations. This 2003 Update also comments on issues worth tracking over the next five years.

The following selected topics are covered in detail:

- Water quality review: turbidity, coliform, *Giardia* and *Cryptosporidium*, TOC, organic chemicals, arsenic, hexavalent chromium, and distribution system levels of disinfection by-products.

- Watershed activities assessment: upper watershed stewardship programs, body contact recreation, conditions along the Lower American riparian corridor, urban runoff, Aerojet discharges, and spills. Mather Air Force Base (Mather AFB) discharges are also described since there had been consideration of discharge of treated groundwater from the former Mather AFB to the American River during the period 1998 through 2002.

- Regulatory compliance evaluation: the Interim or Long Term 1 Enhanced SWTRs, Filter Backwash Rule, Long Term 2 Enhanced SWTR, Stage 1 and Stage 2 Disinfection By-Product Rules, and arsenic and hexavalent chromium regulations. The compliance evaluation pertains to utilities that are currently diverting and treating American River water.

American River Watershed Characteristics

The watershed has an area of approximately 1,900 square miles, situated on the western slope of the Sierra Nevada, extending from the spine of the Sierra Nevada westward to the City of Sacramento.

Elevations range from above 10,000 feet in the high Sierra to 23 feet above mean sea level at the confluence of the American and Sacramento rivers. The highest elevations of the watershed are above the tree line. From east to west, as the watershed elevation decreases, vegetation is principally characterized by coniferous forests, oak-studded grasslands, and finally grasslands. Little native grasslands actually remain below Folsom Lake, having been replaced by urban landscaping.

The American River watershed climate is temperate and is characterized by wet winters and dry summers; ninety-five percent of the annual precipitation occurs between November and April as both rain and snow. The annual snowpack acts as a natural reservoir, releasing water over the spring and summer months.

The river is regulated by dams, canals, pipelines, and penstocks for power generation, flood control, water supply, and recreation. Folsom Dam, owned and operated by the U.S. Bureau of Reclamation, is the principal regulating reservoir. Folsom Lake and its afterbay, Lake Natoma, release water to the lower American River and to the Folsom South Canal. The operation of Folsom Dam directly affects most of the water utilities on the American River system.

The greater Sacramento metropolitan area extends from the City of Sacramento eastward along the Lower American River, and is contiguous with communities around Folsom Lake and along the Interstate 80 and U.S. Highway 50 corridors. Approximately 85 percent of the population in the watershed resides in this contiguous and expanding urban area.

The upper watershed lies in Placer and El Dorado counties and is characterized by high topographic relief, occasional wildfires, and low-density population. The Tahoe and El Dorado National Forests occupy much of the upper reaches of the Sierra Nevada. The foothills area is characterized by relatively small urban areas, limited agriculture, and open space.

Folsom Lake, which lies in Placer, El Dorado, and Sacramento counties, divides the upper watershed from the lower watershed. The Folsom Lake basin is partly urban and partly formed by the Folsom Lake State Recreation Area.

The land tributary to the Lower American River is urbanized but also includes a narrow riparian corridor. The Lower American riparian corridor, which lies in Sacramento County, is formed by the Lake Natoma Unit of the Folsom Lake State Recreation Area and the American River Parkway.

1.2 Participating Utilities

Twelve water supply utilities, with an interest in American River water quality, joined together under a Memorandum of Understanding to conduct this update. Nine of the utilities currently divert and treat American River water; three utilities, as noted below, do not. Of the nine utilities that currently treat American River water, one agency (EID) has two water treatment plants. Thus there are 10 intakes, shown on **Figure 1-1**, and 10 water treatment plants, summarized in **Table 1-1.**

Participating Utilities

1. Placer County Water Agency
2. El Dorado Irrigation District
3. City of Folsom
3. Folsom State Prison
5. San Juan Water District
6. City of Roseville
7. Arden Cordova Water Service
8. Carmichael Water District
9. Sacramento Suburban Water District [a]
10. City of Sacramento
11. County of Sacramento Department of Water Resources [b]
12. East Bay Municipal Utility District [b]

NOTES:
[a] From 1998 through 2002, the Sacramento Suburban Water District has relied solely on its groundwater rather than its American River water supply.
[b] The County of Sacramento and East Bay Municipal Utility District (EBMUD) are currently developing a water supply project on the Sacramento River, downstream of the American River confluence.

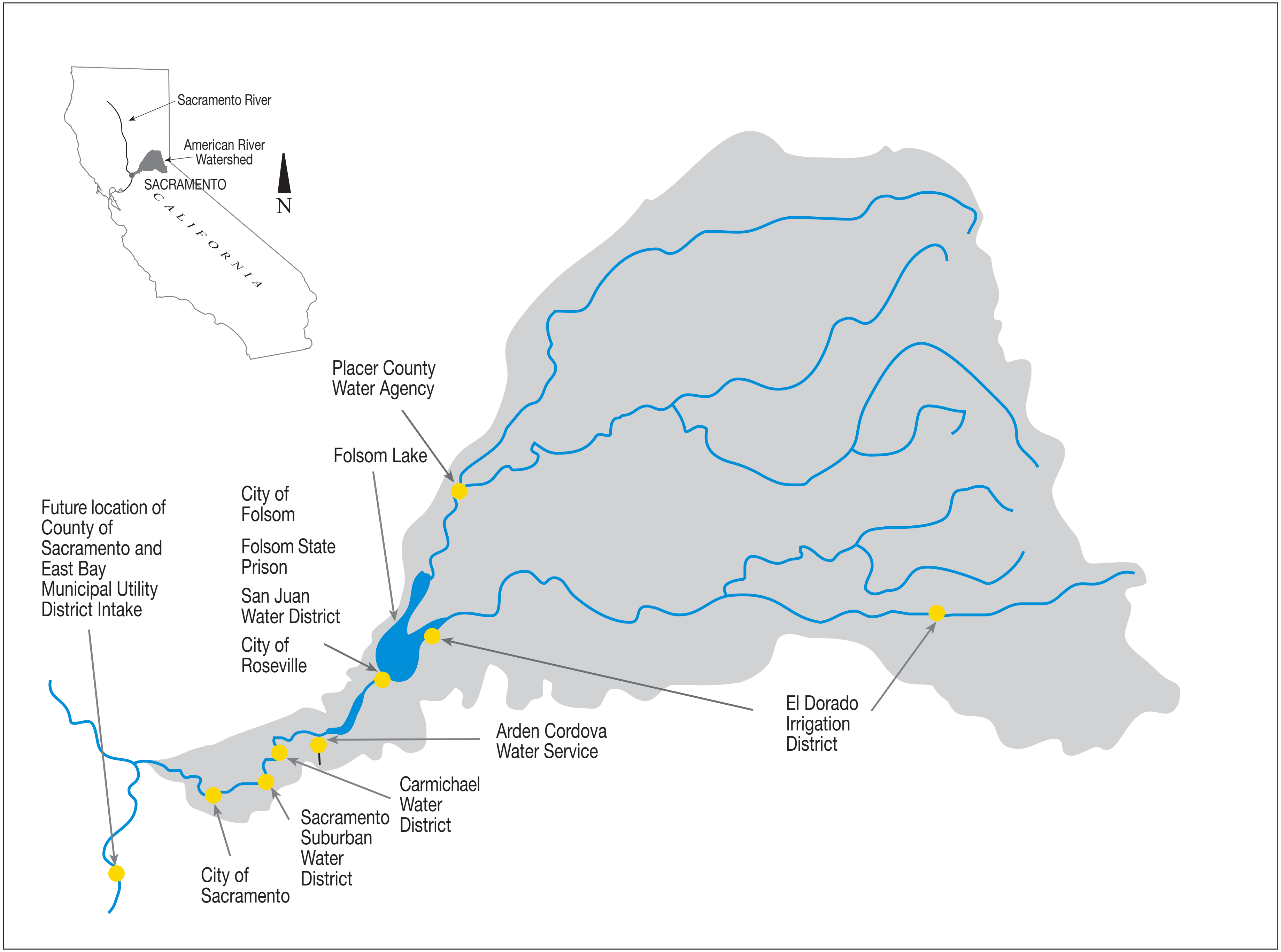


Figure 1-1. Water Utility Diversions Locations

1.3 Conduct of the Study

The project team consisted of a Technical Committee, comprised of representatives from the 12 water utilities, and a consultant team, consisting of Archibald & Wallberg Consultants and MWH, Americas. The City of Sacramento acted as project manager for the Technical Committee.

The scope of work was developed by the consultants with input from the Technical Committee, and was approved by the DHS.

In developing the 2003 Update, the consultants:

- Obtained water quality data and other information from each participating utility by conducting individual utility surveys.
- Obtained additional water quality data on the American River from the Sacramento Coordinated Monitoring Program (CMP), EBMUD, the Sacramento River Watershed Program, and the United States Geological Survey (USGS).
- Conducted tours of those treatment plants that had made process changes or added new facilities since 1998 including: PCWA, Folsom, Roseville, ACWS, CWD, and the City of Sacramento.
- Collected information on watershed activities through literature reviews, file reviews, and discussions with various agencies' staff. A list of agency contacts and a bibliography are included in Appendix A.

The Technical Committee participated in meetings with the consultants to discuss work in progress and reviewed and commented on the draft report.

Table 1-1. Summary of Water Treatment Plant Facilities

Utility	Intake Location	Water Treatment Plant Facility
Placer County Water Agency	North Fork of the American River approximately 3 miles downstream of the confluence with the Middle Fork of the American River.	Foothill WTP 55 MGD (40 MGD Train #1, 15 MGD Train #2) Train #1 - Conventional WTP with Sand Ballasted Clarification Train #2 - Conventional WTP
El Dorado Irrigation District	South Fork of the American River at the town of Strawberry.	Strawberry WTP 100 gpm Microfiltration Membrane WTP with Chlorination
	South Fork of the American River at the confluence with Folsom Lake.	El Dorado Hills WTP 18 MGD Conventional WTP with Upflow Clarifiers
City of Folsom	Folsom Lake at the combined Intake Facility at Folsom Dam.	Folsom WTP 40 MGD Conventional WTP
Folsom State Prison	Folsom Lake at the combined Intake Facility at Folsom Dam.	FSP WTP 4 MGD Direct Filtration WTP (Two-Stage Microfloc)

Table 1-1. Summary of Water Treatment Plant Facilities (continued)

Utility	Intake Location	Water Treatment Plant Facility
San Juan Water District	Folsom Lake at the combined Intake Facility at Folsom Dam.	Sidney N. Peterson WTP 120 MGD Conventional WTP with Tube Settlers
City of Roseville	Folsom Lake at the combined Intake Facility at Folsom Dam.	Roseville WTP 60 MGD Conventional WTP with Circular Upflow Clarifiers
Arden Cordova Water Service	Lower American River water is diverted at Nimbus Dam into the Folsom South Canal. The intake water is diverted at Folsom South Canal milepost 2.5.	Coloma WTP 11 MGD Direct Filtration WTP
Carmichael Water District	Lower American River water diverted using three Ranney Collectors located near River Mile 17.5, at Rossmoor Bar.	Carmichael WTP 16 MGD Microfiltration Membrane WTP with Chlorination
City of Sacramento	Lower American River at River Mile 7.5, near Howe Avenue bridge crossing.	E. A. Fairbairn WTP 100 MGD Conventional WTP

SECTION 2
AMERICAN RIVER WATER QUALITY

This water quality section reviews available American River monitoring data for selected drinking water constituents, for the period 1998 through 2002. The discussion begins with an overall review of river water quality, based largely on comparison to MCLs. A more detailed discussion of selected constituents follows. Then there is a discussion on the appropriate *Giardia* and virus reduction requirement, based on data collected over the past five years, and consideration of *Cryptosporidium* reduction requirements.

Table 2-1 shows the monitoring programs from which data was collected for this review. Some of the data is summarized and illustrated in this section. Individual water utility data is described further in Section 4. Additional ambient monitoring program data is contained in Appendix B. The CMP data were especially useful in assessing Lower American River water quality.

Table 2-1. Sources of Water Quality Data

Utility	Data	Period of Record
Water Utility Monitoring Programs		
PCWA	General Constituents, TOC, Coliform	1998 - 2002
EID	General Constituents, TOC, Coliform	1998 - 2002
Folsom	General Constituents, TOC, Coliform	1998 - 2002
FSP	General Constituents, TOC, Coliform	1998 - 2002
SJWD	General Constituents, TOC, Coliform, *Giardia/ Cryptosporidium*	1998 - 2002
City of Roseville	General Constituents, TOC, Coliform	1998 - 2002
ACWS	General Constituents, TOC, Coliform, *Giardia/ Cryptosporidium*	1998 - 2002
CWD	General Constituents, TOC, Coliform	2001 - 2002
City of Sacramento	General Constituents, TOC, Coliform , *Giardia/ Cryptosporidium*	1998 - 2002
Ambient Monitoring Programs on the Lower American River		
CMP – Nimbus and Discovery Park	General Constituents, Metals, Organics, TOC, DOC, UV254, Coliform, *Giardia/Cryptosporidium*	1998 – 2002
EBMUD – Lower American River	General Constituents, TOC, DOC, UV254, Coliform, *Giardia/Cryptosporidium*	1997 - 2000
Sacramento River Watershed Program – Discovery Park	General Constituents, Metals, Pesticides, UV254, Coliform	1999 - 2002
USGS National Ambient Water Quality Assessment Program – J Street	General Constituents, Metals, DOC, Pesticides	1996 – 1998

NOTES:

Typically, the water utility data for general constituents, such as turbidity, is collected daily, coliform data is collected bi-weekly or monthly, *Giardia* and *Cryptosporidium* and TOC data is collected monthly. Data for other constituents, such as organics, is collected at variable and frequencies.

For the ambient monitoring programs, the CMP has an on-going program that collects most data on a monthly basis; the EBMUD data was collected weekly over a three-year period.; the Sacramento River Watershed Program has an on-going program that collects data on a variable frequency; and the USGS collected data on a monthly basis for over two years.

Drinking Water Quality Standards

MCL – Enforceable drinking water standard, set by the EPA and/or the DHS. Primary MCLs are based on health risk, detectability, treatability, and cost for treatment and are set as close as technically and economically feasible to the Maximum Contaminant Level Goal (MCLG)/Public Health Goal (PHG). Utilities are required to meet MCLs in primarily finished water. The DHS also sets secondary MCLs, which are aesthetically based.

MCLG/PHG – Level at which there is no significant health risk if consumed in drinking water over a lifetime. EPA sets MCLGs for all constituents with federal MCLs. In California, the Office of Environmental Hazard and Health Assessment sets PHGs for constituents that have or will soon have primary MCLs. These are non-enforceable limits that are part of the basis for setting MCLs. In some cases adequate laboratory methods do not exist to reliably analyze the constituents to a detection level as low as the MCLG/PHG. In other cases there is no treatment effective at reliably treating water to meet the specified MCLG/PHG. And in other cases, there may be available treatment, but at a cost which is prohibitive.

Action Level – This is a health based advisory level, set by the DHS, generally in response to contamination of drinking water supplies by a constituent for which there is no MCL. This is a level thought by DHS to not pose a significant health risk when ingested in water daily. For non-carcinogen constituents the no observable adverse effect level governs. For carcinogens the 1/1,000,000 risk level governs. If these levels are below the practical quantitation limit (PQL) for analysis, then the PQL governs. When constituents are detected above the Action Level, the DHS recommends that consumer notification occur and the source be removed from service.

2.1 Overall Water Quality

The review of overall water quality is largely based on comparison of the utilities' intake water (also called raw water) to drinking water limits for constituents currently regulated by both the United States Environmental Protection Agency (EPA) and the DHS (listed in Appendix C). This includes all constituents with primary and secondary MCLs and unregulated constituents that have Action 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. For regulatory compliance, the MCLs and Action Levels primarily apply to treated water.

Title 22 monitoring data was provided by all the participating utilities currently diverting and treating American River water. Overall, the American River provides excellent quality raw water. The raw water can be treated to meet all drinking water standards using conventional and direct filtration processes, as well as membranes. No persistently present constituents have been identified in the river that require additional treatment processes. This same overall finding was reported in the 1998 Update.

As previously mentioned, individual utility data is summarized in Section 4. None of the utilities reported any exceedances of either primary or secondary MCLs from 1998 through 2002. High turbidities during storm events are sometimes a treatment challenge, which the utilities report managing by various means such as adjusting chemical doses and reducing plant flow.

2.2 Selected Constituent Review

Several water quality constituents were selected for a more detailed discussion, i.e. their general characteristics, seasonal and historical trends, and significance with respect to existing and potential future regulations. Several of these constituents were reviewed in the 1998 Update, namely turbidity, coliforms, *Giardia* and *Cryptosporidium*, TOC, arsenic, and Lower American River levels of pesticide SOCs. Arsenic data are reviewed again in this 2003 Update because the DHS is expected to lower the state arsenic MCL. Hexavalent chromium was added for review in this 2003 Update because the

DHS will set a new MCL for hexavalent chromium. Lower American River levels of VOCs and additional SOCs were also reviewed for this 2003 Update.

Constituents of long term interest (i.e. constituents the water utilities would prefer to see minimized in their raw water) along with the principal sources in the American River watershed, are shown in **Table 2-2**.

Table 2-2. Principal Potential Sources of Constituents of Interest

Constituent	Subwatershed	Upper watershed runoff	Body contact recreation	Lower American riparian corridor runoff	Urban runoff	Industrial facility discharges	Spills
Turbidity	Upper watershed	■					
	Folsom Lake	■			■		
	Lower American River*			■	■		
Microorganisms	Upper watershed **	■	■				■
	Folsom Lake	■	■		■		■
	Lower American River		■	■	■		■
Total Organic Carbon	Upper watershed	■					
	Folsom Lake	■			■		
	Lower American River			■	■		
VOCs and SOCs	Upper watershed						■
	Folsom Lake				■		■
	Lower American River				■	■	■

NOTE:
*During strong or long-duration winter storms when water is being rapidly paused through Folsom Dam, upper watershed runoff can affect turbidity levels in the Lower American River.
**Septic systems are also a potential source of microorganisms in the watershed. Septic systems were not reviewed in this 2003 Update since there has been little change or new information. Septic systems were reviewed in the initial survey and the 1998 Update.

2.2.1. Turbidity

Raw and treated water turbidity data was provided by all the participating utilities currently diverting and treating American River water. The data was used to generate time series plots to identify trends and to evaluate the ability of the water treatment plants to remove solids.

From 1998 through 2002, raw water turbidity levels along the river exceeded 10 nephelometric turbidity unit (NTU) less than 5 percent of the time and never exceeded 100 NTU. There appears to be a slight increase in turbidity levels from upstream of Folsom Dam to downstream of the dam.

The most significant turbidity trend is seasonal and is related to storm events. **Figure 2-1**, a time series plot of SJWD raw water turbidity data, illustrates that turbidity peaks occur during wet months.

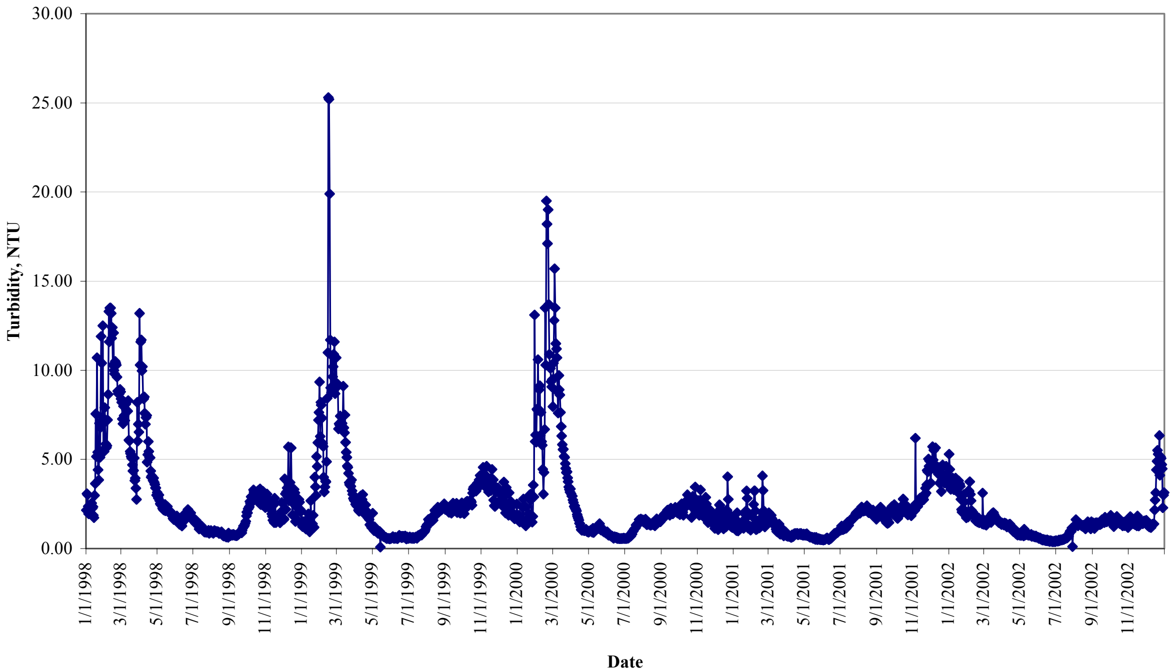


Figure 2-1. Sidney N. Peterson WTP Raw Water Turbidity – San Juan Water District

The paired time series plots of Roseville's raw and finished water turbidity data, **Figure 2-2** and **Figure 2-3**, illustrate how successfully the turbidity levels can be reduced through conventional filtration treatment. The treated water turbidity levels are well below drinking water standards.

Turbidity levels and trends in the river are similar to those described in the 1998 Update with one exception. The 1998 Update included the January 1997 Pineapple Express storm which caused extreme short term raw water turbidity spikes. Data from that winter slightly skewed the average turbidity levels for the period of record 1992 through 1997, so that raw water turbidity levels exceeded 10 NTU less than 10 percent of the time and exceeded 100 NTU less than 1 percent of the time. All the water utilities experienced treatment challenges during the Pineapple Express. Although no such storm occurred during the period 1998 through 2002, such a storm will likely occur again at some point in time when similar climatic conditions recur.

The 1998 Update recommended that the water utilities optimize treatment during storms to reduce turbidity levels as well as microorganisms and TOC. All the utilities diverting and treating American River water use a variety of techniques to optimize treatment. For a summary of water utility actions on 1998 recommendations, see Appendix D. The City of Sacramento section in Appendix D also contains more information on City actions that address 1998 Update recommendations.

2.2.2. Coliforms

Raw water coliform data was provided by most of the utilities and additional ambient data was provided by the ambient monitoring programs. Some utilities monitored for fecal coliform while others monitored for *Escherichia coli* (*E. coli*). This data was used to calculate average and median values at each intake and to generate time series plots to identify trends.

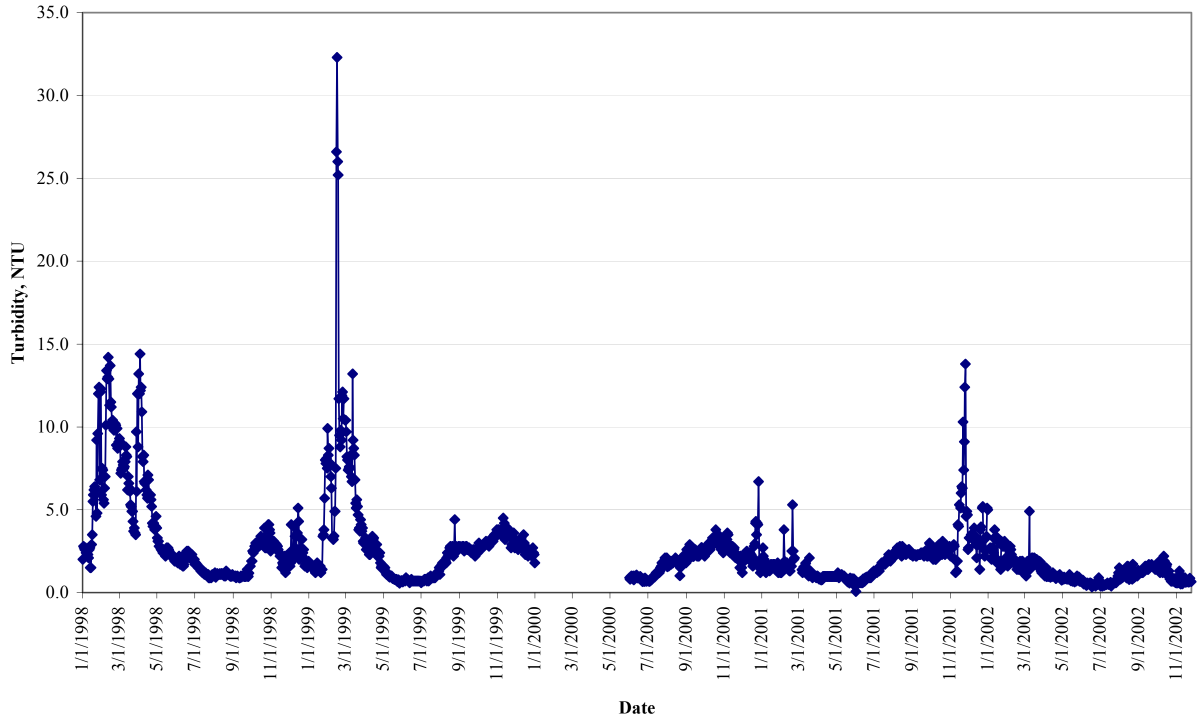


Figure 2-2. Roseville WTP Raw Water Turbidity – City of Roseville

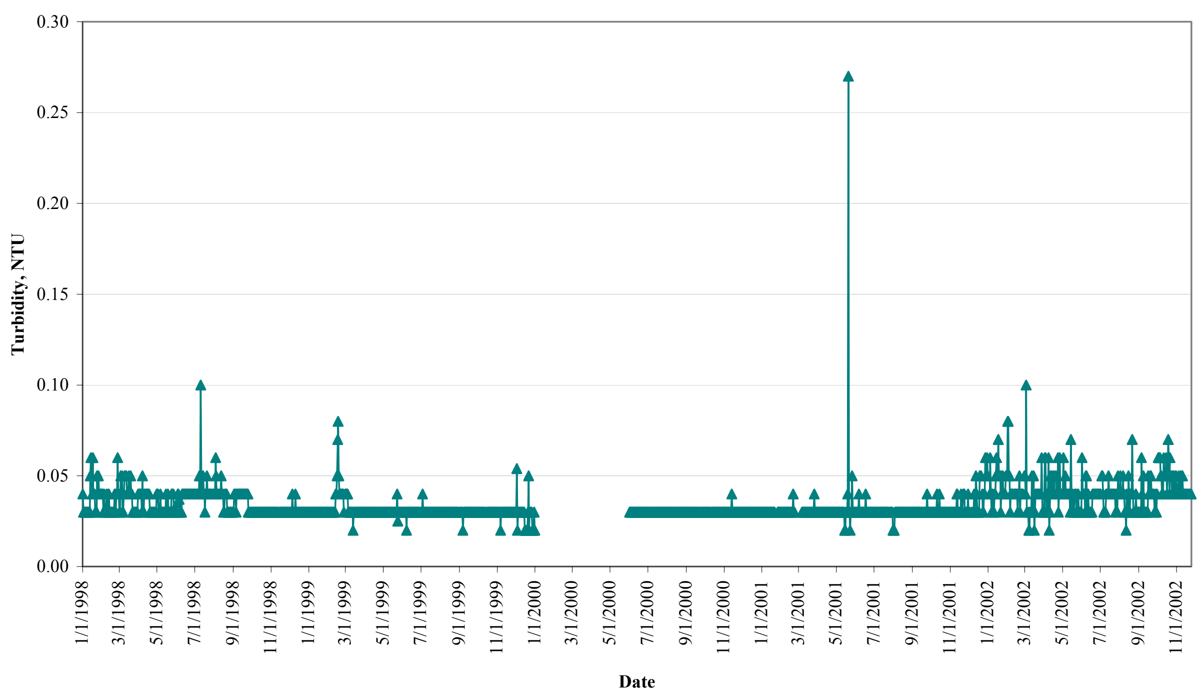


Figure 2-3. Roseville WTP Treated Water Turbidity – City of Roseville

Turbidity

Turbidity is the measurement of the light scatter caused by suspended particles such as clay, organics and microorganisms. High turbidity levels are typically the result of erosion and sediment transport during storm/high flow events. Principal sources of turbidity include upper watershed runoff, Lower American riparian corridor runoff, and urban runoff.

High turbidity levels are undesirable because high levels may mask the presence and interfere with disinfection of microorganisms. Turbidity, like coliform, is used as an indicator of general water quality.

Turbidity is used to evaluate the efficiency of the treatment process and is a regulated constituent. Turbidity was originally regulated as part of the National Interim Primary Drinking Water Regulations (NIPDWR) in the 1970's. Treated water turbidity standards were also set as part of the SWTR. The current standards for combined filter effluent turbidity are based on the Interim Enhanced SWTR (for systems serving greater than 10,000 population) and the Long Term 1 Enhanced SWTR (for systems serving less than 10,000 population). These regulations revise the combined filter effluent turbidity performance criteria to less than 0.3 NTU in 95% of measurements and never to exceed 1 NTU. They also require continuous monitoring of individual filter effluent turbidity.

Turbidity has also been indirectly regulated in drinking water as part of the Filter Backwash Rule. This rule requires utilities that recycle waste streams to return the water to the headworks of the water treatment plant, upstream of all chemical feed systems. This is to ensure that chemical feed is adjusted for blended water quality, including increases in turbidity. The regulation also recommends flow pacing of the recycle stream to minimize pulsing of solids loading.

All ten water treatment plants have processes that are designed to remove turbidity.

Median fecal coliform and *E. coli* densities increase from upstream of Folsom Dam to downstream of the dam, i.e. median fecal coliform and *E. coli* densities along the Lower American River are consistently higher than those upstream. Within the Lower American River reach, median densities do not appear to increase from upstream to downstream, while the average fecal coliform and *E. coli* densities do appear to increase. The average values are affected by several outlier samples with higher densities. These outlier samples generally occurred during the fall, winter, and spring months, although there was also an outlier associated with the 4th of July holiday in 2001. The fecal coliform and *E. coli* data are summarized in **Table 2-3**. As can be seen on Table 2-2, there is limited *E. coli* data available from the upper watershed.

Figure 2-4 is a time series plot of Folsom's raw water *E. coli* densities that shows most peak densities occur during the wet months. Paired time series plots of fecal coliform and *E. coli* densities along the Lower American River are shown on **Figure 2-5** and **Figure 2-6**. Figure 2-5, shows fecal coliform data for the entire period of record from 1998 through 2002 while the *E. coli* data on Figure 2-6 begins in 2000. Both plots show that most peak densities occur during the wet months and also show that the densities are relatively similar at Nimbus Dam (upstream) and Discovery Park (downstream).

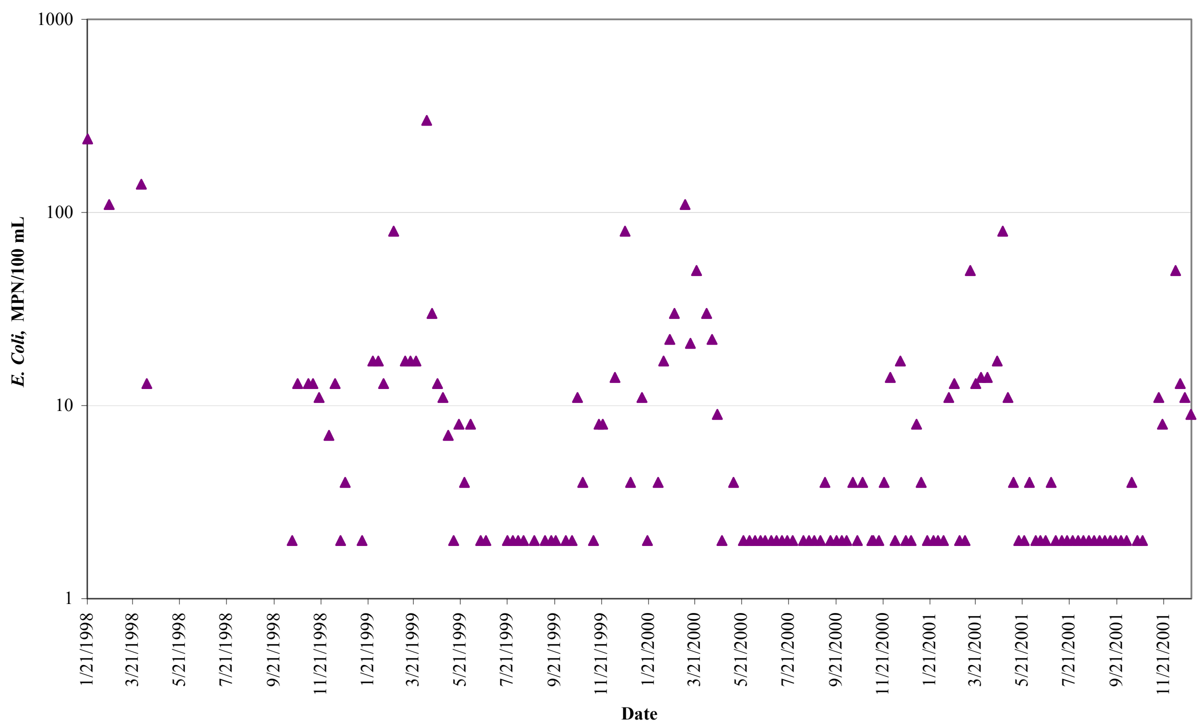
Two intake locations have higher coliform densities in summer months rather than in wet months, in contrast to the general trend. Some combination of local factors may account for this.

- The data for EID's Strawberry WTP shows that the overall median was non-detectable, while the median of summer month samples was 4 most probable number (MPN)/100 mL. A possible factor is that the Strawberry community's septic systems may be leaching to the river causing elevated coliform densities when available dilution is minimized due to low summer river flows.

Table 2-3. Fecal Coliform and *E. coli* Levels along the American River

	Fecal Coliform, MPN/100mL			*E. coli,* MPN/100mL		
	# Samples	Average	Median	# Samples	Average	Median
North Fork (PCWA)	43	7	2	17	16	4
South Fork at Strawberry WTP (EID)	44	4	<2	NA	NA	NA
Folsom Lake at El Dorado Hills WTP (EID)	113	63	4	NA	NA	NA
Folsom Dam (Folsom)	169	25	13	143	20	8
Folsom Dam (FSP)	<15	24	17	<15	14	7
Folsom Dam (SJWD)	128	15	5	NA	NA	NA
Folsom Dam (Roseville)	NA	NA	NA	NA	NA	NA
Nimbus Dam (CMP)	54	120	30	24	70	22
Nimbus Dam (EBMUD)	NA	NA	NA	198	70	30
Lower American River at Fairbairn WTP (Sacramento)	44	96	30	235	81	23
Lower American River at Fairbairn WTP (EBMUD)	NA	NA	NA	186	110	23
Lower American River at Hwy 160 Bridge (EBMUD)	NA	NA	NA	44	390	30
Lower American River at Discovery Park (CMP)	55	280	30	25	120	17
Lower American River at I-5 Bridge (EBMUD)	NA	NA	NA	152	110	30

NOTES:
NA = Not analyzed
Sample collection factors may impact coliform levels. Coliform densities are typically highest near the surface of the water. When samples are collected manually, they are often collected from or near the surface. When samples are collected at intakes, the water is typically drawn from depth. Also, there is considerable natural variation in coliform levels in surface waters, so the number of samples collected affect the average and median values. Since coliform densities during storms and wet weather are generally higher than is typical, the number of samples collected under these conditions will influence the average value.



Non-Detects Shown as 2 MPN/100 mL

Figure 2-4. Folsom WTP Raw Water *E. coli* – City of Folsom

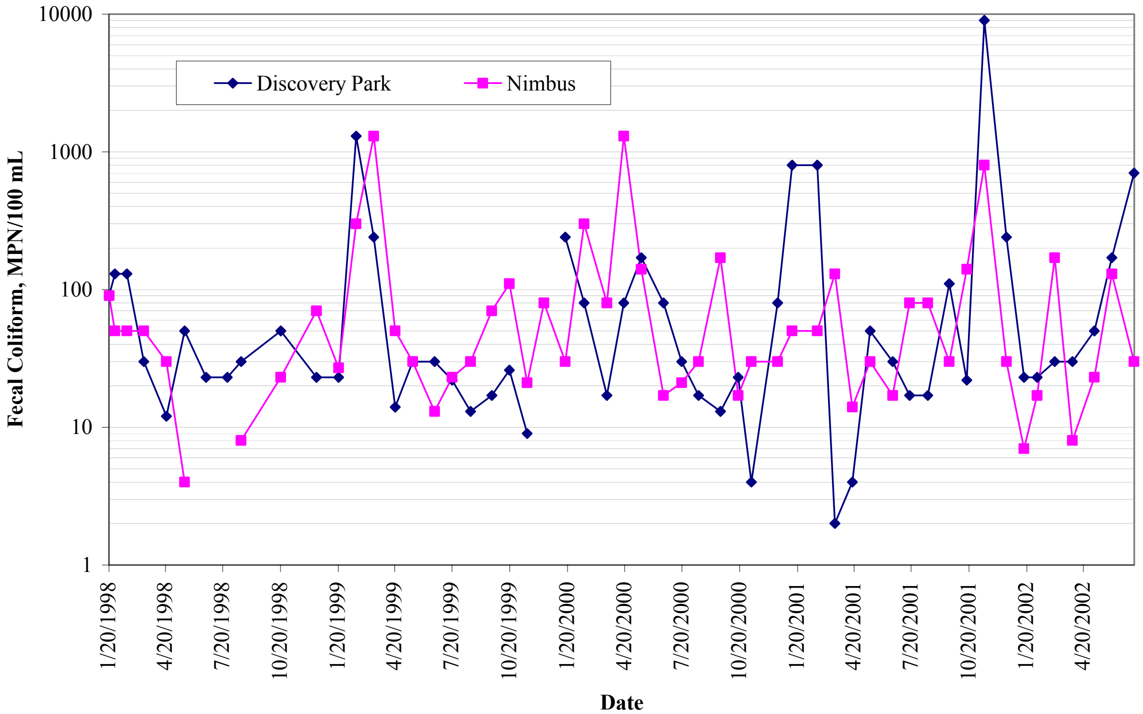


Figure 2-5. Fecal Coliform Levels along the Lower American River – Coordinated Monitoring Program

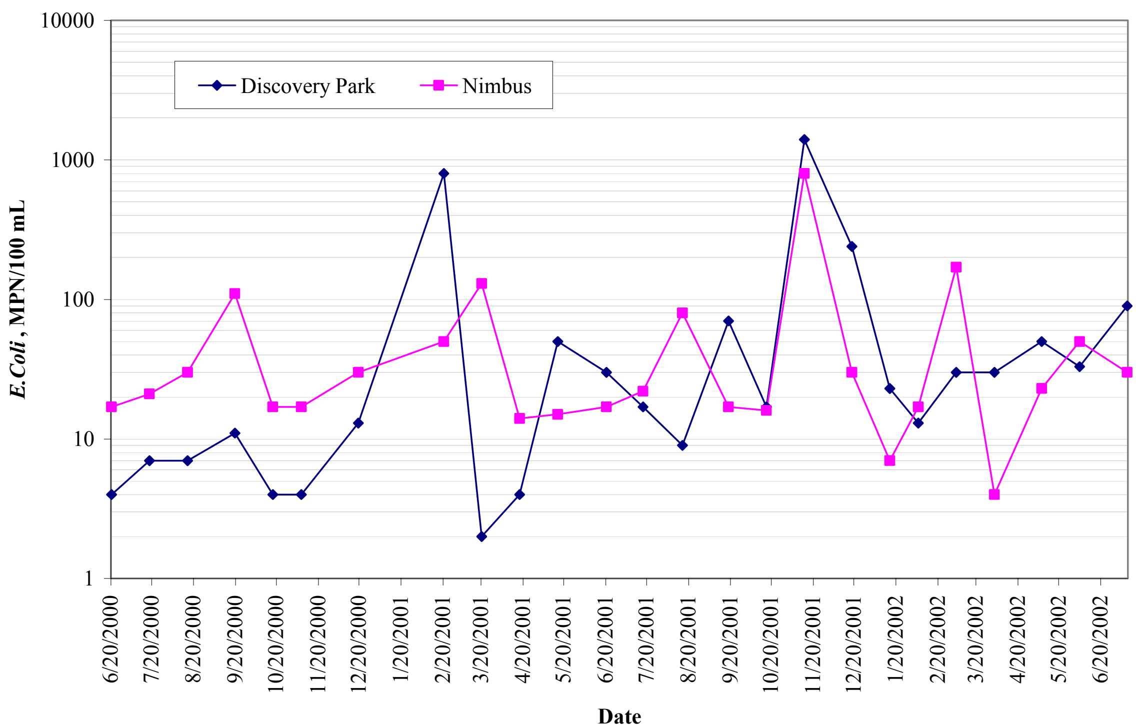


Figure 2-6. *E. coli* Levels along the Lower American River – Coordinated Monitoring Program

- The data for ACWS' Coloma WTP on the Folsom South Canal shows that the median *E. coli* density between May and September is 17 MPN/100 mL, over 50 percent higher than the overall median of 11 MPN/100 mL. Possible factors may be that the canal is relatively shallow and warmer during summer months and/or that increased recreational use of and/or other conditions at Lake Natoma contribute to higher summer coliform densities.

EBMUD, alone among the monitoring programs, collected samples for seven consecutive days, once per month, thus allowing observations on whether there are any discernible coliform increases associated with summer weekend recreational use of the river. This program included monitoring for fecal coliform and *E. coli* at four locations on the Lower American River between July 1997 and February 2000. This limited data showed some increases and some decreases associated with weekend use, so that no consistent picture emerged from this data.

The general coliform trends discussed here are similar to those described in the 1998 Update with the exception of upstream to downstream trends within the Lower American River reach. The 1998 Update relied on total and fecal coliform <u>average</u> values, which showed a clear upstream to downstream increasing trend. This trend was most pronounced for total coliform. The 2003 Update focuses on fecal coliform and *E. coli* and uses median as well as average values. The average fecal coliform and *E. coli* values still show such a trend, although it is less pronounced than for total coliform. The median values do not show such a trend. As discussed above, the average values are affected by outlier samples from the fall, winter, and spring months. This highlights the affect of sources of storm runoff on coliform levels along the Lower American River as well as the need for treatment optimization during storms.

The 1998 Update recommended coliform monitoring at Strawberry to better identify the potential effects of septic systems. EID began monitoring for fecal coliform in December 1999 and that data is discussed above.

The 1998 Update recommended that the Lower American River water utilities further consider the fish hatcheries as a potential source of coliforms (and incidentally of TOC as well) to the Lower American River. The City of Sacramento led an effort, with participation by the County of Sacramento and EBMUD, to better explore the benefits of a hatcheries special monitoring study. These efforts highlighted the fact that fish, which are cold-blooded animals, do not host fecal coliforms or *E. coli*. As drinking water evaluations move away from the use of total coliform and increasingly use *E. coli* as the preferred coliform indicator, there may be little reason to continue to pursue such a special study. The utilities' efforts also revealed that fish, although they may host some species of *Giardia* and *Cryptosporidium*, are unlikely to carry *Giardia* and *Cryptosporidium* species that are infectious to humans.

The 1998 Update noted that the installation and operation of the TCD at Folsom Dam could alter water quality levels for certain constituents, including coliforms, for both the Folsom Lake water utilities and for those utilities diverting water downstream of the dam. The TCD, which delivers shallower lake water to the Folsom Lake water utilities while releasing deeper lake water to the Lower American River, was installed and began operation in 2003. The period of record for the next watershed sanitary survey update will demonstrate whether there is any marked water quality change as a result of TCD operations. The 1998 Update recommended that the Folsom Lake water utilities remain involved throughout the design and construction of the TCD, which most did.

Coliforms

Total, fecal, and *E. coli* coliform bacteria are used as general indicators of microbial water quality. Fecal coliform and *E. coli* are successively more specific as indicators of fecal contamination from humans and other warm-blooded animals (i.e., mammals) and are typically found at much lower concentrations than total coliform. Although coliform levels have not been shown to correlate with levels of pathogenic microorganisms, they are used as indicators because of a continued lack of affordable and reliable direct analytical methods for many pathogens. Any source of mammalian fecal matter is a potential source of fecal coliform and/or *E. coli.* Principal sources of fecal matter include upper watershed runoff, Lower American riparian corridor runoff, urban runoff, body contact recreationalists, and SSO spills.

Coliforms are directly regulated in treated water under the Total Coliform Rule. This regulation limits the number of positive detections of total and fecal coliform and *E. coli* in the distribution system.

All ten water treatment plants have processes that are designed to remove and/or inactivate coliforms.

2.2.3. *Giardia* and *Cryptosporidium*

Raw water *Giardia* and *Cryptosporidium* data was provided by SJWD and the City of Sacramento. Additional ambient data was provided by the CMP and EBMUD. There were nearly 150 samples analyzed along the American River from 1998 through 2002, most along the Lower American River. There were not data from the upper watershed and limited data for Folsom Lake. The data were summarized and evaluated for frequency of detection and relative levels as well as trends. A summary of all the data collected during this period is provided in **Tables 2-4** and **2-5.**

Table 2-4. *Giardia* Levels along the American River

	Giardia, cysts/L						
	# Samples	# Presumed	% Presumed	Average of Presumed	# Confirmed	% Confirmed	Average of Confirmed
Folsom Dam (SJWD)	12	0	0%	0	0	0%	0
Nimbus Dam (CMP)	20	1	5%	0.015	1	5%	0.005
Nimbus Dam (EBMUD)	6	1	17%	0.017	0	0%	0
Lower American River at Fairbairn WTP (Sacramento)	44	23	52%	0.155	3	7%	0.006
Lower American River at Fairbairn WTP (EBMUD)	4	2	50%	0.200	1	25%	0.025
Lower American River at Hwy 160 (EBMUD)	23	17	74%	0.161	1	4%	0.004
Lower American River at Discovery Park (CMP)	22	12	55%	0.195	3	14%	0.014

NOTES:

Samples collected prior to June 1999 were analyzed using the Information Collection Rule (ICR) Method; samples collected thereafter were analyzed using EPA Method 1622 or 1623, with the exception of ACWS which still utilizes a modified ICR Method. Thirty five percent of the results were obtained using the ICR Method and 65 percent were obtained using one of the EPA Methods. Both of these methods have variable performance and recovery rates. The detection limits vary, depending on the analytical method, volume of sample collected, and dilution requirements. The effectiveness of the analysis often depends on the turbidity of the source water quality. The results from the ICR Method are not considered firm values, but rather as indicators of general presence and relative levels. The EPA believes that the values obtained from EPA Method 1622/1623 should be considered quantifiable.

The results have been categorized into presumed or confirmed counts. A presumed count includes appropriately sized particles without any identified internal structure. A confirmed count includes appropriately sized particles with internal structures identified. With specific reference to EPA Method 1622/23, presumed results include all particles of the correct, size, shape and fluorescence. This is the total immunofluorescence assay count from the analytical laboratory report. Confirmed results include an additional evaluation of internal structures and vital dye staining by 4',6-diamidino-2-phenylindole (DAPI). This is the internal structure and DAPI+ count form the analytical laboratory report. Neither count is capable of determining whether the protozoa is viable, i.e. capable of infecting a human.

Table 2-5. *Cryptosporidium* Levels along the American River

	Cryptosporidium, oocysts/L						
	# Samples	# Presumed	% Presumed	Average of Presumed	# Confirmed	% Confirmed	Average of Confirmed
Folsom Dam (SJWD)	12	0	0%	0.000	0	0%	0
Nimbus Dam (CMP)	20	0	0%	0	0	0%	0
Nimbus Dam (EBMUD)	6	0	0%	0	0	0%	0
Lower American River at Fairbairn WTP (Sacramento)	51	4	8%	0.008	0	0%	0
Lower American River at Fairbairn WTP (EBMUD)	6	0	0%	0	0	0%	0
Lower American River at Hwy 160 (EBMUD)	25	4	16%	0.020	3	12%	0.012
Lower American River at Discovery Park (CMP)	21	2	10%	0.043	1	5%	0.005

NOTES:

Samples collected prior to June 1999 were analyzed using the ICR Method; samples collected thereafter were analyzed using EPA Method 1622 or 1623, with the exception of ACWS which still utilizes a modified ICR Method. Thirty five percent of the results were obtained using the ICR Method and 65 percent were obtained using one of the EPA Methods. Both of these methods have variable performance and recovery rates. The detection limits vary, depending on the analytical method, volume of sample collected, and dilution requirements. The effectiveness of the analysis often depends on the turbidity of the source water quality. The results from the ICR Method are not considered firm values, but rather as indicators of general presence and relative levels. The EPA believes that the values obtained from EPA Method 1622/1623 should be considered quantifiable.

The results have been categorized into presumed or confirmed counts. A presumed count includes appropriately sized particles without any identified internal structure. A confirmed count includes appropriately sized particles with internal structures identified. With specific reference to EPA Method 1622/23, presumed results include all particles of the correct, size, shape and fluorescence. This is the total immunofluorescence assay count from the analytical laboratory report. Confirmed results include an additional evaluation of internal structures and vital dye staining by DAPI. This is the internal structure and DAPI+ count form the analytical laboratory report. Neither count is capable of determining whether the protozoa is viable, i.e. capable of infecting a human.

The data shows limited confirmed counts of either protozoan. Of the nearly 150 samples collected, only nine samples had confirmed *Giardia* cysts (for a detection frequency less than seven percent) and four samples had confirmed *Cryptosporidium* oocysts (for a detection frequency of less than three percent).

For *Giardia* the average value of confirmed counts at the five monitoring locations ranged from non-detectable to 0.025 cysts/L, with an overall average of 0.007 cysts/L. For *Cryptosporidium*, the average value of confirmed counts ranged from non-detectable to 0.012 oocysts/L, with an overall average of 0.003 oocysts/L. The frequency of detection, as well as the average value of confirmed counts, increased slightly from upstream to downstream sites. This is particularly evident for samples collected during storm events.

This data suggests that there are generally low concentrations of *Giardia* and *Cryptosporidium* in the American River during any time of the year. It appears likely that storm events contribute to the few occasions of higher counts in the river. This highlights the importance of the water treatment plant operations to continue to optimize treatment to remove solids during wet weather and storm events.

Giardia

Giardia is a protozoan that is commonly found in the environment as a cyst in the feces of wild animals, although wild and domestic animals as well as humans may be hosts. *Giardia* may be present in any type of surface water, including pristine supplies; its prevalence ranges from low (<20 percent of samples) to high (60 percent of samples). *Giardia* can infect humans and cause the gastrointestinal disease giardiasis. As with coliforms, any source of mammalian fecal matter may be a source of *Giardia*.

Giardia is currently regulated under the SWTR. 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. EPA and DHS Guidance state that 3-log reduction of *Giardia* is appropriate when average concentrations of *Giardia* in the source water are less than 0.01 cysts/L. In determining log reduction requirements for *Giardia*, the DHS allows, in the absence of actual *Giardia* data, the use of a surrogate 200 MPN/100 mL limit for either fecal coliform or E. coli. Source waters with coliform levels consistently below that limit are considered to be appropriate for the minimum 3-log reduction requirement.

All ten water treatment plants have processes that are designed to remove and/or inactivate *Giardia*.

The overall low frequency and low levels of *Giardia* and *Cryptosporidium* detections is similar to that described in the 1998 Update. Most of the data evaluated for the 2003 Update, however, were analyzed using Method 1622/23 rather than the ICR method. The Method 1622/23 data provides increased confidence for that finding.

The 1998 Update recommended that the water utilities consider collecting protozoa data when analytical methods became substantially more exact. The City of Sacramento continued to collect *Giardia* and *Cryptosporidium* data at the E. A. Fairbairn WTP, using EPA Method 1622/1623. Most of the other large water utilities (>10,000 population) will be required to collect EPA Method 1622/1623 *Cryptosporidium* data under the Long Term 2 Enhanced SWTR. Small utilities (<10,000 population) will be required to monitor for *E. coli*.

Cryptosporidium

Cryptosporidium is a protozoan that is found in the environment as an oocyst in the feces of domestic animals (especially young livestock), although wild and domestic animals as well as humans may be hosts. Like *Giardia*, *Cryptosporidium* may also be present in any type of surface water, including pristine supplies, with prevalence ranging from low (<10 percent of samples) to high (>20 percent of samples). *Cryptosporidium* can infect humans and cause the gastrointestinal disease cryptosporidiosis. As with Coliforms and *Giardia*, any source of mammalian fecal matter may be a source of *Cryptosporidium*.

The Interim Enhanced SWTR and the Long Term 1 Enhanced SWTR set an MCLG of zero for *Cryptosporidium* and require a 2-log (99%) reduction of *Cryptosporidium*. These regulations have been promulgated by the EPA and will soon be adopted by the DHS. Conventional treatment, direct filtration, slow sand filtration, and diatomaceous earth filtration will all be granted 2-log (99%) credit for removal if the treatment plant is meeting turbidity performance standards. *Cryptosporidium* will be further regulated as part of the Long Term 2 Enhanced SWTR which will require source water monitoring and quantification of concentrations to determine if additional action is required. The Long Term 2 Enhanced SWTR is expected to be finalized in 2004.

Cryptosporidium oocysts are resistant to traditional chemical treatment with chlorine. All ten water treatment plants have processes that will physically remove various amounts of *Cryptosporidium*.

2.2.4. Organic Carbon

Raw and treated water TOC data was provided by most of the utilities and additional ambient data was provided by the ambient monitoring programs. The data was used to calculate average and median values and to generate time series plots to identify trends. Specific ultraviolet absorbance (SUVA) data provided information on the humic nature of the organic carbon present in the river. The abilities of the water treatment plants to remove TOC was also evaluated. Average and median levels of TOC along the river range between 1.2 and 1.9 milligrams per liter (mg/L). There is some increase from upstream of Folsom Dam to downstream of the dam. The data show that a large part of the TOC is in the dissolved fraction, which is what typically contributes to disinfection by-product (DBP) formation. **Table 2-6** provides a summary of TOC and dissolved organic carbon (DOC) data along the river.

Table 2-6. Total and Dissolved Organic Carbon Levels along the American River

	Total Organic Carbon			Dissolved Organic Carbon		
	# Samples	Average	Median	# Samples	Average	Median
North Fork (PCWA)	19	1.2	1.3	NA	NA	NA
South Fork at Strawberry WTP (EID)		1.9	1.85	NA	NA	NA
Folsom Lake at El Dorado Hills WTP (EID)		1.5	1.2	NA	NA	NA
Folsom Dam (Folsom)	12	--	--	NA	NA	NA
Folsom Dam (SJWD)	19	1.3	1.6	NA	NA	NA
Folsom Dam (Roseville)	20	1.6	1.5	NA	NA	NA
Nimbus Dam (CMP)	25	1.9	1.7	28	1.4	1.4
Nimbus Dam (EBMUD)	196	1.5	1.4	196	1.3	1.2
Lower American River at Fairbairn WTP (Sacramento)	21	1.2	1.2	NA	NA	NA
Lower American River at Fairbairn WTP (EBMUD)	190	1.5	1.4	190	1.2	1.2
Lower American River at Hwy 160 Bridge (EBMUD)	41	1.6	1.4	41	1.4	1.2
Lower American River at Discovery Park (CMP)	26	1.8	1.9	26	1.8	1.7
Lower American River at I-5 Bridge (EBMUD)	154	1.5	1.4	152	1.2	1.2

NOTES:
NA= Not analyzed
City of Folsom data for the period 1998 through 2002 are not shown as the data were analyzed using an alternate test method. This resulted in artificially high results. The City of Folsom conducted some additional monitoring in 2003 using the preferred laboratory method; those results have been less than 2.0 mg/L, in line with the other Folsom Lake utilities' data.

One intake location has higher TOC levels. This is the ACWS intake on the Folsom South Canal, off-stream of the American River. The ACWS intake had median and average TOC levels greater than 2.0 mg/L. A possible factor contributing to these higher TOC levels is the mats of vegetation that grow in the canal due to the canal's relatively shallow, warmer, low-flow conditions.

Figure 2-7 is a time series plot of TOC along the Lower American River. The peak TOC concentrations are associated with a storm event in the fall of 2001. The figure shows no increasing or decreasing trend in TOC concentrations over the past several years.

Figure 2-8 is a time series plot of the raw and treated water TOC at the City of Sacramento's E. A. Fairbairn WTP. This plot illustrates how successfully and consistently the TOC can be reduced through conventional filtration treatment.

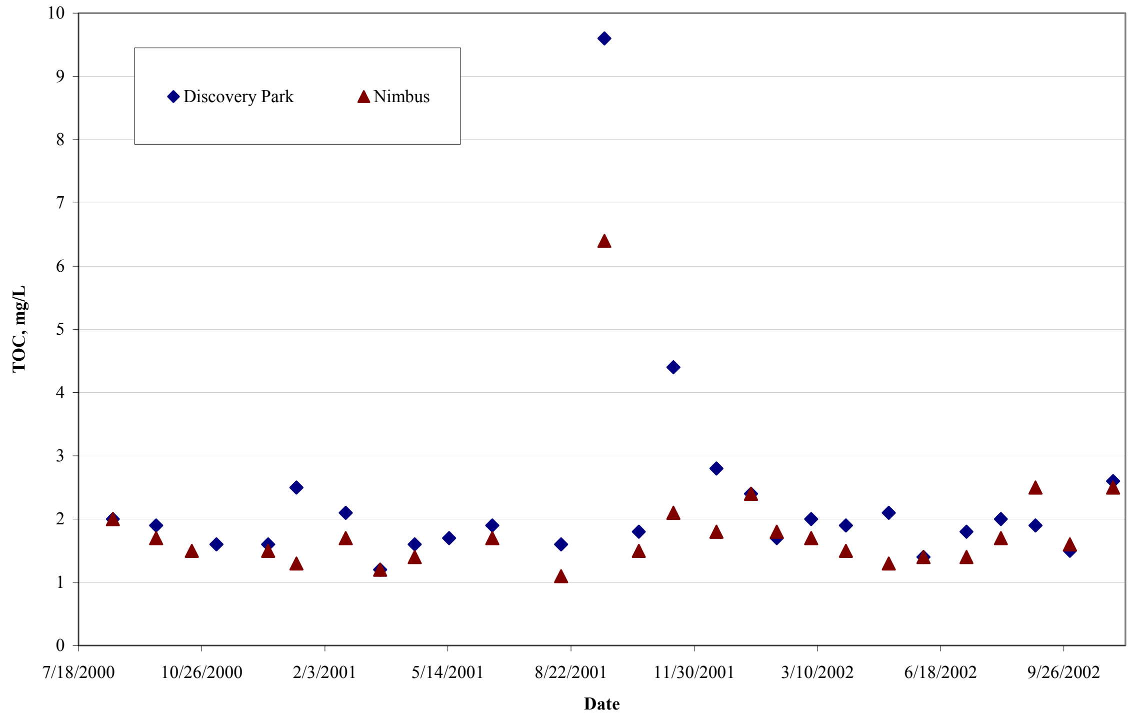


Figure 2-7. Total Organic Carbon along the Lower American River - Coordinated Monitoring Program

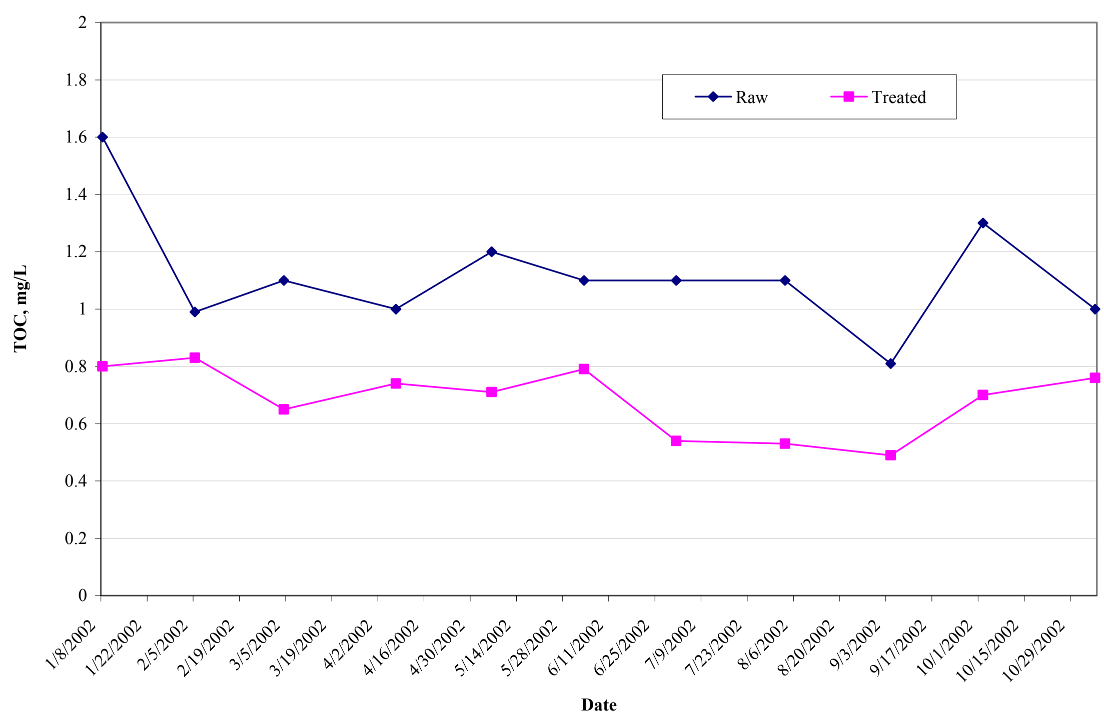


Figure 2-8. E.A. Fairbairn WTP Raw and Treated Water Total Organic Carbon Levels – City of Sacramento

Figure 2-9 is a time series plot of SUVA data from four locations on the Lower American River, collected between July 1997 and February 2000. This data indicates that SUVA levels in the river (with the exception of the Highway 160 site, which has only a few data points) are at or above 3.0 miter-liter per milligram (m-L/mg). SUVA levels greater than 3.0 m-L/mg indicate that the organic carbon is humic in nature and can contribute to DBPs. This figure also shows that the SUVA levels sometimes increase during the fall and winter months.

TOC levels and trends in the river are similar to those described in the 1998 Update.

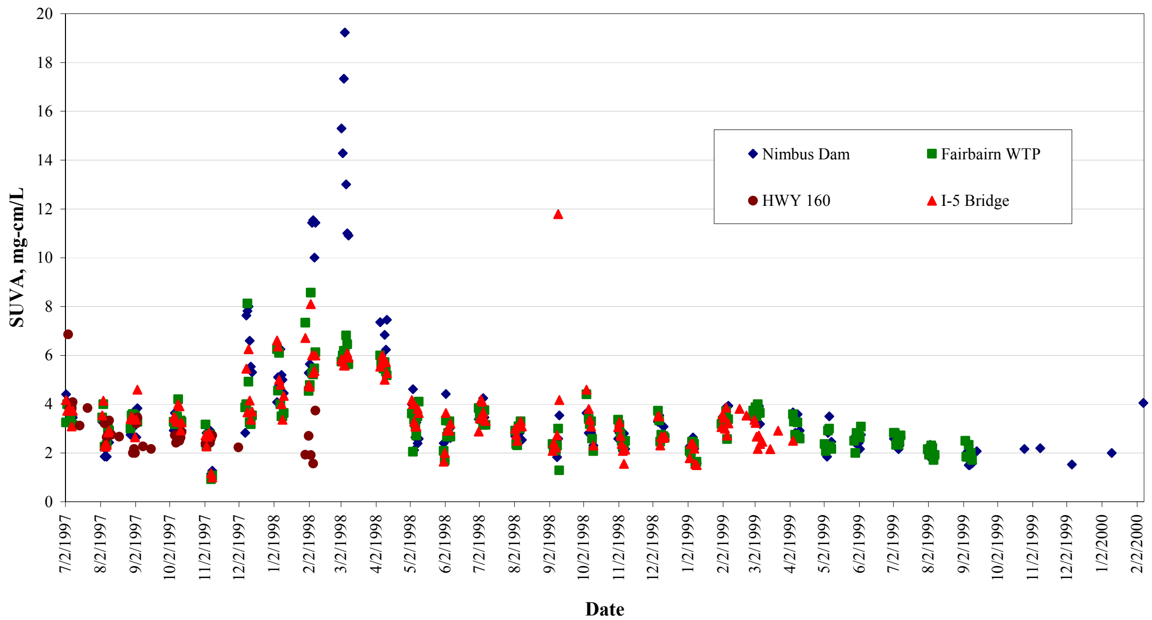


Figure 2-9. Specific UV Absorption Levels along the Lower American River - East Bay Municipal Utility District

Total Organic Carbon

TOC containing humic acids and fulvic acids is a DBP precursor, i.e. it reacts with disinfectants during treatment to form DBPs. The ratio of dissolved organic carbon to ultraviolet light, called SUVA, is used to indicate whether the organic carbon is humic in nature. SUVA levels greater than 3.0 m-L/mg indicate the presence of humic materials that can contribute to DBPs. DBPs, including trihalomethanes (TTHMs) and haloacetic acids (HAAs), are suspected human carcinogens, mutagens and teratogens. Any source of plant matter, fecal matter, or soil is a potential source of TOC, including general watershed runoff, runoff from riparian corridors, urban runoff, and wastewater.

DBP precursors are currently regulated as part of the Stage 1 D/DBP Rule. This regulation requires varying levels of enhanced removal of TOC if the source water TOC levels exceed 2 mg/L and a utility implements conventional filtration.

All of the 10 water treatment plants have processes that remove some amount of TOC, but EID's Strawberry WTP, FSP, ACWS, and CWD do not have treatment plants that utilize full flocculation and coagulation and therefore cannot implement enhanced coagulation to remove TOC.

2.2.5. Volatile and Synthetic Organic Chemicals

Organic chemical data was provided by all the water utilities currently diverting and treating American River water. In addition, three of the ambient monitoring programs collected extensive data on organic chemicals in the Lower American River. During the period 1998 through 2002, the CMP reported sporadic detections of several VOCs and SOCs. Three of these (hexachlorobenzene, methyl-tert-butyl-ether (MTBE) *, and pentachlorophenol *) were detected at levels below their respective MCLs. MTBE was detected at Discovery Park twice, both at 0.55 μg/L and at Nimbus three times, all below 0.85 μg/L. Fifteen other detected VOCs and SOCs do not have associated MCLs (acenaphthene *, anthracene *, benzo(a)anthracene *, benzofluoranthene *, bromoform, chrysene *, diazinon *, dibenzo(ah)anthracene *, diuron *, flouranthene *, fluorine *, indeno(1,2,3-cd)pyrene *, N-nitrosodi-N-propylamine, prowl, pyrene *). Overall, the detections are at very low levels and occur sporadically. Out of a total of 3,643 organic analyses, the CMP reported only 111 detections of VOCs and SOCs. The sporadic detections at low levels of organic chemicals in the Lower American River do not currently pose any compliance issues for drinking water. *Note: VOCs and SOCs detected in Sacramento area urban runoff area indicated with an asterisk (*).*

The CMP also detected two VOCs in the river at levels above their respective drinking water MCLs.

- A single detection of 1, 2-dichloroethane at 1.1 microgram per liter (μg/L) at Discovery Park in February 2002. This is above the MCL of 0.5 μg/L.
- Two detections of dichloromethane* in October 2001 at Nimbus Dam (7.7 μg/L) and Discovery Park (9.8 μg/L). These detections are above the MCL of 5 μg/L.

Detections at these levels in the Lower American River are highly anomalous. It is especially unusual that VOCs such as 1, 2-dichloroethane and dichloromethane, would be present at the reported levels, since VOCs vaporize under ambient conditions.

The CWD detected a third organic chemical at its ranney collector intake. The CWD had a single detection of atrazine at 0.1 μg/L in June 2001. This is below the MCL of 3 μg/L. A resample was non-detectable.

The ACWS had a single detection of 1,4-dioxane at its intake on the Folsom South Canal and several detections of NDMA, below the PQL, during the period of 1998 through 2002. Subsequent testing in 2003 has not detected either of these constituents.

The City of Sacramento and the American Water Works Association Research Foundation collected 14 samples from Folsom Lake and the Lower American River from 1999 through 2002, and analyzed them for MTBE with ultra low detection levels. Ten of the 14 samples were collected at the E.A. Fairbairn WTP intake. All MTBE concentrations were below the MCL of 13 μg/L. The highest concentration was detected in Folsom Lake at 4.8 μg/L. A single sample collected at the Sidney N. Petersen WTP intake was <0.2 μg/L. At the E.A. Fairbairn WTP intake, concentrations ranged from <0.2 to 1.2 μg/L with a median value of 0.4 μg/L.

Volatile and Synthetic Organic Chemicals

VOCs and SOCs are formulated for or are by-products of industrial, agricultural, and/or urban use. Pesticides are a major subgroup of SOCs. Many organic chemicals are known or suspected carcinogens or may cause damage to specific organs or other body systems. Principal potential sources of VOCs and/or SOCs in the American River include urban runoff, discharges from industrial faculties, and hazardous materials spills.

Some VOCS and SOCs have MCLs, mostly set under the Phase I, II, or V Regulations.

None of the water treatment plants have processes designed to specifically remove VOCs or SOCs, although the processes may remove incidental amounts.

One potential source of many of these organic chemicals is urban runoff from the Sacramento urban area or upstream urban areas. Sacramento area urban runoff has been extensively tested for organic chemicals. A review of urban runoff data provided by the City of Sacramento from a search of the Sacramento Stormwater Monitoring Program database and a review of Sacramento Stormwater Management Program Annual Monitoring Reports show that many of the VOCs and SOCs detected in the river have been detected in urban runoff.

None of the detections of VOCs and SOCs with MCLs appears to be associated with known spill events. Information on spills was provided by the City of Sacramento from a search of records of spills that the City was notified of and from a search of the State Office of Emergency Services online spill report archives.

Dichloromethane was previously detected in Aerojet Superfund Site treated groundwater samples from the groundwater extraction and treatment (GET) E/F area. The river detections (assuming the river data are not an artifact of laboratory or sampling error) may or may not have been associated with the Aerojet site. Aerojet was not discharging from the GET E/F to the river at the time these samples were collected.

In general, these few sporadic low level detections of VOCs and SOCs in the Lower American River are similar to those reported in the 1998 Update. CMP data were reported only for pesticides in the 1998 Update, not for all VOCs and SOCs as was done for the 2003 Update. The 1998 Update reported that of a total of 249 analyses for 31 pesticides, only three pesticides were detected in the Lower American River prior to 1998 (diazinon, diuron, and simazine). Diazinon and diuron were also detected during the period 1998 through 2002.

The 1998 Update reported only one raw water detection of an organic chemical with an associated MCL. This was a single detection of MTBE at 0.92 μg/L at EID's El Dorado Hills WTP. The 1998 Update included a recommendation for the Folsom Lake water utilities to coordinate sample collection for MTBE. These water utilities did not coordinate their monitoring, but did independently continue to monitor in accordance with regulatory requirements. There were no MTBE detections at any utility intakes from 1998 through 2002, with the exception of several detections below the MCL at the E.A. Fairbairn WTP intake.

2.2.6. Arsenic

Arsenic data was provided by all the water utilities currently diverting and treating American River water. All the raw water arsenic data, provided by the water utilities, are below the analytical detection limit of 2 μg/L and therefore are below the current MCL of 10 μg/L. So, there are currently no compliance issues related to arsenic levels. In 2004, however, the DHS is expected to lower its MCL closer to the PHG of 4 nanograms per liter (ng/L). Until the DHS proposes what number it intends to set for the revised MCL, it will remain uncertain whether the revised MCL will affect the water utilities.

Arsenic

Arsenic is a metal, naturally contributed by soils and rock formations. Mine drainage from inactive mines associated with arsenopyrite rock is a likely source of arsenic in the American River watershed. Arsenic is a carcinogen.

Arsenic has an MCL of 10 μg/L, set under the National Primary Drinking Water Regulations. The DHS may set a state MCL that is significantly lower than the current MCL.

Six of the ten water treatment plants have processes that incidentally remove various amounts of arsenic. The EID Strawberry, FSP, ACWS, and CWD water treatment plants do not have processes in place that specifically remove arsenic.

The 1998 Update included arsenic monitoring results at ultra low detection limits, collected through the CMP for a limited time period (1996 and 1997). This data showed a total arsenic average value of 0.36 μg/L at Nimbus Dam on the Lower American River and an average of 0.37 μg/L at Discovery Park. These values are well below the standard detection limit of 2 μg/L but above the PHG of 4 ng/L.

2.2.7. Hexavalent Chromium

Treated water hexavalent chromium data was provided by all the water utilities currently diverting and treating American River water. All the treated water hexavalent chromium data, provided by the water utilities, are below the analytical detection limit of 1 μg/L. There is currently no MCL for hexavalent chromium and therefore no current compliance issues related to hexavalent chromium levels. In 2004, however, the DHS is expected to set an MCL. Until the DHS proposes what number it intends to set for the MCL, it will remain uncertain whether the new MCL will affect the water utilities.

Hexavalent chromium has been relatively recently raised as a health concern. It was not discussed in the 1998 Update.

Hexavalent Chromium

Chromium is a metal, naturally contributed by soils and rock formations. It is also used in various industrial processes. It occurs primarily in two valence states – trivalent (Cr +3) and hexavalent (Cr+6). Trivalent chromium is non-toxic. Hexavalent chromium can cause liver and kidney damage.

Speciation is believed to be affected by disinfection processes; most chromium in treated drinking water is in the hexavalent state. Hexavalent chromium is currently regulated under the 50 μg/L MCL for total chromium. The DHS is developing a state MCL for hexavalent chromium.

None of the water treatment plants have processes designed to specifically remove hexavalent chromium, although the processes may remove incidental amounts.

2.3 *Giardia,* Virus and *Cryptosporidium* Reduction Requirements

The SWTR requires all surface water suppliers to provide a minimum 3-log (99.9 percent) reduction of *Giardia* and 4-log (99.99 percent) reduction of viruses. Treatment providing 3/4-log reduction is considered appropriate for average *Giardia* concentrations less than or equal to 0.01 cysts/L. If no protozoa monitoring data is available, then the DHS allows comparison of fecal coliform or *E. coli* data to a level of 200 MPN/100 mL.

The Interim Enhanced SWTR and the Long Term 1 Enhanced SWTR require all surface water suppliers to provide 2-log (99 percent) reduction of *Cryptosporidium*. The Rules state that conventional and direct filtration water treatment plants will be granted credit for 2-log reduction, provided they meet the new combined filter effluent (CFE) turbidity performance standards. Utilities implementing alternative treatment technologies must coordinate with the DHS on determining what log reduction credit is granted.

2.3.1. E. A. Fairbairn WTP

The City of Sacramento's E.A. Fairbairn WTP has an extensive database of raw water samples collected between July 1999 and December 2002 and analyzed for *Giardia* under EPA Method 1623. This *Giardia* data was reviewed for confirmed and verified levels of *Giardia* cysts. Weekly raw water monitoring for *E. coli* was used to support the evaluation.

Giardia was confirmed present in eight percent of the samples, with an average concentration of 0.008 cysts/L. *E. coli* data for the same period (July 1999 through December 2002) had a median value of 23 MPN/100 mL and an average value of 94 MPN/100 mL. These data indicate that 3/4-log reduction of *Giardia* and viruses continues to be appropriate at the E.A. Fairbairn WTP.

A review of E.A. Fairbairn WTP treated water turbidity showed that the CFE turbidity was less than 0.3 NTU in all four-hour measurements during the study period and never exceeded 1.0 NTU. This data indicates the E. A. Fairbairn WTP should be granted credit for 2-log reduction of *Cryptosporidium* under the Interim Enhanced SWTR.

2.3.2. Other Water Treatment Plants

Giardia and virus log reduction requirements for the other water treatment plants on the American River were based on raw water fecal coliform and *E. coli* data, collected either monthly or weekly from 1998 through 2002. Available ambient *Giardia* data analyzed under EPA Method 1623 was used to support the evaluation, reviewed for confirmed and verified levels of *Giardia* cysts.

Table 2-7 provides a summary of raw water average and median values of fecal coliform and/or *E. coli* for each utility except Roseville, which did not provide data for these indicators during the study period. Table 2-7 shows median and average values well below 200 MPN/100 mL.

Table 2-7. Summary of Utility Raw Water Fecal Coliform and *E. coli* Levels

Water Agency	Fecal Coliform MPN/100 mL		*E. coli* MPN/100 mL	
	Average	Median	Average	Median
PCWA	7	2	16	4
EID – Strawberry	4	<2	NA	NA
EID – EDH	63	4	NA	NA
Folsom	25	13	20	8
FSP	24	17	14	7
SJWD	15	5	NA	NA
Roseville	NA	NA	NA	NA
ACWS	55	21	29	11
CWD	NA	NA	<2	<2

Note:
NA = Not Available

Ambient and raw water intake samples from the Lower American River, collected between May 1999 and December 2002, and analyzed under EPA Method 1623, show *Giardia* confirmed present in seven percent of the samples, with an average concentration of 0.006 cysts/L. This data indicates that 3/4-log reduction of *Giardia* and viruses continues to be appropriate at the other water treatment plants on the American River.

A review of treated water turbidity from the other water treatment plants showed that the CFE turbidity was less than 0.3 NTU in greater than 95 percent of four-hour measurements during the study period and never exceeded 1.0 NTU at any water treatment plant. Based on this data the other conventional and direct filtration water treatment plants should be granted 2-log reduction credit for *Cryptosporidium*.

SECTION 3
WATERSHED ACTIVITIES AND DISCHARGES

This watershed activities and discharges section describes pertinent characteristics of each of the watershed activities and discharges selected for review for this 2003 Update. New information and changes during the period 1998 through 2002 are described.

Several activities and discharges were not selected for review for the 2003 Update including most NDPES permitted facilities, septic systems in the upper watershed, and transportation and pipeline corridors. These facilities were considered to have no substantial changes from 1998 through 2002. A summary of the contacts made to Central Valley Regional Water Quality Control Board (RWQCB) staff with respect to selected NPDES permitted facilities is included in Appendix D.

3.1 Upper Watershed Stewardship Projects

The upper watershed stewardship projects offer a potential means of addressing source water protection issues of concern to water utilities in the upper watershed and perhaps also to the utilities taking water at Folsom Dam and along the Lower American River. These stewardship projects currently provide leadership in addressing soil erosion of the upper watershed, which results in storm sediment loading and high turbidity levels at water treatment plant intakes during storms. Upper watershed runoff also contributes microorganisms and TOC to the river from wash off of animal waste and plant matter. Both the stewardship projects are initially focused on reducing sediment loading and on reducing fuel loading to decrease the threat of broad scale catastrophic wildfire (fewer catastrophic fires would also reduce sediment loading). This initial focus reflects popular, broad-based support in Placer and El Dorado Counties for addressing these two watershed issues.

These are long-term, stakeholder-based projects; measurable results and improvements will likely be a long time in coming. The projects will start with small pilot projects with the expectation that successful pilot projects will lead to broader efforts. Other source water protection areas of interest (e.g. body contact recreation, septic systems along the South Fork, etc.) may be included later if the stewardship projects continue to thrive.

The American River Watershed Group (ARWG), which covers the North and Middle Fork watershed, predates the South Fork American River Watershed Group (SFARWG), and is more established, but the two groups work collaboratively and their objectives and methods are similar. The ARWG had been formed at the time of the 1998 Update. The SFARWG was formed within the last 3 years. Both the ARWG and SFARWG have been active in obtaining CALFED grant funds. With continued grant funding and stakeholder support, the two groups should move from planning and assessment activities to development and implementation of actual projects. Active participation of the upper watershed water utilities (PCWA and EID) will be a key factor in determining whether or not these projects incorporate drinking water source water protection issues in a meaningful way. Watershed areas covered by the stewardship projects are shown on **Figure 3-1**.

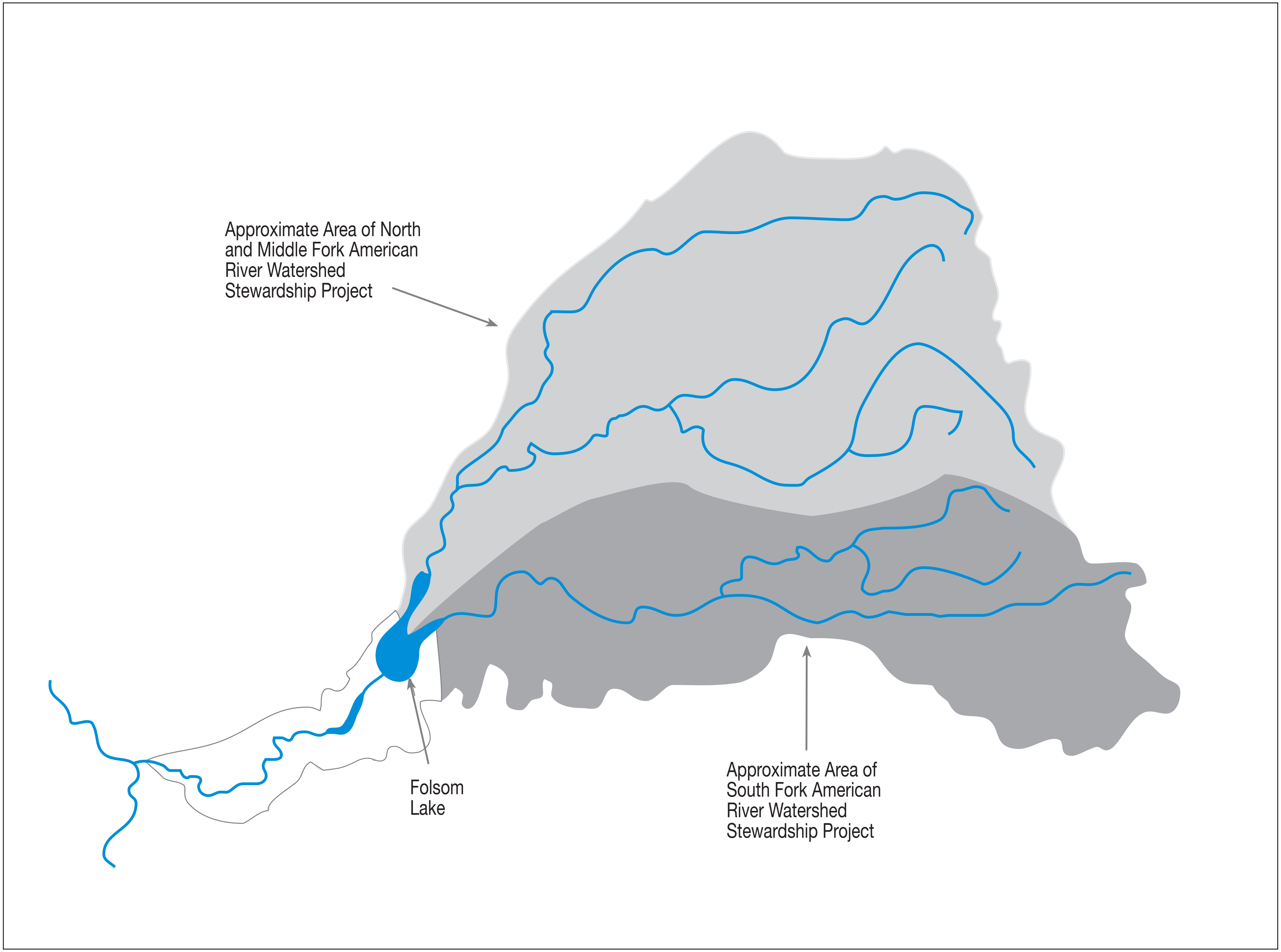


Figure 3-1. Upper Watershed Stewardship Projects

North and Middle Fork American River Watershed Stewardship Project

The Placer County Resource Conservation District (RCD) spearheads the North and Middle Fork American River Watershed Stewardship Project. PCWA is one of the founding stakeholders. Over the past several years, the ARWG, which includes the Placer County RCD, PCWA, and other watershed stakeholders, has been active in obtaining CALFED grant funds.

The current focus of watershed management is on sediment loading and fuel issues. The ARWG is currently working on developing a stewardship strategy, which will explore working relationships between various stakeholders in the watershed and will set the stage for creation of various subgroups that will participate in implementation of actual projects. Five stewardship strategies have been identified to date:

1. Firesafe Ecosystem Strategy– Six local Firesafe Councils have been formed, and two additional councils are in the process of forming. In the first five years, it is estimated that there has been a fuel load reduction in the watershed of over 10,000 tons.
2. Sediment Strategy – The ARWG is working with agencies to better understand sediment sources with the goal of identifying specific projects to minimize sedimentation. The ARWG is currently applying for additional grant funds to conduct applied research on movement of sediment in the North and Middle Fork basins and to distinguish between natural and anthropogenic sediment loading.
3. Education Strategy – A nonprofit organization (the American River Watershed Institute) was formed to assist in educating residents about watershed health issues and objectives. Several educational programs have been implemented to date.
4. Data Management & Capacity Building Strategy – Grant funds paid for creation of a geographic information system (GIS) database that merges information from various agencies on soil, forest areas, geology, etc. A regional GIS Data Center is being discussed and will likely be hosted by Sierra College.
5. Resource Inventory Strategy – Data gaps are being identified to focus future inventory efforts.

Two subwatersheds have been selected for implementation of pilot stewardship projects. Bunch Canyon is a small subwatershed with considerable private land ownership in the Colfax-Weimar area that is faced with development pressure. A larger subwatershed in the Upper Middle Fork encompasses primarily public land.

In the 1998 Update, it was noted that the American River Coordinated Resources Management Plan (CRMP), the forerunner of the North and Middle Fork American River Watershed Stewardship Project, was focused on establishing itself in Placer County. It was also noted that once established, the American River CRMP might seek to include the South Fork watershed in El Dorado County.

The 1998 Update recommended that the EID begin the process of encouraging expansion of the American River CRMP into El Dorado County. Since then, EID staff have participated in the SFARWG and anticipates being more consistently involved in the future.

South Fork American River Watershed Stewardship Project

The Georgetown Divide RCD spearheads the SFARWG, which is in the process of developing a South Fork American River Watershed Stewardship Project. EID has participated in the project, although not consistently. Over the past two years, the Georgetown Divide RCD has obtained CALFED grant funds for development of a watershed assessment.

The focus of the assessment is on sediment loading issues and fuel management, similar to the North and Middle Fork American River Watershed Stewardship Project. The next phase of work will involve identification of actual projects and stakeholder groups to implement the projects. The Georgetown Divide RCD also expects to develop a GIS database, similar to that of the ARWG that merges information from various agencies on soil, forest areas, geology, etc. The watershed assessment has:

1. Identified priority subwatersheds for fire hazard reduction based on distribution of fuels load and on resources-at-risk.
2. Identified priority subwatersheds in areas at risk of increased sedimentation based on problem roads, culverts, impervious cover, and other factors.
3. Considered both types of priority subwatersheds in developing a set of priority basins for pilot projects.

Over the long term, as projects are implemented, the PCWA, EID, Folsom, Roseville, FSP, and SJWD may be able to measure the effect of watershed stewardship projects on storm sediment loading and turbidity levels at their intakes.

3.2 Body Contact Recreation

Body contact recreation consists of activities where the recreationalist is in direct full body contact with the water such as swimming, rafting, jet skiing, and water-skiing. Body contact recreation occurs throughout the American River on all the major reservoirs and river reaches. The river reaches and reservoirs that are most downstream in the river system are the most used, due primarily to their proximity to the Sacramento metropolitan area. The summer (June through September) is the prime body contact recreation season.

Body Contact Recreation Management in the Watershed

The U.S. Forest Service (USFS) uses available parking as the limiting factor on carrying capacity at its developed recreation areas. A formula of 25 to 50 people per toilet is used to determine the number of needed restroom facilities. Some general public education on pollution prevention is provided in the form of brochures at kiosks, campgrounds, and visitor centers.

The CDPR also uses available parking as the limiting factor on carrying capacity at its developed recreation areas. A range of formulas are used for determining number of restrooms based on usage and type of recreation area. The number of restrooms for day use areas is based on parking spaces; for campgrounds there is a preferred ratio of 1 toilet per 25 persons. CDPR guidelines also include provisions that restrooms be no further than 400 feet from the areas serviced and be positioned to reflect actual use patterns. Grant funds from the Department of Boating and Waterways are being used to install one new restroom on the North Fork and four new restrooms on the Middle Fork. Restroom facilities at Folsom Lake and Lake Natoma include floating restrooms, provided by the Department of Boating and Waterways. Restroom facilities at Lake Natoma were renovated between 1998 and 2002. The CDPR manages rafting on the North and Middle Forks, including carrying capacity for commercial rafting companies. Permits for commercial rafting include sanitation requirements to ensure that restroom facilities are available at lunch and overnight break locations. There are currently three restrooms along the North Fork rafting reach from Iowa Hill Bridge to Upper Lake Clementine and three restrooms along the Middle Fork rafting reach from the Oxbow access to the North fork confluence. As a sponsor of the Pumpout and Restroom Campaign, the CDPR participates in public outreach towards the recreational community at Folsom Lake.

The County of El Dorado manages whitewater recreation between Chile Bar Dam and Salmon Falls Road on the South Fork, including controls on carrying capacity. There are currently 10 restrooms along the South Fork rafting reach from Chile Bar to Folsom Lake. Management actions called for in the County's River Management Plan include public education in the form of on-river signage identifying toilet locations as well as other outreach efforts on sanitation. Management of body contact recreation on the South Fork originated due to concern over noise and littering impacts to adjacent private property.

The County of Sacramento does not manage carrying capacity on the Lower American River. There are two raft rental firms, and the number of available rafts indirectly provides some carrying capacity limitation. However, according to the County chief ranger, about 1/2 to 2/3 of the people rafting on the river own their own raft. The County chief ranger estimates there are approximately 1,000 rafts on the river on summer holiday weekends. There are currently six restrooms along the Lower American River rafting reach from Sunrise to Watt Avenue. The County works towards placing restroom facilities at put-in and take-out locations on the river. The County has prioritized older restrooms for renovation/replacement, with the pace of work being dependent on funding. Funding for renovation and replacement is actively sought and has been received from California Department of Boating and Waterways grant programs and from State Park Bond Act grant programs. As a sponsor of the Pumpout and Restroom Campaign, the County participates in public outreach towards the recreational community.

The City of Sacramento currently operates a boat patrol, which enforces an ordinance that prohibits unseaworthy vessels from mooring or anchoring in local waterways. This ordinance enabled the removal of squatters living on derelict boats in the American River channel that lacked appropriate means of sewage handling.

This 2003 Update discussion focuses on body contact activities. There are also many land based recreation activities in the watershed: equestrian use, off highway vehicle use, camping, and hiking. See the 1998 Update for a discussion of these activities.

The major reservoirs and river reaches and some of their characteristics are shown respectively on **Figure 3-2** and in **Table 3-1**. Recreation is a specific purpose for some of the reservoirs and river reaches and in general is considered an important public amenity in the watershed. There are no DHS designated drinking water supply reservoirs in the watershed that are subject to DHS recreational guidelines. Folsom Lake is the only reservoir in the American River Watershed that has direct intakes for the participating water utilities. The different agencies listed in Table 3-1 exercise agency specific procedures and criteria for control of carrying capacity, determination of number of restroom facilities, and public outreach.

One identified problem area in the river is at the most downstream reach of the Lower American River. According to a City of Sacramento Police Department Boat Patrol officer, the congregation of recreational boats during summer weekends in the Lower American River channel upstream of Discovery Park results in visible sewage contamination of the river. This is likely due to discharge of the boats' wastewater rather than actual body contact recreation. The City of Sacramento is interested in reducing this pollution through efforts that may include public outreach and/or designation and enforcement of a "no discharge zone" for this reach of the river. A designation as a "no-discharge zone" would prohibit any wastewater discharge, including those from boats with marine sanitation devices, which may be discharged. Designation of "no discharge zones" upstream of drinking water intakes may be incorporated into the California Urban Water Agencies' (CUWA) input into the RWQCB Central Valley Drinking Water Policy, which is currently being developed. Both the City of Sacramento and EBMUD are members of CUWA.

Body contact recreation contributes microorganisms to the river through urination, defecation, and a natural shedding/washing of the body. Principal factors affecting the degree of microbial contamination are the number of people and people's behavior. People's behavior is affected by the availability of restroom facilities and is also affected by whether they follow a stewardship ethic.

It is difficult to assess the true impact of body contact recreation on a river system as large and complex as the American River since there are numerous other potential sources of microorganisms to the river. Also, contamination is spread out and it occurs directly in the water; therefore, it is typically neither observable nor directly measurable.

The coliform water quality data show that during the summer months, levels of coliform bacteria are generally low throughout all reaches of the American River. There were, however, exceptions that may or may not be recreation related:

- Fecal coliform peaks at PCWA's North Fork intake during June 2001 and July 2002.
- Generally elevated summer coliform densities at EID's Strawberry WTP intake.
- A fecal coliform peak at the Folsom Dam intake in July 2001, closely following the July 4th holiday weekend.
- Generally elevated summer coliform densities at ACWS' intake along the Folsom South Canal.
- A fecal coliform peak at Discovery Park on the Lower American River in July 2001, closely following the July 4th holiday weekend.

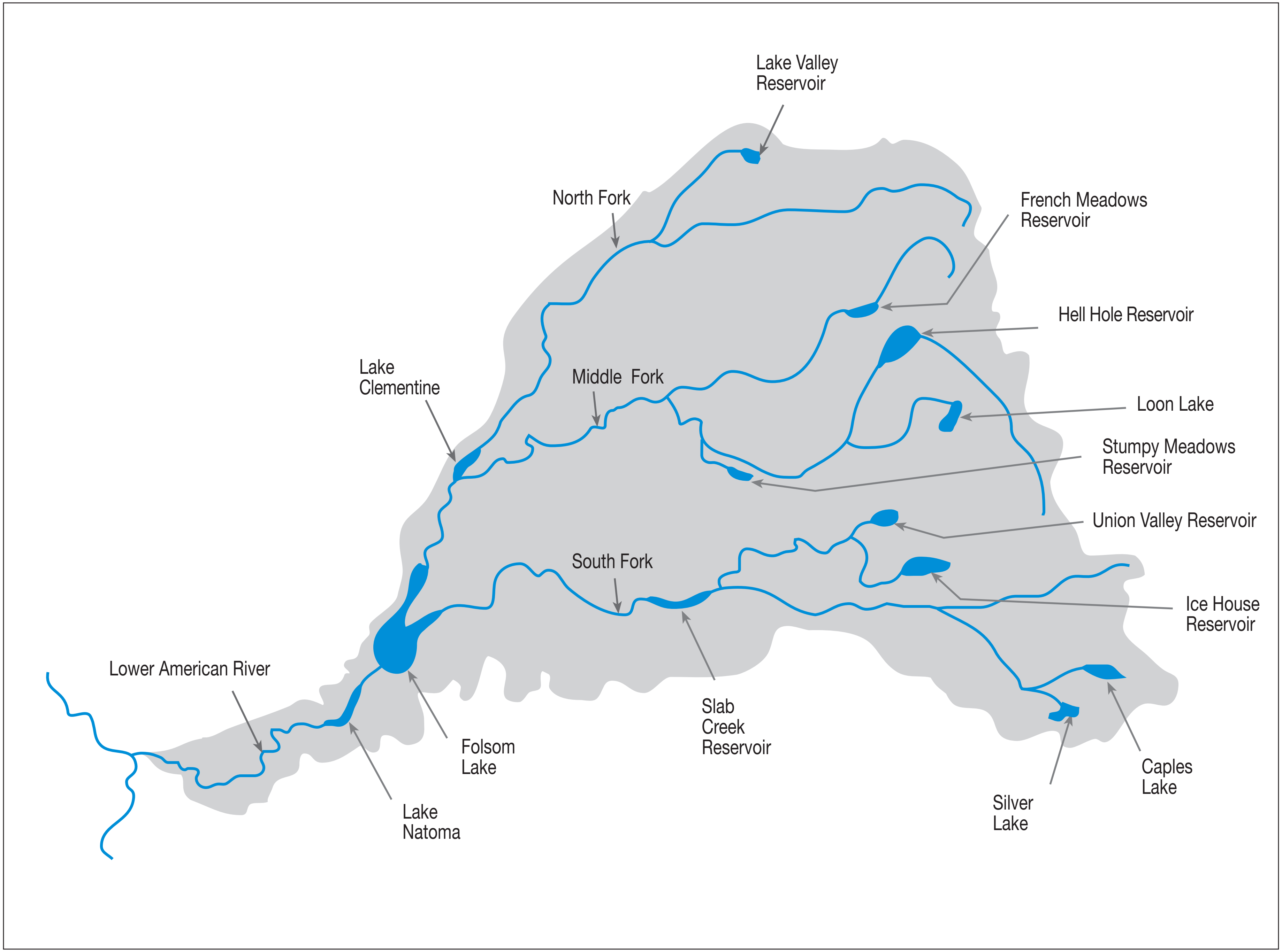


Figure 3-2. Major Reservoirs and River Reaches on the American River

Table 3-1. Characteristics of Major Reservoirs and River Reaches

River Reach/ Reservoir	Recreational Operator(s)*
North Fork Wild and Scenic River classification due to scenic, recreational, and historic values (Rafting from Iowa Hill Bridge to Upper Lake Clementine)	CDPR Auburn SRA
Lake Valley Reservoir Power generation	Pacific Gas & Electric
Lake Clementine Debris control	CDPR Auburn SRA
Middle Fork/Rubicon (Rafting from Oxbow access to North fork confluence)	CDPR Auburn SRA
Loon Lake Power generation	USFS El Dorado National Forest
Hell Hole Reservoir Multiple use – irrigation, municipal and industrial supply, power generation	USFS El Dorado National Forest PCWA
French Meadows Reservoir Multiple use – irrigation, municipal and industrial supply, power generation	USFS Tahoe National Forest PCWA
Stumpy Meadows Reservoir Multiple use – irrigation, municipal and industrial supply	USFS El Dorado National Forest
South Fork (Rafting from Chile Bar to Folsom Lake)	El Dorado County
Caples Lake Power generation	USFS El Dorado National Forest EID
Silver Lake Power generation	USFS El Dorado National Forest EID
Ice House Reservoir Power generation	USFS El Dorado National Forest
Union Valley Reservoir Power generation	USFS El Dorado National Forest Sacramento Municipal Utility District
Slab Creek Reservoir Power generation	USFS El Dorado National Forest
Folsom Lake Central Valley Project flood protection and water supply	CDPR Folsom Lake SRA
Lake Natoma Central Valley Project regulates Folsom Lake releases to the Lower American River and the Folsom South Canal	CDPR Folsom Lake SRA
Lower American River Wild and Scenic River classification due to recreational values (Rafting from Sunrise to Watt Avenue)	County of Sacramento Department of Regional Parks, Recreation and Open Space

NOTES:
SRA =State Recreation Area
* On some reservoirs there is also private land ownership and privately developed recreational facilities.

Modeling Impacts of Body Contact Recreation

Other water utilities have used modeling techniques to assess body contact recreation impacts. The Metropolitan Water District of Southern California (MWDSC) developed a risk assessment model for its Eastside Reservoir in a pioneering attempt to quantify risk associated with recreational use. Their model incorporated a number of factors including number of recreationalists, locations of use, reservoir volume and configuration, seasonal features, transport factors, and assumptions on pathogen loading. The results of this model, which found Eastside Reservoir source water particularly susceptible to *Cryptosporidium* contamination as a result of body contact recreation, prompted the DHS to revise its guidelines for recreational use permits for designated drinking water supply reservoirs and prompted several other water utilities to develop similar models, all for designated drinking water supply reservoirs. The MWDSC conclusions have been recently criticized in the literature as unsuitable as a basis for developing source water protection policy, due to the large uncertainties in the parameters used to compute pathogen loading.

There were only two confirmed detections of *Giardia* and one of *Cryptosporidium* in the Lower American River during summer months. This low frequency of detection during summer months is consistent with the trend found year-round, so there is no apparent recreation related trend.

In summary, although there are summer coliform peaks and elevated summer coliform densities at two intakes (EID Strawberry WTP and ACWS Coloma WTP) there is a limited ability to discern the true relationship of these data characteristics to body contact recreation. The few coliform peaks that immediately follow summer holiday weekends suggest a link. The observations of the City of Sacramento Boat Patrol on visible sewage contamination during periods when overnight boats congregate along the Lower American River is another link. We do know that there is a high degree of body contact recreation throughout the American River, that recreational use will increase as the population of the area increases, and that microbial contaminant loading is a direct function of the number of recreationalists.

A number of developments have occurred since the 1998 Update:

- New restrooms were installed on the North Fork and Middle Fork, were renovated at Lake Natoma, and were renovated or replaced along the American River Parkway.
- El Dorado County developed a plan for managing whitewater rafting on the South Fork, which includes limiting carrying capacity, insuring restroom facilities, and public outreach.
- The City of Sacramento passed and enforces an ordinance that prohibits unseaworthy vessels from mooring or anchoring in local waterways. This ordinance enabled the removal of derelict boats in the American River channel that lacked appropriate means of sewage handling.
- The Pumpout and Restroom Campaign was initiated, promoting the use of restrooms and the pumpout at Folsom Lake and the use of restrooms along the Lower American River. This campaign was extended from the Sacramento River to Folsom Lake and the Lower American River in response to the 1998 Update recommendation that the American River water utilities develop and implement a public education campaign targeting responsible recreational use of the river system.

The Pumpout and Restroom Campaign

The Pumpout and Restroom Campaign is a public outreach effort to identify the locations, of and promote the use of, pumpouts and restrooms at river recreation areas in the Sacramento metropolitan area. The Campaign was originated by the City of Sacramento along the Sacramento River in 2000 and was extended to Folsom Lake in 2001 and the Lower American River in 2002.

Sponsoring agencies now include many members of the ARWTC, the CDPR, the County of Sacramento Department of Regional Parks, Recreation and Open Space, and others. The 2002 campaigns began coordination with the City of Folsom's bilge management outreach program. Surveys, conducted by student assistants, provide feedback on the success of the program.

The campaign centers on distribution of "give-aways" and brochures showing the location of pumpouts and restrooms. A regional brochure shows Folsom Lake, the Lower American River, and part of the Sacramento River. Materials are distributed at Folsom Lake access points, local marinas, the American River Interpretive Center, the Nimbus fish hatcheries, at American River Parkway locations, parks offices, at local recreational-related retail outlets including boating and rafting companies, and at other points. Partner marinas fly flags showing the location of public pumpouts. Materials have also been distributed through field surveys and through public outreach events with the help of the U. S. Coast Guard Auxiliary and the City of Folsom's Folsom Lake Bilge Oil Kit Program. Public service announcements were developed and distributed for play on local radio stations; radio interviews were also conducted and given local radio station airtime. Campaign materials are in Appendix D.

3.3 Sanitary Issues along the Lower American Riparian Corridor

The Lower American riparian corridor includes the riparian/recreational areas bordering the Lower American River, namely the Lake Natoma Unit of the Folsom State Recreation Area and the American River Parkway.

Sanitary issues include availability of public restroom facilities, waterfowl waste at Nimbus Flat, horse waste from use of the equestrian trail, dog waste along certain areas of the parkway, and human waste associated with illegal camping in the most downstream reaches of the parkway.

Restroom locations with easy access to boaters and rafters are shown on the Pumpout and Restroom Campaign map in Appendix D. Restrooms are maintained at all parks and at regular intervals along the trail:

- At Lake Natoma there are restroom facilities at Negro Bar, Willow Creek, Nimbus Flat and the California State University at Sacramento (CSUS) Aquatic Center. There is also a floating restroom stationed between Negro Bar and Willow Creek. The Willow Creek and Nimbus Flat facilities were renovated between 1998 and 2002. The entire CSUS Aquatic Center facility is currently being renovated.

- Along the American River Parkway, restrooms are evenly spaced at about a 1.2 mile average, except in the area between Cal Expo and Discovery Park, an area of the parkway with homeless encampments, that has been plagued with past vandalism problems. As previously mentioned, the County rangers have prioritized older restrooms for renovation/replacement, with the pace of work being dependent on funding. The replacement and remodeling effort is intended to provide nice, bright, clean, well-lighted facilities with the expectation that nicer facilities will encourage greater use.

Waterfowl Population at Nimbus Flat

Recent renovation of Nimbus Flat has led to an increased use of the area and a large, ever-present, non-migratory waterfowl population as a result of people feeding the waterfowl. Goose and duck waste are now present at the Nimbus Flat area to such an extent that it even interferes with the public's enjoyment of the facilities.

The CDPR is currently conducting a survey of the migratory versus non-migratory waterfowl population. The survey is required by the California Department of Fish and Game (CDFG) as a first step in development of a waterfowl control program for the lake. Once the survey is complete, the CDFG will develop a control program, which the CDFG and the CDPR will then jointly implement. In the meantime, the CDPR installed interpretive signs at Nimbus Flat explaining the connection between feeding the waterfowl and the degradation of the area and requesting the public to cease the feeding activities.

Most restroom sewage is piped to the regional sanitary collection system although there are a few vault toilets and portable toilets. Flood proofing measures are in place for piped and vault toilets. Portable toilets are located on high ground and may also be removed at short notice in the event of flooding.

Waterfowl at Nimbus Flat are described in the accompanying text box. These waterfowl may be partly responsible for generally elevated summer coliform levels at the ACWS intake along Folsom South Canal, which is just downstream of Nimbus Flat.

There is an equestrian trail along the length of the Lower American River corridor. There is no manure pickup along the trail. According to the County chief ranger, however, the equestrian trail is used infrequently. Dog waste issues and illegal camping are described in the accompanying text box, as is illegal camping.

There are currently no public education signs or other materials related to use of restrooms, pet waste management, or any other sanitary issues along the American River Parkway. The parkway chief ranger, however, recently agreed to post stewardship messages (indicating that the river is a drinking water source) and perhaps other source water protection messages on new bulletin boards that are expected to be installed in the parkway.

All of the sanitary issues discussed (with the exception of restroom facilities) involve deposition of fecal waste on near shore areas. During storms, this fecal waste washes into the American River upstream of the Lower American River water utilities' intakes. This wash off contributes to microorganism loading during storm events and likely contributes, to some degree, to the coliform peaks associated with wet weather and the increase of average bacteria levels from upstream to downstream along the Lower American River.

Dog Waste along the American River Parkway

According to the parkway chief ranger, dog waste is a problem in specific areas of the parkway. The most problematic areas are those where neighborhood enclaves have local access points to the parkway and resident dog owners have developed the habit of walking their dogs in the parkway in order to use the parkway for defecation. Paradise Beach is another parkway area with heavy dog use. Park rangers post and enforce the leash law but do not currently post or enforce pet waste pick up ordinances.

The CUWA is facilitating a project to install, service, and promote dog waste dispenser stations along the Lower American riparian corridor. This project would address pet waste in the parkway through signage, installation of pet waste bag dispenser stations, and posting of local pet waste ordinances with increased enforcement. Interested project participants currently include the Sacramento County Parks, Recreation, and Open Spaces Department, the American River Parkway Foundation, the City of Sacramento, and potentially other Lower American River water utilities.

Illegal Camping in the American River Parkway

There is a continuous, though shifting, population of homeless people camping illegally in the parkway. These camps are mostly downstream of the Capital City freeway bridge crossing, close to social services in downtown Sacramento. Many of the camps are near the river. A few encampments are also found between the Howe Avenue and Capital City freeway bridge crossings. A map showing the location of illegal campsites is in the City of Sacramento section of Appendix D.

The camps become littered with debris, garbage, and sewage (litter, used toilet paper, human waste, discarded syringes, food wrapper, old clothes, etc.). Park rangers clean up the 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. According to the parkway chief ranger, during 1999 about 15 tons of trash was removed from homeless camps in the parkway. Since the assignment of two full-time rangers, the amount of trash picked up has averaged about 60 tons per year.

The Sacramento County and Cities Board of Homelessness continues to address homeless issues with a comprehensive program of social services, relocation, and enforcement. This effort, which began in 1998, has resulted in a decrease in numbers of homeless people within the parkway to about 100 people. Estimates of homeless people in the parkway in earlier years ranged from 300 to 900. The parkway chief ranger characterizes most of the remaining homeless people in the parkway as service resistant, i.e. people unwilling to accept help to change their homeless lifestyle. Therefore, while social services continue to be offered, further efforts in the parkway have focused on enforcement: tightening ordinances, citing, arresting and prosecuting service resistant homeless people. The City of Sacramento Attorney's Office takes the lead on prosecutions.

The 1998 Update noted that Lake Natoma recreational facilities would be renovated; the resulting waterfowl problem at Nimbus Flat was not foreseen. The 1998 Update also described restroom facilities along the parkway. The prioritization of older restrooms for renovation and replacement, finding funds for the work, and beginning replacement of some of the restrooms began since the 1998 Update and is continuing at present. The 1998 Update also noted the illegal camping problem in the parkway. Formation of the Sacramento County and Cities Board of Homelessness occurred in 1998 and all work conducted as part of that effort began in 1998, extending to the present.

The 1998 Update recommended that the Lower American River water utilities confer with the County of Sacramento regarding sanitary improvements along the American River Parkway, which most did.

3.4 Urban Runoff

Urban runoff occurs during both dry and wet weather. Urban runoff is of interest to the water utilities diverting from the Lower American River and is of increasing interest to the Folsom Lake water utilities as urbanization of the Folsom Lake basin and the lower reaches of the upper watershed continues. During wet weather, it is one of several sources of storm runoff that also include upper watershed runoff, runoff from the Lower American riparian corridor (Lower American River only) and occasional SSOs. Urban areas in the watershed under NPDES permit are shown on **Figure 3-3**. The accompanying text box describes the two phases of regulations that require local governments to manage their urban runoff. The Sacramento Phase I permittees have had an established stormwater management program since 1990. The Phase II permittees are currently developing their stormwater management programs.

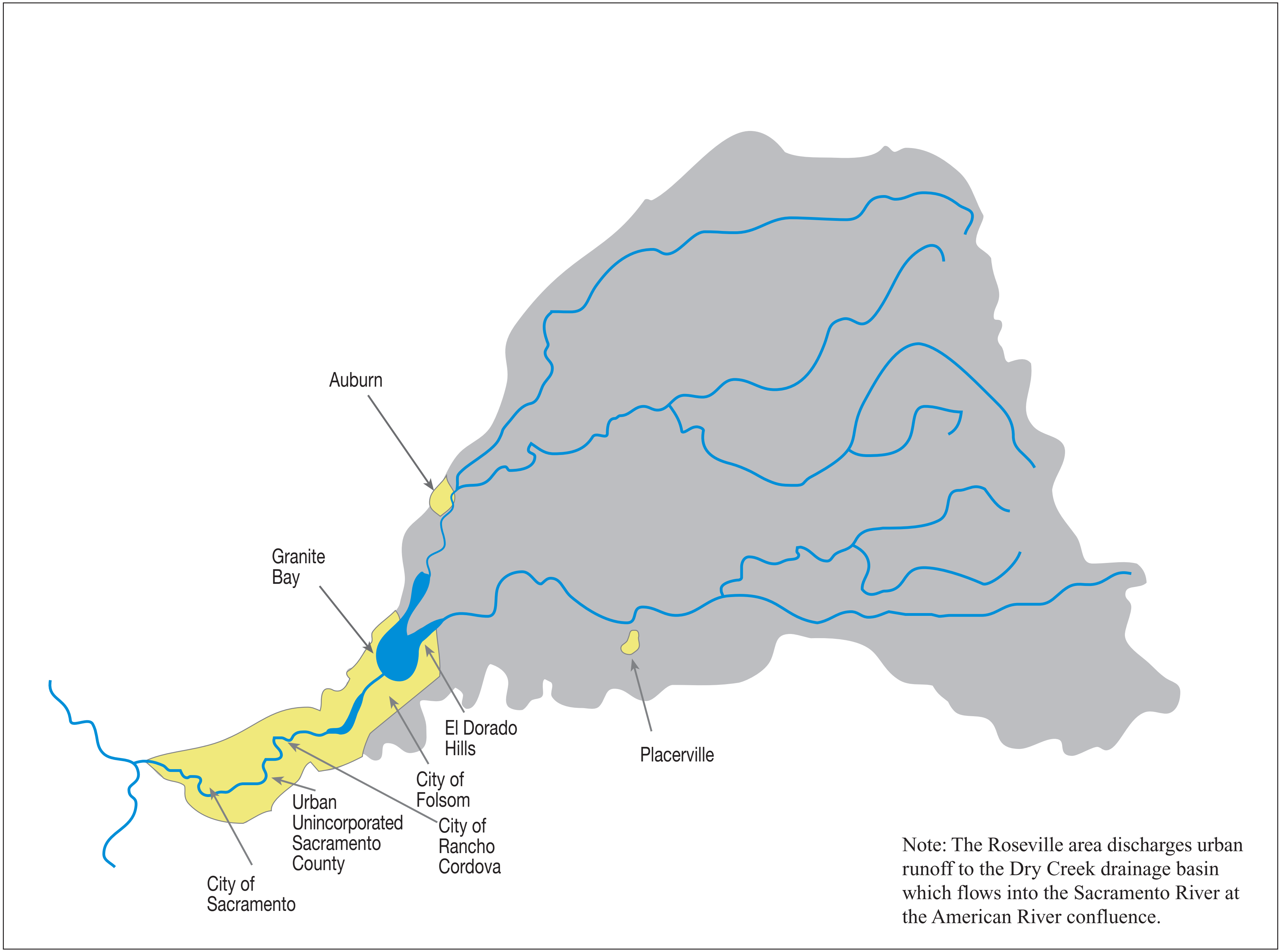


Figure 3-3. Urban Areas Subject to Stormwater Regulation

Urban Runoff Management

Management of runoff from urban areas is the responsibility of local governments, with stormwater management for certain urban areas conducted under the NPDES permit program. The 1990 Phase I stormwater regulations covered large municipalities and brought Sacramento County and the municipalities within Sacramento County under an individual NPDES permit. In the American River watershed, the Sacramento Stormwater Management Program, under the Phase I regulations, includes the entire urban area tributary to the Lower American River under the jurisdiction of the:

County of Sacramento
City of Folsom
City of Sacramento

The Sacramento Stormwater Management Program is well established, implementing BMPs to reduce pollution from construction sites, industrial facilities, new developments and municipal operations and facilities and to detect and eliminate illegal discharges. Public education and outreach is used as the principal BMP to reduce pollution resulting from activities of the general public. The program includes a long term monitoring effort to measure the overall success of the program in improving the water quality of urban runoff. The program also includes a unique effort to implement target pollutant reduction strategies to reduce levels of mercury, pesticides, coliform/pathogens, copper, and lead in the runoff.

The 2003 Phase II regulations bring smaller municipalities and urban areas under permit. The Phase II permittees fall under a state general permit that requires the municipality to implement a stormwater management program similar to the Phase I permittees, but less prescribed. Phase II municipalities in the American River watershed include several municipalities either tributary to Folsom Lake or in the upper watershed:

El Dorado Hills
Placerville (part of this city drains to the American River)
Auburn (part of this city drains to the American River)
Granite Bay
Roseville, whose urban runoff drains into the Sacramento River at the American River confluence, is also a Phase II municipality

Urbanization adds to the impervious cover in a drainage basin, and thus contributes to intense flows and increased sediment loading to the river during storms. Urban runoff is also a source of SOC pesticides and VOCs from urban use and vehicular sources; TOC from vegetation and green waste, animal waste, and fertilizers; and microorganisms from fecal waste in the urban environment.

The Sacramento Stormwater Management Program, implemented under Phase I, addresses these aspects of urban pollution as follows:

- Turbidity and sediment loads are reduced through a suite of best management practices (BMPs), including detention basins, implemented during construction and post-construction.
- Pesticide use is a principal focus of public education and outreach efforts. Pesticides are a target pollutant that receive special attention including the formation of creek stewardship groups that target pesticide use.
- BMPs implemented by some of the permittees that reduce TOC include detention basins and grassy swales, street sweeping and storm drain system maintenance, erosion control at construction sites, public education and outreach for landscape management, and containerization of green waste.

- Fecal waste is reduced through an illicit connection program, pet waste public education and pilot programs to install pet waste dispenser stations in parks, inspection of kennel facilities, street sweeping, and storm drain system maintenance. The Sacramento Stormwater Management Program is in the process of developing a Fecal Waste Reduction Strategy with the goal of specifically targeting fecal waste.

- The Cal Expo horse racing facility, which discharges to the storm drain system, is also developing a waste management strategy. Management of horse waste at Cal Expo is currently being discussed between Cal Expo and the RWQCB.

In the past five years, a few special monitoring studies (described in the accompanying text boxes) have provided better information on Sacramento urban runoff levels of TOC, SUVA, and various pathogenic microorganisms. Data collection through the program's ongoing monitoring program has provided information on VOCs and SOCs.

- The Sacramento Stormwater Management Program's ongoing monitoring program shows that various VOCs and SOCs are sometimes detected in urban runoff. As discussed in Section 2, organic chemicals were infrequently detected in the Lower American River between 1998 and 2002. When detected, Sacramento area urban runoff must be considered one of the likely sources since most of the organic chemicals that have been detected in the river over the past five years have also been detected in Sacramento area urban runoff. Other possible sources of the VOCs and SOCs in the river include upstream urban area runoff, Aerojet discharges (for a few organic chemicals) and hazardous materials spills (which occur sporadically).

- The City of Sacramento Urban Runoff SUVA Study shows that Sacramento urban runoff, with a median TOC value of 7 mg/L, is a source of humic organic carbon to the river, which has a median TOC value less than 2 mg/L. Due to a lack of data for other sources, it is not known whether urban runoff is a more or less significant source of TOC than upper watershed runoff or Lower American River corridor runoff.

City of Sacramento Urban Runoff SUVA Study

The SUVA Special Study was conducted by the City of Sacramento to provide better information on organic carbon levels in Sacramento urban runoff and determine whether the organic carbon is humic in nature.

Monitoring data were collected from three City of Sacramento storm drainage sumps from 1999 through 2001. A total of 41 samples were collected during both dry weather and storm events.

The results indicated that Sacramento urban runoff has a median TOC level of 7 mg/L, similar to agricultural drainage. Samples collected during storm events had higher TOC levels than samples collected during dry weather. The highest TOC levels were in the fall (probably associated with the fall leaf drop) and late spring (perhaps associated with spring growth and seasonal landscape maintenance). Most of the time, SUVA levels were greater than 3.0 m-L/mg, indicating that the organic carbon present is humic in nature.

- The University of California at Davis (UC Davis) California Department of Transportation (Caltrans) Urban Runoff Pathogen Study showed few positive detections of pathogenic bacteria, viruses, or protozoa in dry weather urban runoff, statewide. Since detection levels were higher than desirable, it can only be concluded from these data, that pathogens are unlikely to be present at high levels in dry weather runoff.

UC Davis-Caltrans Urban Runoff Pathogen Study

The UC Davis Urban Runoff Pathogen Study was conducted by UC Davis for Caltrans as a survey of the presence of pathogenic microorganisms in Caltrans facility and highway runoff.

Most monitoring data were collected in Southern California. Most study samples were collected during dry weather; a few dry weather samples were collected in Sacramento. Samples were analyzed for four pathogenic viruses (adenovirus, enterovirus, hepatitis A virus, rotavirus), five pathogenic bacteria (*enterrohemorrhagic E. coli*, *enterotoxigenic E. coli*, *Shigella*, *Salmonella*, *Staphylococcus aureas*), and two pathogenic protozoa (*G. lamblia*, *C. parvum*). UC Davis used a new analytical genetic test that they developed based on polymerase chain reaction (PCR) techniques. Detection limits were higher than desired so the results were simply reported as positives or negatives.

The results indicated that of the 146 samples collected throughout California, very few were positive for pathogenic bacteria, viruses, or protozoa. Of the three dry weather samples that were collected in Sacramento, adenovirus was positive in one sample. There were no positives for pathogenic bacteria or protozoa in the Sacramento samples.

The UC Davis researchers are continuing their work into developing pathogen test methods for use on urban runoff. The Caltrans study found the PCR based test methods achieved good reproducibility, but the detection limits were too high. The proposed work aims to make improvements in the detection limits. The City of Sacramento has offered some funds to support the continued research.

- The Sacramento Stormwater Management Program's Pathogen Study supported the UC Davis results described above in that *Giardia* and *Cryptosporidium* were detected in only one out of eight dry weather samples, at relatively low levels. These protozoa were detected more frequently in wet weather samples at generally low levels, but levels from one early season storm were quite high. As discussed in Section 2, there appear to be generally low levels of these protozoa in the river at any time of year, although it appears that storm events contribute to occasions of higher counts. Due to a lack of data from other sources, it is not known whether urban runoff is a more or less significant storm source than upper watershed runoff or Lower American River corridor runoff. Sanitary sewer overflows (SSOs) may also be a source of these protozoa, although SSO occurrence is fortunately sporadic.

The 1998 Update noted that coliform levels are quite high in urban runoff suggesting the presence of fecal waste and other microorganisms such as pathogens. It was further noted that additional ultraviolet (UV) data would be helpful in better evaluating urban runoff as a source of humic organic carbon. The studies on pathogens and SUVA that have been conducted in the past five years enhance our understanding of urban runoff as a source of these constituents. The ability to identify one source as more or less responsible for organic carbon or protozoa in the river remains limited due primarily to a lack of data on the other sources. Currently there appears to be adequate dilution in the American River to accommodate TOC loading from urban runoff and from all other sources of TOC without exceeding the enhanced treatment trigger level of 2.0 mg/L in the river. For drinking water, there appears to be adequate dilution in the Lower American River for organic contaminants. Based on the Sacramento Urban Runoff Pathogen Study results, *Giardia* and *Cryptosporidium* inputs to the river in urban runoff (and from other sources) may occur infrequently, and may not coincide with the timing of river sample collection, making true impacts to the river difficult to quantify. These protozoa may, however, be episodically present in the river at higher levels during storms. As a whole, the monitoring data for urban runoff discharges reinforces the need to optimize water treatment processes during storms, which provides reduction of organic carbon and increased protection against instances of higher pathogen levels in the river.

Sacramento Urban Runoff Pathogen Study

The Sacramento Urban Runoff Pathogen Study was conducted by the Sacramento Stormwater Management Program to test for the presence of *Giardia* and *Cryptosporidium* in Sacramento and to determine whether the *E. coli* that is commonly found in Sacramento urban runoff is the pathogenic strain, *E. coli 0157H7*.

Monitoring data were collected from one City of Sacramento and one County of Sacramento storm drainage channel during 2001 and 2002. A total of 21 samples were collected during both dry weather and storm events. *Giardia* and *Cryptosporidium* samples were analyzed using EPA Method 1623. Matrix spike samples showed, for the most part, good recoveries.

The results, shown below, found these protozoa to either not be present or to be present at low levels. There was one exception in that high *Giardia* and *Cryptosporidium* levels were found in an early season storm sample. This is similar to results of a sampling study on open rangeland in California that found the majority of cysts were transported during the first storms of a rain season. No *E. coli 09157H7* were found.

		Confirmed *Giardia*, organisms/L	Confirmed *Cryptosporidium*, organisms/L
Dry weather samples			
October 2001	S28	<0.1	<0.1
	SRS	0.1	Est. 0.3
January 2002	S28	<1.0	<1.0
	SRS	<0.1	<0.1
March 2002	S28	<0.1	<0.1
	SRS	<0.1	<0.1
May 2002	S28	<0.1	<0.1
	SRS	<0.1	<0.1
Wet weather samples			
February 2001	S104	Est. 0.6	0.2
October 2001*	S28	Est. < 0.4	< 0.2
	S28	Est. < 0.2	< 0.1
	SRS	10	4
	SRS	Est. 8	6
February 2002*	S28	<2.0	< 2.0
	S28	<0.2	< 0.2
	SRS	<0.4	< 0.4
	SRS	0.2	< 0.2
March 2002*	S28	<1.3	< 1.3
	S28	<0.1	< 1.0
	SRS	< 0.9	< 0.9
	SRS	Est. 0.4	0.4

NOTES:
S104 = Sump 104, City of Sacramento sump. This was a feasibility sample to determine whether acceptable recovery rates could be obtained.
S28 = Sump 28, City of Sacramento channel. Most of the drainage system is piped.
SRS = Strong Ranch Slough, County of Sacramento channel. The entire drainage system is open channel.
* An early and late event sample were collected at each sampling location during these wet weather events.

The 1998 Update had a recommendation for the City of Sacramento to share information with the ARWTC on work in progress on the Sacramento Stormwater Management Program. The City of Sacramento is sharing information with other ARWTC members, as part of this 2003 Update. Furthermore, the City wholly sponsored the Urban Runoff SUVA Study.

3.5 Aerojet Superfund Site

Aerojet General Corporation operates a rocket testing and chemical manufacturing facility on property located about a half mile south of Lake Natoma and bounded on the west by the Folsom

South Canal. There is a superfund site at this location as a result of past operating and chemical disposal practices. The EPA, the RWQCB, and the California Department of Toxic Substances Control, are jointly responsible for oversight of the superfund site cleanup. **Figure 3-4** is a map showing the Aerojet Superfund Site. Most of the information on which this discussion is based was obtained from RWQCB staff. See Appendix A for specific documents reviewed. Some general information was also obtained from the EPA website.

Under several NPDES permits, Aerojet discharges storm runoff, cooling tower water runoff, treated groundwater, and (sometimes during wet weather) treated industrial process water to American River tributaries. **Table 3-2** shows the various discharges. There have been no significant changes in the past five years in storm runoff, cooling tower discharges, or treated process water discharges. There have been significant changes in treated groundwater discharges, which is the focus of this 2003 Update review of Aerojet. Further changes may also be anticipated in the future for treated groundwater discharges including changes in where the treated groundwater is discharged. Aerojet is required, as a condition of its groundwater NPDES permit, to evaluate piping the GET E/F discharge to Alder Creek rather then its current discharge to Buffalo Creek. Also, as described in the accompanying text box, reuse alternatives for Aerojet treated groundwater are currently being determined. The reuse determinations will include the disposition of additional treated groundwater to be produced by the new Mather GET as well as the disposition of the American River GET (ARGET) and GET E/F treated groundwater.

Alder Creek currently receives few discharges, only storm runoff and cooling water. Overflow from the pond in Sailor Bar Park generally occurs only during storms when urban runoff inflows to the pond exceed pond capacity. The most complex set of discharges are to Buffalo Creek. Buffalo Creek has been modified, realigned, and impounded in three areas: from upstream to downstream these are F-Area Lake, two unnamed retention ponds, and West Lake. The most downstream impoundment on Buffalo Creek is West Lake, which consists of three distinct cells. There is also a bank of passive infiltration wells between West Lake and the Folsom South Canal. West Lake water can either infiltrate through the lake bed and be carried downwards via the infiltration wells, or continue downstream into Buffalo Creek. According to RWQCB staff, West Lake is at a higher elevation than Buffalo Creek, which is at a higher elevation than Folsom South Canal, so it is possible that there is some hydrologic communication between the canal and these facilities as well as the infiltration wells.

Industrial Process Water Discharges

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

The process water contains rocket propellant residues containing hydrazines, oxides of nitrogen, NDMA, and VOCs. The process water is collected and analyzed for compliance with effluent limits. The detection limit for hydrazines (there are three forms) is 10 μg/L and this is the effluent limit for all hydrazines combined. The EPA recommends estimated permissible concentrations of hydrazine for human health at 18 μg/L and of methylhydrazine at 2 μg/L. Thus, according to RWQCB staff, setting the effluent level at the detection limit is the most protective effluent level that science currently allows.

During wet months, when capacity in the sewer collection system is sometimes exceeded, this process water may be discharged to F-Area Lake (an impoundment on Buffalo Creek).

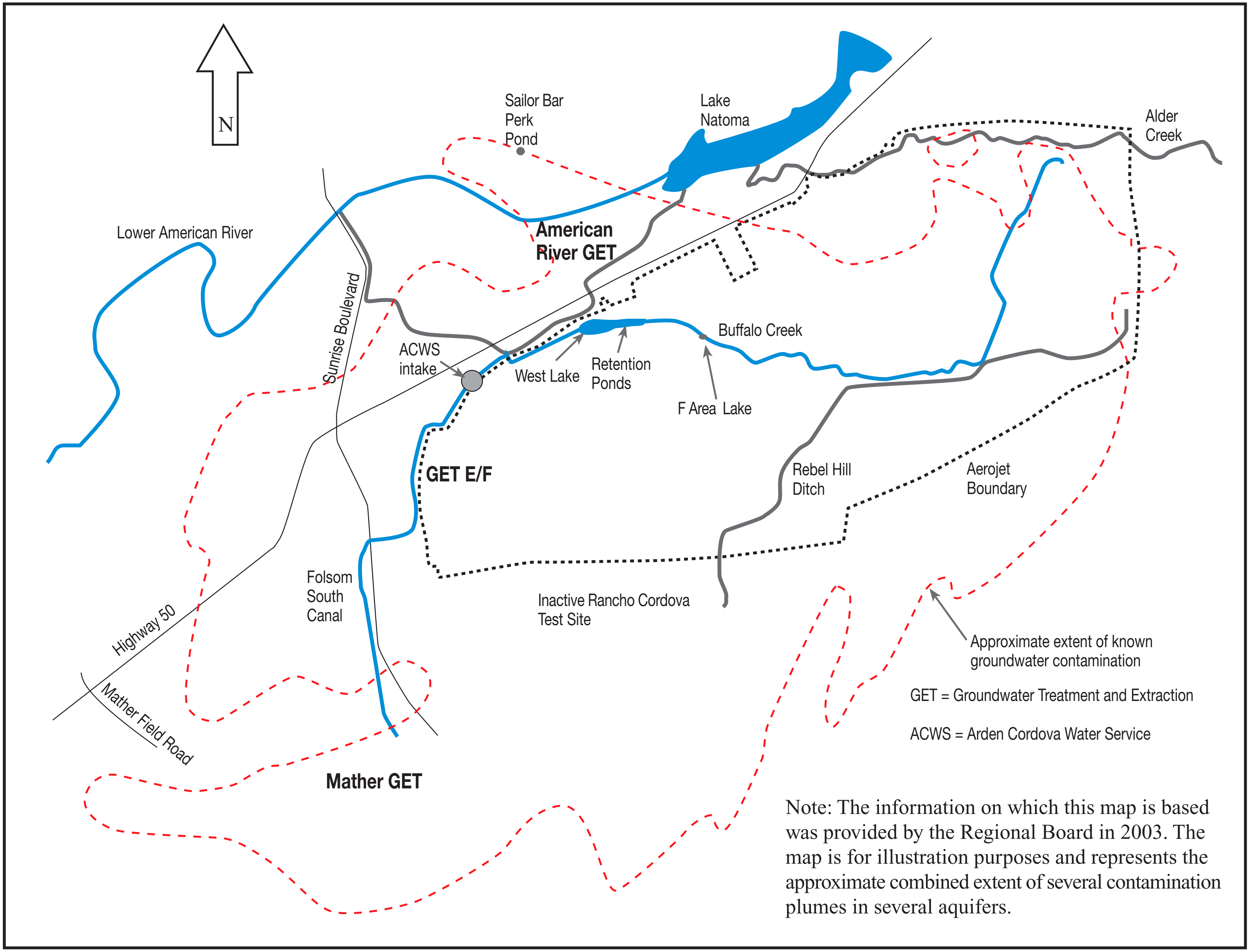


Figure 3-4. Aerojet Groundwater Plume Map

Table 3-2. Current Aerojet Discharges to American River Tributaries

Tributary	Aerojet Surface Water Discharges
Alder Creek (8 discharge locations) - tributary to Lake Natoma	Storm runoff Cooling tower water
Buffalo Creek and its impoundments (166 discharge locations) - tributary to the Lower American River - may have hydrologic communication with Folsom South Canal	Storm runoff Cooling tower water ARGET treated groundwater GET E/F treated groundwater Treated industrial process water
Pond in Sailor Bar Park - Pond overflow is tributary to the Lower American River	ARGET treated groundwater

NOTE:
There are also minor discharges to Rebel Hill Ditch, which empties onto land and is not tributary to the American River.

Changing conditions at the Aerojet Superfund Site, with respect to discharges, are driven by the pace and extent of groundwater cleanup. Groundwater cleanup continues to focus on controlling the leading edge of plumes that are migrating offsite, i.e. on the ARGET, GET E/F, and Mather GETplumes. The overall cleanup strategy, according to RWQCB staff, is to (1) contain offsite movement and (2) conduct cleanup at the site as technologies are developed to facilitate a more complete cleanup. Groundwater cleanup for the ARGET, GET E/F, and Mather GET plumes alone is estimated, according to the EPA, to take around 240 years.

During the period 1998 through 2002, Aerojet conducted more extensive testing of the groundwater contaminant plumes than previously. Much of this testing is described in the accompanying text box on the GET E/F. Aerojet has also tested for the contaminants that the State Water Resources Control Board considers to be emerging groundwater contaminant issues: perchlorate, NDMA, 1,4-dioxane, hexavalent chromium, 1,2,3- trichloropropane, and MTBE. Perchlorate, 1, 4-dioxane, and NDMA are known principal contaminants in the groundwater, as shown in **Table 3- 3**.

ARGET

The ARGET contaminant plume of VOCs (principally TCE), 1, 4-dioxane, and perchlorate extends offsite under the American River. According to RWQCB staff, there are no known sources of NDMA to this plume and current monitoring has not detected any. The plume is migrating laterally northwest and vertically deeper. Most of the contamination is at 50 to 250 feet below ground surface, suggesting the river is not a major interceptor of the contaminant plume. According to RWQCB staff, some low levels of TCE have been found beyond the current extraction well capture zone.

The 3,500 gpm ARGET treatment plant consists of air stripping (removes VOCs to < 0.5 µg/L) and UV light/peroxide oxidation (removes 1, 4-dioxane to < 3 µg/L). Thus, 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 DHS Action Level of 4 µg/L. A decision was made not to add treatment for perchlorate at the ARGET since, as per RWQCB staff estimates, there will be a 30-fold dilution in the American River (estimated at minimum river flow of 250 cfs and maximum discharge rate of 3,500 gpm).

An additional 500 gpm is treated with granular activated carbon (GAC) for discharge to a pond in Sailor Bar Park. The County of Sacramento requested discharge to the park pond since they found the treated groundwater is better quality water than the mix of urban runoff and untreated groundwater that previously fed the pond.

GET E/F

The GET E/F contaminant plume of perchlorate, NDMA, and VOCs extends offsite under the Folsom South Canal. The plume is migrating laterally west and vertically deeper. Most of the contamination is in deeper aquifers, suggesting the canal is not a major interceptor of the plume. The uppermost aquifer is 80 to 100 feet below ground surface along the canal south of Highway 50. Remediation of the GET E/F area has priority due to shut down of drinking water supply wells in the area.

The 6,000 gpm GET E/F treatment plant consists of air stripping (removes VOCs to < 0.5 µg/L), UV light/peroxide oxidation (removes NDMA to < 0.002 µg/L), and biological reduction (reduces perchlorate to <4 µg/L). Thus, treatment covers all the currently monitored and known contaminants.

Aerojet had previously (until 1999) treated the water for VOCs only and reinjected the treated groundwater at the Aerojet site boundary, thus introducing perchlorate and NDMA into the reinjection areas. Aerojet, in recent years, has conducted additional monitoring on its GET E/F effluent to test for the presence of other contaminants. Some of the analyses were conducted by Aerojet's own laboratory while some were conducted by independent laboratories. Detection levels vary for different analyses.

1. Aerojet tested the GET E/F treated water for Title 22 constituents on three dates in 2000. NDMA was detected in all three treated water samples at 0.002 µg/L, below the Action Level. 1, 1-dichloroethane was detected in two treated water samples below the MCL and dichloromethane was detected in all three treated water samples below the MCL.

2. The RWQCB requested Aerojet review 18 chemicals used onsite and assess what laboratory methods could be used to analyze them in the GET E/F effluent, to check for their presence. Aerojet determined that 15 of the 18 compounds can be analyzed using available analytical techniques as tentatively identified compounds reported under EPA Method 8260 and 8270 or as imine compounds analyzed by the Epstein Method. Aerojet had previously analyzed the GET E/ F effluent in 1999 using Methods 8260 and 8270 (see below). In 2001, Aerojet conducted analysis of the GET E/F effluent for imine compounds under the Epstein Method, with no resulting detections at reportable levels. Aerojet determined that there are no known methods of analysis for three of the 18 chemicals (one of which, however, is insoluble).

3. In 1999 and 2000, at the request of the RWQCB, Aerojet conducted monitoring for additional compounds in the GET E/F effluent, as shown below. None of these chemicals were detected at reportable levels except for barium at 110 ppb, which is an order of magnitude below the barium MCL of 1 mg/L.

Test Method	Tested Contaminants
EPA Method 200	Metals
EPA Method 547	Glyphosate
EPA Method 502.2	Volatile organic compounds
EPA Method 505	Organochlorine pesticides
EPA Method 507	Nitrogen-phosphorous pesticides
EPA Method 515.1 and 3510	Chlorinated acid herbicides
EPA Method 531.1	Carbamates
EPA Method 548.1	Endothal
EPA Method 632 and 3510	Carbamate and urea pesticides
EPA Method 504	Ethylene dibromide and 1,2-Dibromo-3-Chloropropane
EPA Method 8015	TPH extractable
EPA Method 524.2	Purgeable organic Compounds
EPA Method 8260	Volatile organics, including tentatively identified compounds
EPA Method 625	Semivolatile organics
EPA Method 549.1	Diquat
EPA Method 8240	Volatile organics
EPA Method 8270	Semivolatile organics, including tentatively identified compounds
Semivolatile organics	HLPC
Prowl	HLPC

Mather GET

A contaminant plume principally consisting of perchlorate (also with some TCE, but no detected NDMA), extends offsite to the west and south, deeper and further than the GET E/F capture zone. This plume will be remediated through installation of the Mather GET. Treatment being considered for the Mather GET is ion exchange for perchlorate and GAC, if needed, for VOCs. The first step in remediation is for extraction wells to be constructed at the leading edge of the plume to prevent further migration. The McDonnell Douglas Corporation (MDC), a subsidiary of Boeing, jointly conducted rocket testing with Aerojet at the Inactive Rancho Cordova Test Site from which this plume originates and shares responsibility with Aerojet for cleanup of this plume.

An aquifer test is needed in order to properly design the extraction wells; the aquifer test discharge is likely to be to the American River. The aquifer test will be done in two phases – a 12-hour step-draw down test followed by a 24-hour recovery period and then a 78-hour constant drawdown test. Prior to conducting the tests, Aerojet will sample the test well and nearby monitoring wells and estimate the concentration of VOCs, perchlorate, and NDMA in the discharge water. If the discharge water is estimated to be less than 18 µg/L perchlorate, 0.020 µg/L NDMA, and 5 µg/L TCE and perchloroethylene (PCE) then the discharge will go to the American River via the County storm drain system (pending negotiation with the County of Sacramento). If the discharge is not estimated to meet these limits it will be discharged to the sanitary sewer system (pending negations with the Sacramento Regional County Sanitation District [SRCSD]). The discharge will be sampled directly; however, the test results cannot be obtained in time to make real-time decisions on discharge options during the testing.

Table 3-3. Principal Groundwater Contaminants at the Aerojet Superfund Site

Contaminant	Source	MCL, µg/L	Treatment
Perchlorate Inorganic anion	Component of solid rocket propellant	4 *	Biological reduction reduces perchlorate to <4 µg/L
N-nitrosomodimethylamine Semi volatile organic compound	Combustion product of liquid rocket fuel	0.01 *	UV light/peroxide oxidation removes NDMA to < 0.002 µg/L
1,4-dioxane	Stabilizer in solvents	3*	UV light/peroxide oxidation removes 1,4-dioxane to < 3 µg/L
Volatile Organic Chemicals			
Trichloroethylene (TCE)	Solvent	5	Air stripping and/or GAC removes VOCs to < 0.5 µg/L
Tetrachloroethylene (PCE)	Solvent	5	
1,1-dichloroethene (1,1-DCE)	Solvent	6	
1,2 – dichloroethene (1,2-DCE)	Solvent	6 (cis) 10 (trans)	
1,1-dichloroethane (1,1-DCA)	Solvent	5	
1,2-dichloroethane (1,2-DCA)	Solvent	0.5	
Carbon tetrachloride (CCl4)	Solvent, refrigerant, propellant	0.5	
Chloroform	Solvent	-- **	
Vinyl chloride	VOC degradation product	0.5	

NOTES:
* DHS Action Level. For perchlorate, the DHS has set a PHG of 2 to 6 µg/L and is planning to establish a state perchlorate MCL by January 2004.
** The MCL is 80 µg/L for the sum of chloroform, dibromochloromethane, bromodichloromethane, and bromoform.

The Aerojet NPDES permit for discharge of treated groundwater includes several requirements related to monitoring:

- Monitoring of effluent and of receiving waters on a mostly monthly frequency.

- Higher frequency (weekly) receiving water monitoring under low flow (1,500 cfs) 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 4 μg/L Action Level or a new state MCL. This condition was included since perchlorate in the ARGET plume is not treated (see accompanying text box on the ARGET).

- Notification to downstream water utilities within 24 hours if effluent limits are exceeded in the discharge.

Aerojet monitoring data were reviewed and/or discussed with RWQCB staff for Alder Creek, Buffalo Creek, and the American River. Monitoring data from the ACWS' Coloma WTP and from the CMP were also reviewed. Neither perchlorate, NDMA, nor 1,4-dioxane were detected at reportable levels in the Lower American River from 1998 through 2002. VOCs were detected in the Lower American River, as discussed in Section 2 and below. The detections of note are as follows:

- Aerojet's Buffalo Creek monitoring data from 2000 through March 2003 showed several detections of perchlorate at the upstream Buffalo Creek monitoring station. Of a total of 392 samples collected between January 2000 and March 2003, there were 40 perchlorate detections at this upstream location, ranging from 4.1 to 16 μg/L, all above the Action Level. There have been no perchlorate detections at reportable levels at the downstream Buffalo Creek monitoring station. The detections at the upstream station are thought, by RWQCB staff, to result from infiltration from Rebel Hill Ditch in a stretch where the creek and the ditch are in close proximity. A section of the ditch will be lined to reduce exfiltration from the ditch.

- ACWS detected NDMA at its Coloma WTP intake seven times in sampling conducted between April 2000 and February 2002 at very low levels, below the PQL. All but one of these low level detections were below the Action Level (0.01 μg/L). An additional 16 samples collected from March 2002 through May 2003 were all non detect below the PQL. The ACWS also had a single detection of 1,4-dioxane at 0.0029 μg/L, below the Action Level (3 μg/L).

- As discussed in Section 2, dichloromethane was detected by the CMP at Nimbus and Discovery Park in October 2001 above the MCL. The river detections may or may not have been associated with the Aerojet site. This contaminant was previously detected in GET E/F treated water, but the GET E/F was not discharging to the river at the time these samples were collected. As discussed in Section 2, detections at these levels in the American River is highly anomalous and especially unusual since dichloromethane is a VOC and vaporizes under ambient conditions.

Since the 1998 Update the RWQCB has permitted additional discharges of treated groundwater to the American River. The treated groundwater discharges consistently meet the groundwater NPDES permit effluent limits, which the RWQCB sets below MCLs and Action Levels or at reportable detection levels. There is one exception to this since the RWQCB allows perchlorate in the ARGET discharge above the Action Level and relies on dilution to reduce these perchlorate levels to below the Action Level in the river.

There have been two positive developments with respect to groundwater treatment at the Aerojet Superfund Site: (1) treatment is now more comprehensive and includes GET E/F treatment for perchlorate and NDMA and ARGET treatment for 1,4-dioxane and (2) there has been more comprehensive testing for additional potential contaminants (Title 22 testing, a full-scan analysis including tentatively identified compounds, and testing for additional chemicals used onsite); this testing has not found additional contaminants of concern.

The 1998 Update recommended that the Lower American River water utilities become involved in expressing their concerns with additional discharges from Aerojet into the American River system and all have done so. Due to water utility comments, the RWQCB included additional monitoring and notification requirements in the groundwater NPDES permit when it was revised to allow GET E/F discharges.

Cleanup of the Aerojet Superfund Site is ongoing. In the future, new science will likely affect cleanup options, improved laboratory technology will likely affect the ability to detect currently unknown constituents, and the EPA and/or DHS may set new drinking water standards for constituents that may be found at the site. Additionally, the best use of the treated groundwater is still under debate and decisions about its use are not final; this discussion on reuse alternatives will likely affect the future volume of discharge to the American River and/or potentially to the Folsom South Canal.

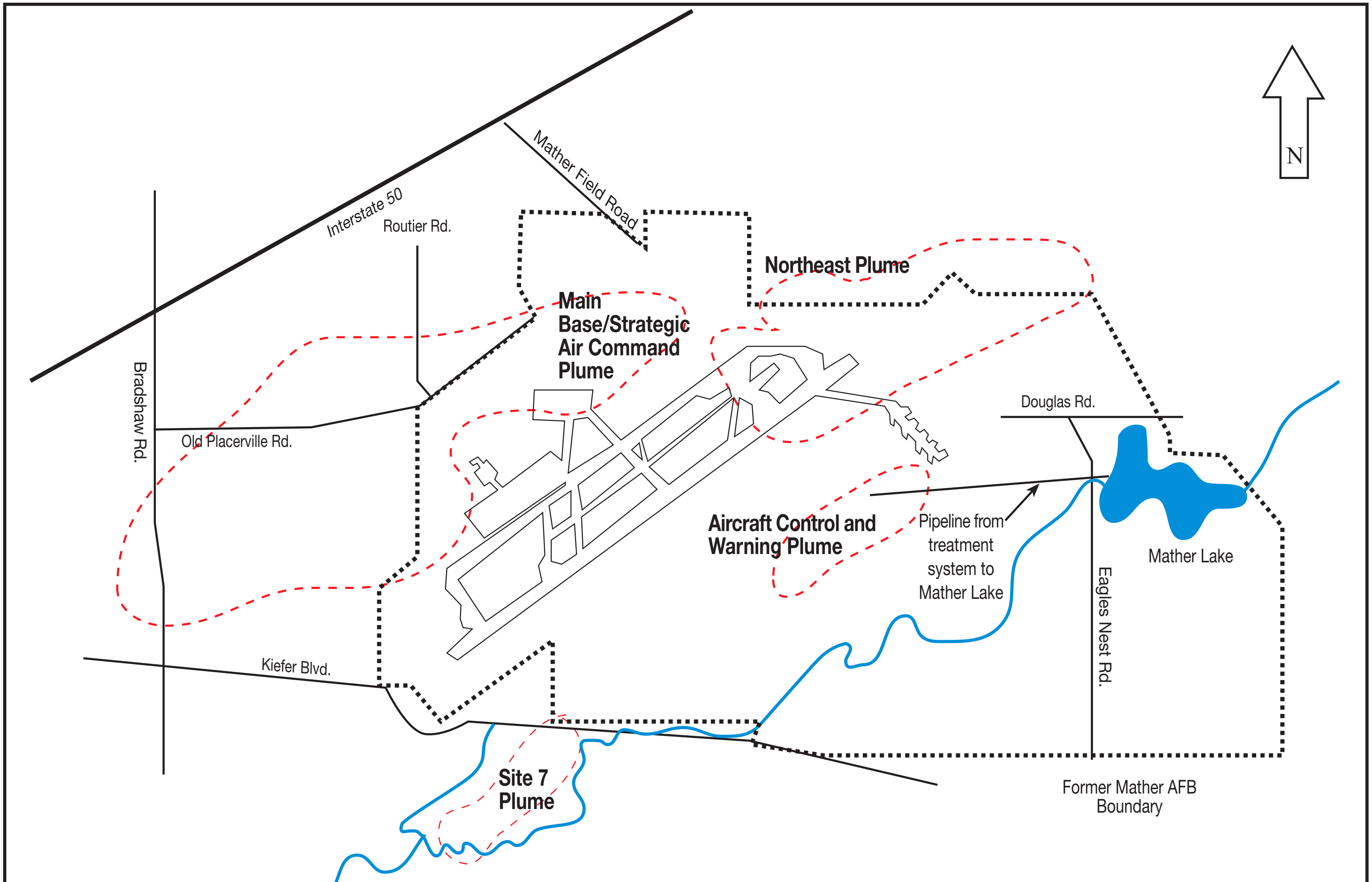
Reuse Alternatives

The volume of groundwater that will eventually be pumped from the groundwater basin south of the American River to clean up the Aerojet Superfund Site has given rise to concerns for the sustainable yield of the basin, which has resulted in a current exploration of alternatives for reuse of the groundwater within the basin. Alternatives for reuse of ARGET, GET E/F, and Mather GET water are currently under discussion. The selected alternative(s) will affect the volume of treated groundwater discharged to the American River in the future; alternatives could involve discharge to the American River, discharge to the Folsom South Canal, or discharge to a dedicated pipeline system. Anticipated discharge volumes are:

ARGET discharges - 3,500 gpm
GET E/F discharges - 6,000 gpm
Mather GET discharges - 7, 500 gpm in 2005

3.6 Mather Air Force Base

There are four distinct groundwater plumes under the former Mather AFB that are the principal responsibility of the U. S. Department of the Air Force (see **Figure 3-5**). The principal contaminants are VOCs. In the past five years, work at the site has moved from characterization to



Note: The information on which this map is based was provided by the Regional Board in 2003. The map is for illustration purposes and represents the approximate extent of several contaminants within each plume.

Figure 3-5. Mather Air Force Base Groundwater Plume Map

remediation. Groundwater extraction and treatment systems have been constructed and are operating for three of the four plumes. In addition, of 89 soil contamination areas, 72 have now been remediated and the remaining 17 are currently being remediated. The five landfills have all been excavated or capped.

The reason the Mather AFB facility was included in this 2003 Update is that there was discussion, within the last five years, of a joint discharge to the American River of treated groundwater from the Mather AFB Aircraft Control and Warning Plume and an Aerojet/MDC plume, which is migrating into the northeast area of the former Mather AFB. This Aerojet/MDC plume is deeper than the Mather AFB plumes. The Department of the Air Force was interested in discharge options because of operational difficulties with clogging of reinjection wells by the Aircraft Control and Warning Plume treated groundwater. The plan for discharge to the American River, however, was abandoned and discharge of treated groundwater from the Aircraft Control and Warning Plume was subsequently changed from reinjection to discharge to Mather Lake. There are currently no discharges from the former Mather AFB to the American River. The fate and use of treated groundwater from the Aerojet/MDC perchlorate plume (which will be remediated by the Mather GET) is part of the overall discussion of reuse options for Aerojet treated groundwater (see previous discussion of Aerojet).

The closest the former Mather AFB plumes come to the American River is about one mile south and about 80 feet below ground surface. Both groundwater and surface water flow direction is to the southwest. Groundwater flow is also characterized by a downward gradient and by cones of depression around extraction wells. According to RWQCB staff, there is no evidence that the Mather AFB plumes are in hydrologic communication with the American River.

The 1998 Update noted that the groundwater plumes were not in communication with the American River and that surface drainage at the site is to the southwest, towards Morrison Creek.

Mather AFB Groundwater Contaminant Plumes

Main Base and Strategic Air Command Plume. This is a single commingled plume: the principal contaminants are TCE, PCE, and carbon tetrachloride (CCl4). Additional contaminants include cis-1,2-dichloroethene (DCE), 1,2-dichloroethane (DCA), chloromethane, benzene, xylenes, total petroleum hydrocarbons, and lead. Off-site plume migration has not been completely controlled. Remediation is occurring in phases with priority given to off-site hot spots near drinking water supply wells and on-site source hot spots. Remediation is through extraction, air stripping, and reinjection.

Site 7 Plume. Principal contaminants are TCE, PCE, and DCE. Additional contaminants include DCA, DCE, 1,4-dichlorobenzene, chloromethane, vinyl chloride, benzene, and total petroleum hydrocarbons. Remediation is through extraction, air stripping, and reinjection. Operation of the remediation system has been on and off due to interference of gravel mining operations in the area.

Aircraft Control and Warning Plume. The principal contaminant is TCE. Remediation is through extraction, air stripping, and discharge to Mather Lake. The effluent limit for VOCs in the discharge is 0.5 µg/L. The NPDES permit also allows for potential use for landscape irrigation. Mather Lake flows into Morrison Creek, which is a tributary of the Delta downstream of Freeport.

Northeast Plume. The contaminants include PCE, CCl4, 1,2 - dichloropropane, DCE, and chloromethane. Because of low concentrations, the plume is currently being monitored only.

Since there is no surface drainage or groundwater contaminant plume connection with the American River and consideration of a discharge to the American River has been abandoned in favor of discharge to the Morrison Creek system, the Mather AFB groundwater contamination and cleanup poses no water quality issues for the American River. There is no need for the water utilities diverting Lower American River to continue to track events at the former Mather AFB unless discharge of treated groundwater to the American River is reconsidered either independently or as part of the overall discussion of reuse options for groundwater in south Sacramento County.

3.7 Spills into the American River System

The principal concern related to spills over the past five years has been with SSOs from sanitary collection systems into the American River and Folsom South Canal. City of Sacramento staff provided data from their records of spills that the City was notified of, and from a search of the Office of Emergency Services database that show there have been more SSOs than any other type of spill from 1998 through 2002. A few of the SSO spills have been quite large. SSO spills are usually related to capacity problems aggravated during storms and so are a mix of wastewater and storm runoff.

Management of Sanitary Collection Systems

Currently, with the exception of Folsom, sanitary collection systems in the American River watershed are not managed under permit. Management, operations, and facilities improvements are undertaken at the initiative of each individual collection system agency as their budget and work priorities allow, sometimes with direction from the RWQCB.

In 2002 the RWQCB adopted an NPDES Permit and cease and desist order (CDO) for the Folsom sanitary collection system. The permit prohibits SSOs except under extreme conditions. Furthermore, the permit and CDO require the City to address capacity issues, develop a preventative management plan, and improve spill response and reporting.

The EPA is currently developing NPDES permit regulations for sanitary collection systems nationwide to improve the capacity, management, operation, and maintenance (CMOM) of these systems and to improve notification of SSO events. A draft notice of proposed rulemaking was signed by EPA Administrator Browner in January 2001; however the EPA withdrew this document from the Federal Register later that month to give the incoming Administration the opportunity to review it. Stakeholder meetings are ongoing with a report to Congress due by December 2003. Although the schedule and final form of the CMOM regulations are not known at this time, eventually additional sanitary collection systems will come under the NPDES permit program through the CMOM regulations and will require improvements to conform to the new regulations.

In addition to SSOs, there have also been spills of treated wastewater from the City of Colfax WTP storage pond. During high intensity storms the plant has capacity problems, partly due to infiltration and inflow (I & I) in the collection system. The plant's pond system, which is built on fractured rock, seeps under the pond and also spills over the spillway. The RWQCB file notes that, during the period 1998 through 2002, spills over the spillway occurred in 1997/98, 1998/99 and 1999/00. The City of Colfax' WTP NPDES permit was reissued in 2001 and this permit contains a schedule for solving the plant's capacity problems, with full compliance required by June 2006. Meeting the permit compliance deadline for system improvements will be problematic as the City is having difficulty identifying upgrade options that it has the ability to fund. Although the manner in which the City of Colfax capacity problems will be resolved is not clear at this time, the City and the RWQCB are bound by the 2001 permit to find a solution. According to RWQCB staff, the City of Colfax has made some improvements to its collection system to reduce the I & I problem.

The record of SSOs into the American River from 1998 through 2002 is shown on **Figure 3-6**. This record was drawn from RWQCB files and is dependent on individual sanitary collection system agency reports of their SSOs to the RWQCB; thus, it is incomplete as it reflects only those spills that were reported and included estimated spill volumes. Nevertheless, it illustrates the overall SSO spill situation in recent years.

- The City of Placerville has had several SSOs related to I & I problems. According to RWQCB staff, the City of Placerville has made improvements to its collection system to reduce the I & I problem.

- The FSP has had several SSOs related to plugged lines due to inmates stuffing materials into the system, some capacity problems, and aging infrastructure. The FSP has improved internal communications on spill reporting and response, requested funds to install an "auger-monster" so they can ream the existing pipelines as needed, and completed a utility needs assessment, which included modeling of capacity in the sanitary sewer system. Five reaches of pipe were identified as needing to be replaced with larger capacity pipes. The FSP subsequently requested funds to revamp all utilities at the prison including the sanitary collection system. The FSP must compete for funds, first within the California Department of Corrections and then with other state agencies. Progress on FSP sanitary collection system issues will be dependent on state funding allocations.

- Folsom has had several SSOs, as city expansion outstripped the capacity of its sanitary collection system. The single largest SSO spill during the period 1998 through 2002 was an estimated 700,000 gallon spill in January 2000 into Lake Natoma. Folsom's Pump Station #1, which had previously been the bottleneck in part of the City's system and responsible for the majority of the SSOs including the January 2000 spill, was replaced in 2000 with the Folsom East Interceptor, relieving this problem. As described in the accompanying text box, Folsom's sanitary collection system is now under NPDES permit. Prior to adoption of the permit and CDO, Folsom took measures to address the spills by improving major pump stations, replacing pipeline in problem areas with larger capacity lines, stepping up their I & I program, monitoring flow, updating their master plan, and beginning to update operational procedures and their overflow response plan. Further improvements will be made according to permit requirements.

- In February 2000, a SRCSD manhole lid on the south side of the Folsom South Canal Highway 50 overcrossing, was lifted due to surcharging and over pressurization in the pipeline, causing an SSO spill into the canal. The construction of the Folsom East Interceptor, which relieved problems at the Folsom's Pump Station #1, moved the collection system bottleneck to the SRCSD interceptor at the Highway 50 overcrossing. The SRCSD is constructing a new Folsom/Bradshaw interceptor (to be completed in 2005) that will, when connected with the Folsom East Interceptor, provide adequate capacity throughout the SRCSD system in this area. Subsequent to the spill, the SRCSD fitted the manhole with a gasketted cover and bolted it, evaluated other nearby manholes, and retrofitted and bolted six others. With the manholes bolted, the SRCSD estimates that the line can withstand high intensity storm flows for short periods of time. The SRCSD verifies at six-month maintenance periods that the manholes remain bolted. Spills into the canal are a particular problem, because of the relatively low dilution capacity and flow in the canal.

- In September 2000, an estimated 325,000 gallon spill of mixed wastewater and urban runoff from the City of Sacramento was discharged into the American River at J Street. A contractor mistakenly connected a sewer bypass line to a storm drain line during replacement of a combined sewer pipe. The spill was originally reported at the start of a weekend by the general public as an odor problem on the American River so notification of City response personnel was delayed. Subsequently, the City of Sacramento implemented procedures for contractors to report on a daily basis regarding sewer bypass implementation.

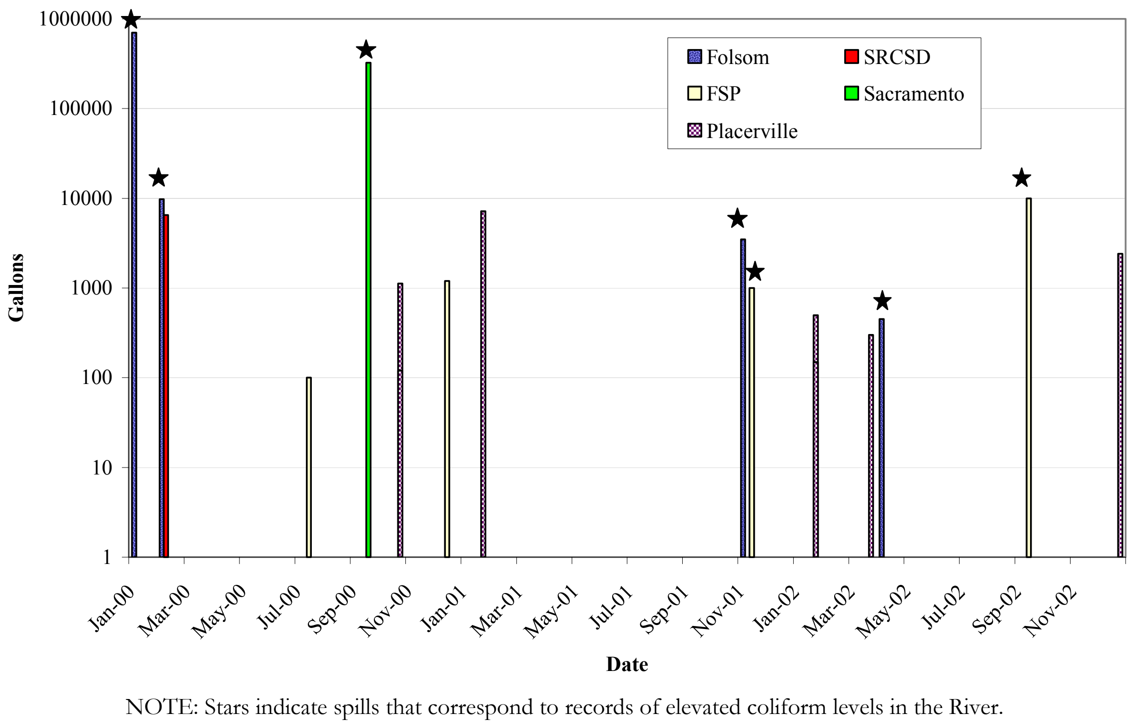


Figure 3-6. Record of Sanitary Collection Spills into the American River, 1998 - 2002

As noted on Figure 3-6, several of the SSOs have corresponded with elevated bacteria levels in the river. This correspondence is noted, but does not indicate a conclusive cause and effect relationship since SSOs generally occur during heavy storm events when other sources also contribute to elevated bacteria levels in the river.

As described in the accompanying text box, several of the ARWTC agencies have notification procedures with these sanitary collection system agencies in the watershed. Notification is provided to the ARWTC through a notification phone tree. According to City of Sacramento staff, they received notification from all the agencies with records of SSOs over the past five years, except for the City of Placerville.

Although there have been several SSOs in the past five years, positive steps have been taken by individual agencies to address and correct circumstances causing SSOs. Funding is a constraint on the pace of some improvements. The pace and scope of sanitary collection system improvements will likely be stepped up if the CMOM regulations contain substantive regulatory requirements. If they do not, then the initiative for further improvements will depend on either the budget and work priorities of each individual collection system agency or direction from the RWQCB to the individual agency. The direction of the CMOM regulations should be clearer at the end of 2003, when the EPA must report to Congress on its intended direction for these regulations.

The SSO spills highlight the importance of timely notification of the water utilities when spills occur. The utilities need this information to make appropriate spill response decisions. The 1998 Update included a recommendation to ensure that spill notification procedures are in place. As described in the accompanying text box, procedures have been established within the ARWTC to communicate on spills. Several of the water utilities have individual notification arrangements as well.

Another 1998 Update recommendation was for the water utilities to meet and confer with RWQCB staff on wastewater issues in the watershed. Non-discharging wastewater systems were discussed with the RWQCB during scoping of the 2003 Update (see Appendix D); SSOs are addressed in this 2003 Update. In addition, EID has conferred with the RWQCB with respect to the Placerville wastewater treatment plant, ACWS has conferred with the RWQCB with respect to sewage spills into Lake Natoma and the Folsom South Canal; and Folsom, the FSP, and the City of Sacramento have conferred with the RWQCB about sewage spills from their own sanitary collection systems.

ARWTC Spill Notification Procedures

Over the past five years, the ARWTC has established procedures to improve knowledge and communication with respect to spills into the American River. Several of the ARWTC agencies have established direct notification procedures with emergency response agencies, WTPs and other agencies in the American River watershed. These agencies have agreed to provide the ARWTC agencies with direct notification of spills, of which they have knowledge, that enter or threaten to enter the river system. The ARWTC also established communication procedures within the group that included (1) development of a phone tree, (2) working towards a standard spill reporting form, and (3) dry runs to test the communication procedures. A full dry run test was conducted in May 2002 and a dry run test of a portion of the notification phone tree was conducted in November 2002. Additional information is in Appendix D.

Several of the ARWTC utilities also have individual direct notification agreements with various agencies in the watershed and have conducted individual internal training and implemented internal tracking procedures.

SECTION 4

INDIVIDUAL UTILITY COMPLIANCE EVALUATIONS

This section provides individual water quality and regulatory compliance evaluations for the nine utilities that are currently diverting and treating American River water. The compliance evaluations pertain to selected existing and future drinking water regulations and were based on each utilities' water quality and operations data supported by the ambient monitoring data. Appendix E contains individual utility system summaries and more detailed monitoring data for turbidity, coliforms, *Giardia* and *Cryptosporidium*, TOC, and DBPs.

Highlights of Selected Existing Drinking Water Regulations

NIPDWR and Phase I, II and V Regulations. Set MCLs for many inorganic chemicals, SOCs, and VOCs.

SWTR. Sets minimum 3/ and 4/- log reduction requirements for *Giardia* and viruses, respectively. Set turbidity requirements, which have since been tightened.

Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule. Set minimum 2-log reduction requirement for *Cryptosporidium*. Requires monthly source water monitoring for coliforms. Requires continuous monitoring of individual filter effluents (IFE) and CFE. Tightened treated water turbidity requirements: CFE < 0.3 NTU in 95 percent of samples, and not to exceed 1 NTU longer than 1 hour. Set IFE reporting and evaluation requirements. Requires recycling of all flows to the headworks by June 2004. Requires a recycle statement be submitted to DHS by December 2003.

Stage 1 D/DBP Rule. Sets a treatment technology for DBP precursor removal (enhanced coagulation) based on source water TOC levels. Varying levels of removal are required if the source water concentrations are > 2 mg/L. Sets MCLs for TTHMs and HAA5 of 80/60 µg/L, respectively in distribution system as system-wide running annual average (RAA).

Highlights of Selected Future Drinking Water Regulations

Long Term 2 Enhanced SWTR. Will require *Cryptosporidium*, or *E. coli* source water monitoring depending on system size. Source water classification to be dependent on monitoring results. If average *Cryptosporidium* value is > 0.075 oocysts/L, additional action (which could be additional log reduction or other actions, including source water protection) will be required. Also requires disinfection profiling and benchmarking if monitoring for *Cryptosporidium*. Second round of source water monitoring to be conducted again, six years after first round.

Stage 2 D/DBP Rule. Will require compliance with distribution system MCLs for TTHM and HAA5 to be based on locational running annual average (LRAA). In Stage 2A, compliance will be based on system-wide RAA of 80/60 µg/L and LRAA of 120/100 µg/L. In Stage 2B, compliance will be based on LRAA of 80/60 µg/L. Initial Distribution System Evaluations must be completed within two years of promulgation to identify long term monitoring locations, with consecutive systems to comply under schedule of the largest system.

Arsenic. Arsenic has a current MCL of 10 µg/L. The DHS may set a state MCL that is significantly lower than the current federal MCL.

Hexavalent Chromium. Hexavalent chromium is not currently regulated. The DHS is developing a state MCL for hexavalent chromium.

4.1 Placer County Water Agency

PCWA diverts water from the North Fork of the American River at the Auburn Dam site, downstream of the Middle Fork confluence. Water is diverted from a temporary pump station, which is installed in early spring and dismantled in the late fall. Completion of a permanent pump station is scheduled for 2005. PCWA uses this source to serve as a main supply when its Pacific Gas and Electric Company (PG&E) source water is offline during maintenance periods, primarily October and November. The American River water is pumped from the Auburn Tunnel to PG&E's South Canal and to supplement the PG&E source during high summer demand by releasing American River water into Auburn Ravine and holding Yuba/Bear River water in the South Canal. From there, it is conveyed to PCWA's Foothill WTP.

Watershed activities of interest to PCWA that were reviewed for this report include factors affecting erosion in the upper watershed (North and Middle Fork) and recreation (along the North and Middle Forks). The City of Colfax treated wastewater spills are also of concern, although these generally have occurred during wet months when the North Fork diversion is not used.

4.1.1. System Description

The Foothill WTP is a conventional water treatment plant with a total capacity of 55 million gallons per day (MGD), which consists of two distinct treatment trains.

Train Number 1 has a capacity of 40 MGD and is operated primarily during the summer months, with an average daily flow of 25 MGD. Train Number 1 includes a grit removal facility, sand ballasted clarification, followed by post-chlorination and then filtration. There are nine dual media, deep bed filters with air scour. These are high-rate filters at 10 gpm/sf. There is filter to waste in operation, which is recycled to the headworks.

Train Number 2 has a capacity of 15 MGD and is operated throughout the year, with winter flows averaging 8 MGD and summer flows averaging 15 MGD. Train Number 2 is a conventional water treatment plant with flocculation and long, horizontal sedimentation basins. There is a mechanical chain and flight sludge removal system in the sedimentation basins. The water is post-chlorinated prior to being sent to four dual media filters. The filters also have air scour. The filtered water is treated with caustic soda for pH control prior to storage in the reservoirs (11 million gallons [MG]). This is where most of the disinfection contact time (CT) credit is achieved.

Facility changes since the 1998 Update include completion of a 28 MGD expansion with construction of the new Train Number 1, described above. Both treatment trains now implement filter-to-waste. The expansion also included redundant coagulant feed and storage systems. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. PCWA has done this, with installation of the redundant coagulant feed and storage systems and sand ballasted clarification.

4.1.2. Water Quality Summary

With recent operational developments, when PCWA is using its American River source, the influent water to the Foothill WTP is generally only American River water. PCWA has collected samples of raw American River water for a variety of constituents. **Table 4-1** provides a review for selected constituents.

Table 4-1. Selected Constituent Review, PCWA Foothill WTP

Constituent	Review
IOCs/VOCs/SOCs	Raw Water: None detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform and *E. coli* levels <10 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Median 1.2 mg/L, Running Annual Average 1.3 mg/L.
Disinfection By-Products	Distribution System: Not tested for solely American River water. Blended water TTHMs RAA and LRAA <60 µg/L, HAA5 RAA and LRAA <40 µg/L.
Arsenic	Raw Water: Not detected, <2 µg/L.
Hexavalent Chromium	Raw Water: Not detected, <1 µg/L.

The raw water has excellent quality. Neither inorganic chemicals (IOCs), VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity, during the periods of American River use, can range from less than 2 NTU to over 100 NTU. The treated water turbidity, however, is consistently less than 0.1 NTU, with only one excursion over 0.3 NTU during the period 1998 through 2002. Fecal coliform and *E. coli* levels are generally very low.

4.1.3. Drinking Water Regulations Compliance

Table 4-2 provides a compliance evaluation for selected existing and future drinking water regulations. PCWA is currently in compliance and is expected to be in compliance with future anticipated regulations at the Foothill WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Foothill WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Foothill WTP. The plant is granted credit for 2.5/2-log reduction of *Giardia*/viruses for physical removal and 0.5/2-log for disinfection, respectively.

- The Foothill WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 3-log reduction credit under the Long Term 2 Enhanced SWTR, since it implements conventional filtration and meets the more stringent turbidity standards. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L. Although there are currently no protozoa data available for the North Fork, downstream protozoa data indicate *Cryptosporidium* levels will likely be below the action level.

- Since American River water has low levels of TOC, PCWA's distribution system DBP RAA levels are expected to be below the Stage 1 D/DBP Rule MCLs. The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The Stage 2 D/DBP Rule will require compliance with distribution system DBPs based on LRAA. Currently, PCWA has no data for distribution system levels that is representative of American River source water only, but the blended water is expected to meet the new locational MCLs.

Table 4-2. PCWA Foothill WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity > 0.3 NTU only once. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided; will need to monitor and report variances to DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required. Distribution system data for TTHMs and HAA5 representative of American River water not provided. MCLs are not expected to be exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR - 2004*	Microbial	Reduction credit should be upgraded to 3-log reduction for *Cryptosporidium* for conventional filtration. No *Cryptosporidium* monitoring data at intake. Will need to conduct 24 months of monitoring in accordance with Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule - 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring, coordinated with consecutive systems unless all distribution system samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program waived.
State arsenic MCL - 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation.

4.2 El Dorado Irrigation District

EID operates two water treatment plants with direct intakes on the American River: the Strawberry WTP in the community of Strawberry on the upper South Fork and the El Dorado Hills WTP in the community of El Dorado Hills on Folsom Lake. The intake water for the El Dorado Hills WTP is diverted from Folsom Lake where the South Fork of the American River enters the Lake.

Watershed activities of interest to EID that were reviewed for this report include factors affecting erosion in the upper watershed (South Fork), recreation (especially along the South Fork and at Folsom Lake), and potentially septic systems along the South Fork. The City of Placerville SSO spills and urban runoff from the increasingly urbanized Folsom Lake basin are also of concern at the El Dorado Hills WTP.

4.2.1. System Descriptions

The Strawberry WTP is a small membrane microfiltration plant with a design capacity of 100 gpm and an operating flow range of 80 to 125 gpm. There is no pretreatment of the water. The plant consists of 20 microfiltration modules and is monitored with system control and data acquisition controls and alarms in Placerville. The microfiltration modules are backwashed every 40 minutes for three minutes, with filter-to-waste in operation. The filtered water is chlorinated with chlorine gas, the pH is adjusted with soda ash, and it is then sent to the distribution system. There is a total of 0.25 MG of storage in the system.

The El Dorado Hills WTP is a conventional water treatment plant with a design capacity of 18 MGD. The plant is usually operated between 2 and 10 MGD with an average winter flow of 2.5 MGD and an average summer flow of 6 MGD. The raw water is pumped from the lake up to the water treatment plant where it is pre-chlorinated for disinfection CT credit, to enhance treatment, and to prevent growth in the treatment facilities. The pH is adjusted with soda ash to help with coagulation. Alum and polymer are both added for coagulation. The water is flocculated and clarified in upflow clarifiers. There are pressure switches in the clarifiers that induce backwash if the pressure builds up in the clarifiers. There are dual media filters with 18" of sand and 30" of anthracite. The filtration rate is six gpm/sf. The filters are backwashed based on headloss, but are backwashed a minimum of once per week. The filters are backwashed at a rate of 20 gpm/sf. There is filter-to-waste in operation. The filter and clarifier backwash water, as well as the filter-to-waste water, are returned to a large settling basin and the decant is blended with the influent water. The filtered water is post-chlorinated with chlorine gas and the pH is adjusted with soda ash. Disinfection CT credit is achieved in the existing 0.5-MG storage tank. There is a total of 7 MG of storage in the system.

Facility changes since the 1998 Update at the El Dorado Hills WTP include a new clarifier/filter module and modification of the intake facility to allow for diversion of warmer water. EID is currently designing a permanent TCD and is also planning to relocate the pre-plant chlorination system. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. The EID is evaluating an alternative site for a second expansion of the El Dorado Hills WTP. There have been no significant facility changes at the Strawberry WTP.

4.2.2. Water Quality Summary

The EID has monitored the raw and treated water at both the Strawberry WTP and the El Dorado Hills WTP for all the required Title 22 constituents. **Table 4-3** and **Table 4-4** provide a review for selected constituents. The raw water has excellent quality at both intakes.

Table 4-3. Selected Constituent Review, EID Strawberry WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.1 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform levels <10 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Median 1.85 mg/L, Running Annual Average <2 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA <40 µg/L, LRAA <60 µg/L and HAA5 RAA and LRAA <40 µg/L.
Arsenic	Raw and Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

Table 4-4. Selected Constituent Review, EID El Dorado Hills WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform levels <10 MPN/100 mL
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Median 1.2 mg/L, Running Annual Average <1.5 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA and LRAA <40 µg/L and HAA5 RAA and LRAA <40 µg/L.
Arsenic	Raw and Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

At the Strawberry WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity can vary significantly, with high turbidity events associated with spring snowmelt. The treated water turbidity is consistently less than 0.1 NTU, regardless of influent quality. Fecal coliform levels are very low; higher levels are seen during the summer months. The overall fecal coliform median value was non-detectable, while the median of summer month samples (May through September) was 4 MPN/100 mL. Also, the summer fecal coliform average value of 11 MPN/100 mL was about twice the overall average of 5 MPN/100 mL.

At the El Dorado Hills WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. During the period 1998 through 2002, there was a single detection of di (2-ethylhexyl) phthalate in the raw water, well below the primary MCL of 4 µg/L. Raw water turbidity can vary significantly, with the highest levels occurring during storm events. The EID has modified its intake facility to allow for diversion of warmer surface water, which has lower turbidity levels and is currently designing a permanent TCD. The treated water turbidity is consistently less than 0.1 NTU, with only one excursion above 0.3 NTU. Fecal coliform levels are very low; higher levels are seen during the winter months.

4.2.3. Drinking Water Regulations Compliance

Table 4-5 and **Table 4-6** provide a compliance evaluation for selected existing and future drinking water regulations. EID is currently in compliance and is expected to be in compliance with all future anticipated regulations at the both the Strawberry WTP and El Dorado Hills WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, EID meets the new turbidity standards under the Interim Enhanced SWTR and the Long Term 1 Enhanced SWTR at both water treatment plants.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at both water treatment plants. The Strawberry WTP is granted credit for 3/0.5-log *Giardia*/virus reduction for physical removal and 0.5/3.5-log reduction from disinfection, respectively. The El Dorado Hills WTP is granted credit for 2.5/2-log reduction for *Giardia*/virus for physical removal and 0.5/2-log reduction for disinfection, respectively.

- The EID will need to coordinate with the DHS to identify log reduction credit for *Cryptosporidium* at their Strawberry WTP since it will not be automatically granted. The EID should be granted credit for 2-log reduction of *Cryptosporidium* at the El Dorado Hills WTP under the Interim Enhanced SWTR, and upgraded to 3-log reduction under the Long Term 2 Enhanced SWTR, since it uses conventional filtration and meets the more stringent turbidity standards. Source water monitoring for *Cryptosporidium* will be required at the El Dorado Hills WTP and for *E. coli* at the Strawberry WTP under the Long Term 2 Enhanced SWTR. Action would be required at the El Dorado Hills WTP if the average is greater than 0.075 oocysts/L. There are currently no protozoa data available for the South Fork and limited data for Folsom Lake; however, downstream protozoa data indicate *Cryptosporidium* levels will likely be below the action level. The Strawberry WTP will only need to monitor for *Cryptosporidium* if the mean *E. coli* levels exceed the trigger level of 50 MPN/100 mL. The Strawberry WTP may qualify for a waiver from the monitoring requirements in the event the DHS approves at least a 5.5-log reduction credit for *Cryptosporidium*.

- Since the Strawberry WTP is a membrane filtration plant, TOC monitoring and treatment is not required.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. Currently, the data for both distribution systems show that RAA levels are below the Stage 1 D/DBP Rule MCLs. Both systems are expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-5. EID Strawberry WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs,-VOCs, SOCs	Monitored as required. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity < 0.1 NTU. Need to coordinate with the DHS to obtain 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided; will need to monitor and report variances to DHS.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required since membrane water treatment plant. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Need to work with DHS to identify log reduction credit for *Cryptosporidium*. If > 5.5 log, then may opt out of 24 months of monitoring. Otherwise, must conduct monitoring in accordance with the Rule. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL – 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

Table 4-6. EID El Dorado Hills WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded. One detection of di (2-ethylhexyl) phthalate < MCL.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia/*virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity > 0.3 NTU only once. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided; will need to monitor and report variances to DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required. Short periods of TOC > 2.0 mg/L; currently relocating prechlorination system. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Should be upgraded to 3-log reduction credit for *Cryptosporidium* for conventional filtration. Will need to conduct 24 months of monitoring in accordance with the Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 μg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution samples continue ≤40 μg/L TTHM and ≤30 μg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL – 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.3 City of Folsom

The Folsom WTP is provided water diverted from Folsom Lake at the Folsom Dam.

Watershed activities of interest to Folsom that were reviewed for this report include factors affecting erosion in the upper watershed, recreation (especially at Folsom Lake), and urban runoff from the increasingly urbanized Folsom Lake basin. Upstream SSO spills are also of concern.

4.3.1. System Description

The Folsom WTP is a conventional water treatment plant and has a design capacity of 40 MGD with an operating range of 0 to 40 MGD. The average flow in the winter is 12 MGD and the average flow in the summer is 32 MGD.

The influent water is treated with sodium hypochlorite for disinfection CT credit and polyaluminum chloride (PAC) and polymer for coagulation. The chemicals are mixed using a pump injection located close to the inlet structure. The water is then flocculated and settled in five parallel treatment trains. There are four-three stage basins with vertical shaft flocculators, followed by four sedimentation basins, with a surface loading rate of 1.25 gpm/sf. The solids are removed mechanically with chain and flight sludge removal equipment. The fifth train is a new flocculation/sedimentation basin with four stages and vertical shaft flocculators.

The settled water is treated with a filter aid and then filtered. There are eight dual media filters with 30 inches of anthracite over eight inches of sand. The filtration rate is five gpm/sf. The backwashing is performed automatically, based on time (daily during the summer and once every three days during the winter). The filters have filter-to-waste capacity. The filter backwash water and filter-to-waste water is sent to the return backwash water pond, and then the decant is recycled to the headworks. The filtered water is then chlorinated for CT credit and adjusted for pH with lime. The system has 29 MG of storage.

Facility changes since the 1998 Update include an expansion, from 25 to 40 MGD that included the fifth flocculation/sedimentation basin and four new dual media filters. On-site sodium hypochlorite generation was also added. Folsom switched the primary coagulant to PAC and now utilizes a streaming current detector for dosing. As part of the water treatment expansion design, physical and hydraulic space was reserved for future ozone facilities. Also, the raw water intake pipeline was replaced, increasing capacity (from 48 to 60 inches) and reliability. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. As part of the recent expansion, Folsom has allowed space for ozone disinfection facilities at the Folsom WTP.

4.3.2. Water Quality Summary

Folsom has monitored the raw and treated water for all the required Title 22 constituents. **Table 4-7** provides a review for selected constituents.

Table 4-7. Selected Constituent Review, Folsom WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform and *E. coli* levels <20 MPN/100 mL
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Median 2.6 mg/L, Running Annual Average >2.0 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA and LRAA <60 µg/L and HAA5 RAA and LRAA <30 µg/L.
Arsenic	Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

The raw water has excellent quality. At the Folsom WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity data showed numerous excursions above 0.3 NTU prior to the plant expansion, but has since been consistently less than 0.1 NTU. Fecal coliform levels are very low; higher levels are seen during the winter months, although a fecal coliform peak was also observed in early July 2001. The 2002 TOC raw water data had an average value greater than 2.0 mg/L, inconsistent with all other monitoring data along the American River. Folsom discovered the 2002 TOC data reflected use of an inappropriate laboratory analytical method. Data collected in 2003, using the appropriate method, showed raw water TOC levels less than 2.0 mg/L, consistent with data from other utilities.

4.3.3. Drinking Water Regulations Compliance

Table 4-8 provides a compliance evaluation for selected existing and future drinking water regulations. Folsom is currently in compliance and is expected to be in compliance with future anticipated regulations at the Folsom WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Folsom WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Folsom WTP. The plant is granted credit for 2.5/2-log reduction of *Giardia*/viruses for physical removal and 0.5/2-log for disinfection, respectively.

- The Folsom WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 3-log reduction credit under the Long Term 2 Enhanced SWTR, since it uses conventional filtration and meets the more stringent turbidity standards. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L. The limited protozoa data available for Folsom Lake and downstream protozoa data indicate *Cryptosporidium* levels will likely be below the action level.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for Folsom's distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-8. Folsom WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity > 0.3 NTU several times prior to plant expansion; none since. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided; will need to monitor and report variances to DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC in 2002 had RAA > 2.0 mg/L, apparently due to use of inappropriate laboratory analytical method. 2003 TOC data, using appropriate method are < 2.0 mg/L. Enhanced coagulation likely not required. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR - 2004*	Microbial	Reduction credit should be upgraded to 3-log reduction for *Cryptosporidium* for conventional filtration. Will need to conduct 24 months of monitoring in accordance with the Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule - 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL - 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.4 Folsom State Prison

The FSP WTP is provided water diverted from Folsom Lake at the Folsom Dam.

Watershed activities of interest to FSP that were reviewed for this report include factors affecting erosion in the upper watershed, recreation (especially at Folsom Lake), and urban runoff from the increasingly urbanized Folsom Lake basin. Upstream SSO spills are also of concern.

4.4.1. System Description

The FSP operates a Microfloc Two-Stage Filtration Package Plant with a design capacity of 4 MGD. The operating range is typically 1 to 2 MGD. The winter average flow is 1.1 MGD and the summer average flow is 1.7 MGD. The plant is operated from 5:00 AM to 8:00 PM.

The influent water flows to a 30,000 gallon raw water wet well. The influent water is treated with chlorine for disinfection CT credit, lime for pH adjustment, and alum and polymer for coagulation. The water is sent through a sand ballasted clarification unit for pre-sedimentation during high turbidity events. The water is then flocculated and clarified in an upflow clarifier. The clarifier is backwashed approximately every 8 hours. The water then flows into two tri-media filters. The filters consist of 10" of anthracite, 8" of sand, 3" of garnet with a gravel base. The filters are backwashed once or twice a day, in conjunction with a clarifier backwash. The filter and clarifier backwash water is sent to the sludge lagoons and the decant is recycled to the headworks. Filter-to-waste facilities have been installed. The filtered water is chlorinated for disinfection CT credit and the pH is adjusted with lime. The system has 2.0 MG of storage.

Facility changes since the 1998 Update include an Actiflo sand ballasted clarification unit as a pre-sedimentation basin for high turbidity events. This unit has a 1,100 gpm capacity, and utilizes a coagulant to assist with sedimentation.

4.4.2. Water Quality Summary

The FSP has monitored the raw and treated water for most of the required Title 22 constituents. **Table 4-9** provides a review for selected constituents.

Table 4-9. Selected Constituent Review, Folsom State Prison WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform and *E. coli* levels <20 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: No Data Provided.
Disinfection By-Products	Distribution System: TTHMs <40 μg/L and HAA5 <20 μg/L.
Arsenic	Treated Water: Not detected, <2 μg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 μg/L.

The raw water has excellent quality. At the FSP WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity has been consistently less than 0.1 NTU. Fecal coliform levels are very low; higher levels are seen during the winter months.

4.4.3. Drinking Water Regulations Compliance

Table 4-10 provides a compliance evaluation for selected existing and future drinking water regulations. The FSP is currently in compliance and is expected to be in compliance with future anticipated regulations at the FSP WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE and IFE turbidity data provided for the study period, the FSP WTP meets the new turbidity standards under the Long Term 1 Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the FSP WTP. The plant is granted 2/1-log reduction for *Giardia*/viruses for physical removal and 1/3-log for disinfection, respectively.

- The FSP WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Long Term 1 SWTR, and upgraded to 2.5-log reduction under the Long Term 2 Enhanced SWTR, since it uses direct filtration and meets the more stringent turbidity standards. Source water monitoring for *E. coli* will be required under the Long Term 2 Enhanced SWTR with possible *Cryptosporidium* monitoring required if the mean is greater than 10 MPN/100 mL. The data available for Folsom Lake indicate *Cryptosporidium* monitoring may be required.

- Since the FST WTP is a direct filtration plant, TOC monitoring and treatment is not required.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for FSP's distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-10. Folsom State Prison WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required for treated water. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity < 0.3 NTU. Should be granted 2-log reduction for *Cryptosporidium.* Individual filter effluent turbidity provided; no exceptions noted. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water TOC monitoring not required since direct filtration plant. Enhanced coagulation not required. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Need to work with DHS to identify log reduction credit for *Cryptosporidium*. If >5.5-log, then may opt out of source water monitoring. Otherwise, must conduct monitoring in accordance with the Rule. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL - 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.5 San Juan Water District

The SJWD Sidney N. Peterson WTP is provided water diverted from Folsom Lake at the Folsom Dam.

Watershed activities of interest to SJWD that were reviewed for this report include factors affecting erosion in the upper watershed, recreation (especially at Folsom Lake), and urban runoff from the increasingly urbanized Folsom Lake basin. Upstream SSO spills are also of concern.

4.5.1. System Description

The Sidney N. Peterson WTP is a conventional water treatment plant and has a design capacity of 120 MGD. The water treatment plant is typically operated between 20 and 120 MGD. The average winter flow is 42 MGD and the average summer flow is 89 MGD.

The influent water is pre-chlorinated with chlorine gas for disinfection CT credit, and alum and polymer are added as coagulants. The coagulants are mixed using a vertical shaft mechanical mixer in a small basin. The water is then flocculated using three stage basins with horizontal shaft flocculators, which are situated parallel with the flow. The sedimentation basins are half covered with tube settlers, which were installed to improve the settling characteristics of the basins. The settled solids are removed from the sedimentation basin using a vacuum-type system.

A polymer is added as a filter aid and the water is filtered through gravity flow dual media filters. There are two filter basins, which are divided into 24 filters with each filter having 10 cells. The filters are made of sand and anthracite with a gravel base on a plate with a screened inserts underdrain system. There are no filter-to-waste facilities. The filter backwash water is sedimented for a short amount of time in a small basin and then returned to the influent stream. The filtered water is post-chlorinated for disinfection CT credit and the pH is adjusted with calcium hydroxide. There is 68 MG of storage in the distribution system.

Facility changes since the 1998 Update include installation of redundant backwash hood assemblies on both filter basins. This increases the speed of backwashing, which minimizes the time required and optimizes filter production capacity. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. The SJWD will address this in the design of any future facilities.

4.5.2. Water Quality Summary

The SJWD has monitored the raw and treated water for all the required Title 22 constituents. SJWD also monitored in compliance with the ICR and has 18 months of data for *Giardia* and *Cryptosporidium*. **Table 4-11** provides a review for selected constituents.

Table 4-11. Selected Constituent Review, SJWD Sidney N. Peterson WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform <10 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: No *Giardia/Cryptosporidium* samples were confirmed positive.
TOC	Raw Water: Median 1.6 mg/L, Running Annual Average 1.3 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA and LRAA <40 µg/L and HAA5 RAA and LRAA <20 µg/L.
Arsenic	Raw and Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

The raw water has excellent quality. At the Sidney N. Peterson WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity is consistently less than 0.1 NTU. Fecal coliform levels are very low; higher levels are seen during the winter months. The Information Collection Rule data showed no positive detections of *Giardia* or *Cryptosporidium*.

4.5.3. Drinking Water Regulations Compliance

Table 4-12 provides a compliance evaluation for selected existing and future drinking water regulations. The SJWD is currently in compliance and is expected to be in compliance with future anticipated regulations at the Sidney N. Peterson WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Sidney N. Peterson WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Sidney N. Peterson WTP. The plant is granted credit for 2.5/2-log reduction of *Giardia*/viruses for physical removal and 0.5/2-log for disinfection, respectively.

- The Sidney N. Peterson WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 3-log reduction under the Long Term 2 Enhanced SWTR, since it uses conventional filtration and meets the more stringent turbidity standards. The SJWD will need to work with the DHS to determine if the location for return of recycled water needs to be revised to upstream of the chemical feed. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L. The limited protozoa data collected by the SJWD using the ICR Method and downstream protozoa data indicate *Cryptosporidium* levels will likely be below the action level.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for SJWD's distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-12. SJWD Sidney N. Peterson WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity < 0.3 NTU. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided. Will need to monitor and report variances to DHS. Need to return recycle water upstream of chemical feed or negotiate with DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Reduction credit should be upgraded to 3-log reduction credit for *Cryptosporidium* for conventional filtration. Will need to conduct 24 months of monitoring in accordance with the Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations <80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution system samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL - 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.6 City of Roseville

The Roseville WTP is provided water diverted from Folsom Lake at the Folsom Dam.

Watershed activities of interest to Roseville that were reviewed for this report include factors affecting erosion in the upper watershed, recreation (especially at Folsom Lake), and urban runoff from the increasingly urbanized Folsom Lake basin. Septic systems along the South Fork and upstream SSO spills are also of concern.

4.6.1. System Description

The Roseville WTP is a conventional water treatment plant with a design capacity of 60 MGD. The plant typically operates between 13 and 50 MGD. The average flow during the winter is 16 MGD and the average flow during the summer is 36 MGD.

The influent water is pre-chlorinated with sodium hypochlorite for disinfection CT credit. Alum and polymer are added for coagulation and are mixed hydraulically using the headloss at the inlet control valve. There is also a chemical addition point at the flash mix so that sodium hydroxide can be added for pH control during high turbidity, low alkalinity storm events.

The treatment plant has two trains. The original train achieves flocculation and sedimentation in three upflow clarifiers. The existing clarifiers are round basins where the water enters in the center and flows up through tube settlers and exits over launders. The clarifiers have a suspended sludge blanket that is used to thicken and settle out the solids. Operations staff monitor the blanket daily to ensure that the clarifiers are operating properly. The clarifier blowoff process removes sludge that is sent to the sludge lagoons. The clarifiers are operated so that an effluent turbidity of less than 1-2 NTU is achieved. This can be difficult since the clarifiers do not respond well to changes in the flow pattern. The second, newer train consists of a long, rectangular flocculation and sedimentation basin. The flocculation basin has four stages and uses vertical shaft mixers. The sedimentation basin is a gravity basin, with chain and flight mechanical sludge removal.

A non-ionic polymer is added as a filter aid upstream of the filters. There are eight dual media filters with 30" of anthracite and 12" of sand, with a Leopold underdrain. The filters are operated with a filtration rate of six gpm/sf. The filters have backwash with a surface wash and are backwashed on an auto sequence. The backwash is operated at a rate of 18.5 gpm/sf. Filter-to-waste is implemented on all filters. The filter backwash water and filter-to-waste water is sent to the reclamation basins, where the water is settled and decant water is returned to the headworks. The filtered water is treated with lime for pH adjustment, fluoride, and sodium hypochlorite for post-chlorination. The system has 22 MG of storage.

Facility changes since the 1998 Update include an expansion of the water treatment plant, bringing the total capacity up to 60 MGD. This included a second inlet control structure, a 25 MGD flocculation and sedimentation basin, two new filters, new chemical delivery/storage/feed systems, and improvements to the reclamation basins and sludge drying beds. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. Roseville has addressed this in their master plan.

4.6.2. Water Quality Summary

Roseville has monitored the raw and treated water for all the required Title 22 constituents. **Table 4-13** provides a review for selected constituents.

Table 4-13. Selected Constituent Review, Roseville WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Not provided.
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Median 1.5 mg/L, Running Annual Average 1.6 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA and LRAA <40 µg/L and HAA5 RAA and LRAA <20 µg/L.
Arsenic	Raw and Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

The raw water has excellent quality. At the Roseville WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity is consistently less than 0.1 NTU. Fecal coliform data was not provided, but should be low, similar to SJWD levels since Roseville and SJWD share the same diversion location and transmission pipeline.

4.6.3. Drinking Water Regulations Compliance

Table 4-14 provides a compliance evaluation for selected existing and future drinking water regulations. Roseville is currently in compliance and is expected to be in compliance with future anticipated regulations at the Roseville WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Roseville WTP meets the new turbidity standards under the Interim Enhanced SWTR. The IFE data was evaluated for 2002 and showed only one event which would trigger reporting in monthly reports to the DHS. This occurred when a filter was brought on-line and resulted in higher than usual turbidity due to the programmed sequence. Roseville has since adopted standard operating procedures and made modifications to the SCADA programming to prevent this from happening again.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Roseville WTP. The plant is granted credit for 2.5/2-log reduction of *Giardia*/viruses for physical removal and 0.5/2-log for disinfection, respectively.

- The Roseville WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 3-log reduction under the Long Term 2

Enhanced SWTR, since it uses conventional filtration and meets the more stringent turbidity standards. Roseville will need to work with the DHS to determine if the location for return of recycled water needs to be revised to upstream of the chemical feed. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L. The limited protozoa data for Folsom Lake and downstream protozoa data indicate *Cryptosporidium* levels will likely be below the action level.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for Roseville's distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-14. Roseville WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required for treated water. No MCLs exceeded.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity < 0.3 NTU. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity provided; only one exception noted. Need to return recycle water upstream of chemical feed or negotiate with DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Reduction credit should be upgraded to 3-log reduction credit for *Cryptosporidium* for conventional filtration. Will need to conduct 24 months of monitoring in accordance with the Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.

Table 4-14. Roseville WTP Drinking Water Regulations Compliance (continued)

	Targeted Compounds	Compliance Status
Future Regulation (continued)		
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring, coordinated with consecutive systems unless all distribution system samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL – 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.7 Arden Cordova Water Service

ACWS operates the Coloma WTP, which uses American River water diverted to the Folsom South Canal at Nimbus Dam. The water is diverted at Folsom South Canal milepost 2.5.

Watershed activities of interest to ACWS that were reviewed for this report include recreation and other conditions along Lake Natoma and urban runoff. Aerojet discharges and SSOs into Lake Natoma and/or the canal are also of concern.

4.7.1. System Description

The Coloma WTP is a direct filtration plant, which utilizes pressure filters. The plant has been classified as direct filtration plant by the DHS due to the size of the sedimentation basins. The Coloma WTP has a capacity of 11 MGD. The plant is operated between 0 and 11 MGD, with an average winter flow of 3.7 MGD and an average summer flow of 7 MGD. 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 water travels several thousand feet to the Coloma WTP inlet.

There are now two parallel flocculation and sedimentation basins. Basin 1 is the original facility. Polymers are added to the water for coagulation and are mixed with a static mixer. There is a flocculation/sedimentation basin that has a vertical paddle flocculator with a rectangular sedimentation basin. The basin is equipped with mechanical sludge removal flights. Basin 2 is a new facility that includes hydraulic mixing, two stage flocculation with vertical paddles, and a rectangular sedimentation basin. The basin is also equipped with mechanical sludge removal flights.

A nonionic polymer is added as a filter aid and then the water passes through the tri-media, rapid sand pressure filters. There are 10 filters that are comprised of 18" of anthracite, 12" of sand, and

12" of garnet. The total filter area is 2,560 square feet. The filters are operated at a filtration rate of 3 gpm/sf. The filters are backwashed when the effluent turbidity exceeds 0.1 NTU, or when the headloss is elevated. The filters are backwashed at a flow not to exceed 15 gpm/sf. There is filter-to-waste capability. The filter backwash water and filter-to-waste water is sent to an upflow clarifier prior to being recycled back to the influent water stream. After filtration, the water is chlorinated. All CT credit is achieved after filtration. The water is treated with chlorine gas and then passes through three large clearwells, in series, with a total of 9 MG of storage.

Facility changes since the 1998 Update include an expansion of the Coloma WTP as well as numerous other facility updates. The plant was expanded from 7 to 11 MGD, which included a new flocculation/sedimentation basin as well as three new pressure filters. ACWS now adds potassium permanganate at the intake at all times as a pre-oxidant. The original flocculation basin was modified to have vertical shaft mixers and baffles. Chain and flight sludge removal equipment was installed in the original sedimentation basin. An upflow clarifier was constructed to provide treatment of the filter backwash water and filter-to-waste water prior to recycling. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. ACWS' expansion has provided for this.

4.7.2. Water Quality Summary

The ACWS has monitored the raw and treated water for all the required Title 22 constituents. ACWS also collected 13 raw water samples for *Giardia* and *Cryptosporidium* analysis using a Modified ICR Method. **Table 4-15** provides a review for selected constituents.

Table 4-15. Selected Constituent Review, ACWS Coloma WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform 21 MPN/100 mL, median *E. coli* 11 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: No *Giardia/Cryptosporidium* samples were confirmed positive.
TOC	Raw Water: Median >2.0 mg/L, Running Annual Average >2.0 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA <10 μg/L, LRAA <20 μg/L and HAA5 RAA <10 μg/L, LRAA <20 μg/L.
Arsenic	Raw and Treated Water: Not detected, <2 μg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 μg/L.

The raw water has very good quality. At the Coloma WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. In the raw water, during the period 1998 through 2002, there was one detection of 1,4-dioxane (0.0029 μg/L), well below the current Action Level (3 μg/L), and several detections of NDMA (all < 0.0747 μg/L), all but one (0.0747 μg/L) below the Action Level (0.01 μg/L). Neither of these constituents has been detected in 2003. Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity is consistently less than 0.1 NTU, but there were several excursions above 0.3 NTU during plant start-up periods. Fecal coliform levels are very low; higher levels are seen during the summer months. The median E. coli value for samples collected between May and September is 50 percent higher than the overall median. When fecal coliform levels in the raw water exceed 200 MPN/100 mL (or total coliform levels exceed 1,000 MPN/100 mL), ACWS adds 1-log reduction through disinfection. Although the raw water TOC shows both median and RAA values greater than 2.0 mg/L, ACWS is not required to implement enhanced coagulation since the Coloma WTP is classified as a direct filtration plant, not capable of this process.

4.7.3. Drinking Water Regulations Compliance

Table 4-16 provides a compliance evaluation for selected existing and future drinking water regulations. The ACWS is currently in compliance and is expected to be in compliance with future anticipated regulations at the Coloma WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Coloma WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Coloma WTP. The plant is granted credit for 2/1-log *Giardia*/virus reduction for physical removal and 1/3-log credit for disinfection, respectively.

- The Coloma WTP should be granted 2-log reduction credit for *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 2.5-log reduction under the Long Term 2 Enhanced SWTR, since it uses direct filtration and meets the more stringent turbidity standards. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L. The data collected by the ACWS using the Modified ICR Method and the *Cryptosporidium* data set for the Lower American River indicate *Cryptosporidium* levels at the Coloma WTP will likely be below the trigger level.

- Since the Coloma WTP is a direct filtration plant, TOC monitoring and treatment is not required.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for ACWS' distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-16. ACWS Coloma WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded. One detection of 1,4-dioxane < the Action Level and seven low level possible detections of NDMA (one detection > Action Level).
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has Credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity > 0.3 NTU several times during plant start up. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided. Will need to monitor and report variances to DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA > 2.0 mg/L. Enhanced coagulation not required since direct filtration water treatment plant. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Reduction credit should be upgraded to 2.5-log reduction credit for *Cryptosporidium* for direct filtration. Limited *Cryptosporidium* data at intake using Modified ICR Method. Will need to conduct 24 months of monitoring in accordance with the Rule. Additional treatment requirements, if any, will depend on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 μg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution system samples continue ≤40 μg/L TTHM and ≤30 μg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL – 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.8 Carmichael Water District

The CWD diverts water for the Carmichael WTP from the Lower American River near River Mile 17.5 through three Ranney Collectors. The CWD water supply, therefore, is considered groundwater under the direct influence of surface water.

Watershed activities of interest to CWD that were reviewed for this report include recreation and other conditions along the Lower American River corridor, and urban runoff. Aerojet discharges and SSOs into Lake Natoma and/or the Lower American River are also of concern.

4.8.1. System Description

The Ranney Collectors are located within the American River floodplain and adjacent to the streambed. They serve as intake and pump structures and provide pre-filtered water to the Carmichael WTP. The Carmichael WTP is composed of microfiltration membrane units with a design capacity of 16 MGD, which can be expanded to 22 MGD. The current operating range is from 0 to 16 MGD. The membrane units are backwashed regularly, and the water is filtered prior to recycling to the headworks. After filtration, the water is chlorinated with sodium hypochlorite and the pH is adjusted with lime prior to distribution. The CWD has six MG of storage.

Facility changes since the 1998 Update include completion of the new membrane filtration plant. This completes a four barrier treatment process: source protection, pre-filtration through the Ranney Collectors, membrane filtration, and chemical disinfection with sodium hypochlorite. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. The CWD has reserved hydraulic and physical space for alternative disinfection facilities and fluoride facilities.

4.8.2. Water Quality Summary

The CWD has monitored the raw and treated water for all the required Title 22 constituents. **Table 4-17** provides a review for selected constituents.

Table 4-17. Selected Constituent Review, CWD Carmichael WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.1 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median *E. coli* levels <2 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: Not tested.
TOC	Raw Water: Not provided.
Disinfection By-Products	Distribution System: Not provided.
Arsenic	Raw and Treated Water: Not detected, <2 µg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 µg/L.

The raw water, which is pre-filtered by the Ranney Collectors, has excellent quality. At the Carmichael WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. In the raw water, during the period 1998 through 2002, there was one detection of atrazine (0.1 µg/L), well below the current MCL (3 µg/L). Raw water turbidity varies less than for other American River diverters: the higher turbidities are during storm events. The treated water turbidity is consistently less than 0.1 NTU, with a few excursions above 0.1 NTU just after plant start-up. *E. coli* levels are very low, mostly non-detectable.

4.8.3. Drinking Water Regulations Compliance

Table 4-18 provides a compliance evaluation for selected existing and future drinking water regulations. The CWD is currently in compliance and is expected to be in compliance with future anticipated regulations at the Carmichael WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the Carmichael WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the Carmichael WTP. The plant is granted 3/0.5-log *Giardia*/virus reduction for physical removal and 0.5/3.5-log reduction from disinfection, respectively.

- The CWD will need to coordinate with the DHS to identify log reduction credit for *Cryptosporidium* at the Carmichael WTP since it will not be automatically granted. Source water monitoring for *Cryptosporidium* will be required under the Long Term 2 Enhanced SWTR with possible action required if the average is greater than 0.075 oocysts/L; however, the Carmichael WTP may qualify for a waiver from the monitoring requirements in the event the DHS approves at least a 5.5-log reduction credit for *Cryptosporidium*.

- Since the Carmichael WTP is a membrane filtration plant, TOC monitoring and treatment is not required.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. No distribution system data was provided, but given that American River water has low levels of TOC and further that the CWD's supply is a blend of river and groundwater, the system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs.

Table 4-18. CWD Carmichael WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded. One detection of atrazine below the MCL may reflect groundwater influence.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity > 0.1 NTU several times during plant start up. Need to coordinate with DHS to obtain 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity provided; no exceptions noted.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water not monitored for TOC. Enhanced coagulation not required since membrane water treatment plant. Distribution system data for TTHMs and HAA5 not provided. No MCLs are expected to be exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Need to work with DHS to identify log reduction credit for *Cryptosporidium*. If > 5.5 log, then may opt out of 24 months of monitoring. Otherwise, must conduct monitoring in accordance with Rule. Must conduct disinfection benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	No locational distribution system TTHM/HAA5 monitoring data provided. Expected to be < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring unless all distribution system samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL – 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

4.9 City of Sacramento

The City of Sacramento diverts water for the E.A. Fairbairn WTP from the Lower American River at River Mile 7.75.

Watershed activities of interest to the City of Sacramento that were reviewed for this report include recreation and other conditions along the Lower American River corridor, and urban runoff. Aerojet discharges and SSOs into Lake Natoma and/or the Lower American River are also of concern.

4.9.1. System Description

The E.A. Fairbairn WTP is a conventional water treatment plant with a design capacity of 90 MGD. The WTP is typically operated between 30 and 90 MGD. The average winter flow is 44 MGD and the average summer flow is 66 MGD.

The influent water is pre-chlorinated for disinfection CT credit. Alum is added as a coagulant and is mixed using pump injection. There is the ability to manually add lime for pH adjustment if necessary. The water is then flocculated in three stage basins with horizontal flocculators. The surface loading rate on the sedimentation basins is 1.24 gpm/sf. The sedimentation basins have mechanical chain and flight sludge removal systems in the first half of the basins and the second half is cleaned manually.

A polymer can be then added as a filter aid. The sedimented water is applied to eight gravity flow tri-media filters. The filters are made of 12" of anthracite, 10" of sand and 2" of garnet with a gravel base on a concrete teepee underdrain. The filters are operated at a rate of 5.7 gpm/sf, at 100 MGD or on filter runtime. The filters are backwashed based on filtered water turbidity, when the headloss exceeds six feet. The filters are backwashed at a rate of 18 gpm/sf. Currently, there are no filter-to-waste facilities. All filter backwash water is returned directly to the influent stream after flows are equalized in an equalization basin. After filtration, the water is chlorinated for disinfection CT credit and pH adjusted with calcium oxide. There is a clearwell at the water treatment plant with 20 MG of storage, and an additional 39 MG of storage in the distribution system.

Facility changes since the 1998 Update include completion of the design of the new water treatment plant expansion with construction now occurring and completion of modifications to the intake structure. The expansion includes a new flocculation/sedimentation basin, new filters, and a new disinfection CT structure. The 1998 Update recommended that all the water utilities provide planning and space to allow for potential installation of facilities to meet future regulatory requirements. The City of Sacramento's expansion design included reserving physical and hydraulic space for either ozone or UV light disinfection.

4.9.2. Water Quality Summary

The City of Sacramento has monitored the raw and treated water for all the required Title 22 constituents. Raw water data were also collected and analyzed for *Giardia* and *Cryptosporidium,* first using the ICR Method, and then using EPA Method 1623. **Table 4-19** provides a review for selected constituents.

Table 4-19. Selected Constituent Review, City of Sacramento E.A. Fairbairn WTP

Constituent	Monitoring Results
IOCs/VOCs/SOCs	Raw and Treated Water: Not detected above MCLs.
Turbidity	Treated Water: <0.3 NTU (95% samples), <1.0 NTU.
Indicator bacteria	Raw Water: Median fecal coliform and *E. coli* <30 MPN/100 mL.
Giardia/Cryptosporidium	Raw Water: 7 % *Giardia* samples confirmed positive, 0 % *Cryptosporidium* samples confirmed positive.
TOC	Raw Water: Median 1.2 mg/L, Running Annual Average 1.2 mg/L.
Disinfection By-Products	Distribution System: TTHMs RAA <50 μg/L, LRAA <60 μg/L and HAA5 RAA and LRAA <30 μg/L.
Arsenic	Raw and Treated Water: Not detected, <2 μg/L.
Hexavalent Chromium	Treated Water: Not detected, <1 μg/L.

The raw water has excellent quality. At the E.A. Fairbairn WTP, neither IOCs, VOCs, nor SOCs pose treatment or compliance concerns. Ultra low detection level monitoring for MTBE at the intake showed that MTBE is present in the raw water at concentrations well below the MCL (5 μg/L). Raw water turbidity levels are highest during winter months and storm events. The treated water turbidity is consistently less than 0.1 NTU. Fecal coliform and *E. coli* levels are generally low; the higher levels occur during the winter months with some coliform peaks during the summer. From 1998 through 2002, the frequency of confirmed *Giardia* detections was low (low is considered less than 20 percent) and there were no confirmed detections of *Cryptosporidium*.

4.9.3. Drinking Water Regulations Compliance

Table 4-20 provides a compliance evaluation for selected existing and future drinking water regulations. The City of Sacramento is currently in compliance and is expected to be in compliance with future anticipated regulations at the E. A. Fairbairn WTP. Compliance with future state regulation of arsenic and hexavalent chromium, however, is unknown since it is not known at what level the new state MCLs may be set. Arsenic and hexavalent chromium are not detectable in American River water at current detection limits.

- Based on CFE turbidity data provided for the study period, the E. A. Fairbairn WTP meets the new turbidity standards under the Interim Enhanced SWTR.

- As discussed at the end of Section 2, water quality data indicate that 3/4-log reduction of *Giardia* and viruses is appropriate at the E. A. Fairbairn WTP. The plant is granted credit for 2.5/2-log reduction of *Giardia*/viruses for physical removal and 0.5/2-log for disinfection, respectively.

- The E. A. Fairbairn WTP should be granted 2-log reduction of *Cryptosporidium* under the Interim Enhanced SWTR, and upgraded to 3-log reduction under the Long Term 2 Enhanced SWTR, since it uses conventional filtration and meets the more stringent turbidity standards. The City of Sacramento has completed the source water monitoring for *Cryptosporidium* for the Long Term 2 Enhanced SWTR; based on source water concentrations, additional action will not be required.

- The 1998 Update recommended that the water utilities monitor distribution system DBPs and disinfection practices in anticipation of future DBP standards. The data for the City of Sacramento's distribution system shows that RAA levels are below the Stage 1 D/DBP Rule MCLs. The system is expected to meet the new LRAA Stage 2 D/DBP Rule MCLs as well.

Table 4-20. City of Sacramento E. A. Fairbairn WTP Drinking Water Regulations Compliance

	Targeted Compounds	Compliance Status
Existing Regulation		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. No MCLs exceeded. Styrene detected in one treated water sample < MCL.
SWTR	Microbial and Turbidity	The data continue to support applicability of 3/4-log reduction for *Giardia*/virus and the plant has credit for *Giardia*/virus 3/4-log reduction. All operating, monitoring and reporting requirements are met. All treated water turbidity requirements are met.
Interim/Long Term 1 Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	Combined filter effluent turbidity < 0.3 NTU. Should be granted 2-log reduction credit for *Cryptosporidium.* Individual filter effluent turbidity not provided. Will need to monitor and report variances to DHS. Must submit recycle statement to DHS by December 2003.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	Raw water monitored for TOC; RAA < 2.0 mg/L. Enhanced coagulation not required. Distribution system data collected for TTHMs and HAA5. No MCLs exceeded.
Future Regulation		
Long Term 2 Enhanced SWTR – 2004*	Microbial	Reduction credit should be upgraded to 3-log reduction credit for *Cryptosporidium* for conventional filtration. Extensive *Cryptosporidium* monitoring data at intake. Have conducted 24 months of monitoring in accordance with the Rule. Additional treatment requirements are not expected based on monitoring results. Must conduct disinfection profiling/benchmark for *Giardia* and viruses.
Stage 2 D/DBP Rule – 2004*	Disinfectants and Disinfection By-Products	Locational distribution system TTHM/HAA5 monitoring indicates all current locations < 80/60 µg/L, respectively. Will need to conduct Initial Distribution System Evaluation to assess distribution system monitoring, coordinated with consecutive systems unless all distribution samples continue ≤40 µg/L TTHM and ≤30 µg/L HAA5 for 2002-2004; then standard monitoring program is waived.
State arsenic MCL - 2004*	Arsenic	All intake and ambient data below detection limit. Compliance with federal MCL expected. Compliance with future state MCL unknown.
State hexavalent chromium MCL- 2004*	Hexavalent Chromium	All intake data below detection limit. Compliance with future state MCL unknown.

NOTE:
* Expected date of promulgation

SECTION 5
FINDINGS AND RECOMMENDATIONS

This section consists of a discussion of principal findings for this 2003 Update followed by a comprehensive list of recommendations.

5.1 Findings

Findings are organized as pertaining to river water quality, watershed activities and discharges, or regulatory compliance. The regulatory compliance discussion pertains only to the nine water utilities currently diverting and treating American River water.

5.1.1. River Water Quality

Overall, the American River provides excellent quality raw water. The raw water can be treated to meet all drinking water standards using conventional and direct filtration processes, as well as membranes. None of the utilities reported any exceedances of either primary or secondary MCLs from 1998 through 2002, and no persistently present constituents were identified in the river that require additional treatment processes.

Turbidity. High turbidities during storm events are sometimes a treatment challenge, which the utilities report managing by various means such as adjusting chemical doses and/or reducing plant flow. Optimizing treatment to remove solids, thus reducing turbidity levels and potentially microorganisms and TOC, is an operational goal of all the utilities diverting and treating American River water. Treated water turbidity data show that all the water treatment plants effectively reduce turbidity levels to well below drinking water standards.

Coliforms. Coliform densities upstream of Folsom Dam are generally low and are lower than those along the Lower American River. Data from Folsom Lake and the Lower American River, collected following summer holiday weekends, suggest recreational use may sometimes contribute to elevated coliform densities. Most peak coliform densities, however, occur during wet months and storm events.

Two intake locations have higher coliform densities in summer months rather than in wet months, in contrast to the general trend: the EID Strawberry WTP on the upper South Fork and the ACWS Coloma WTP on the Folsom South Canal. A possible explanation at the Strawberry WTP is that the Strawberry community's septic systems may be leaching to the river causing elevated coliform densities when available dilution is minimized due to low summer river flows. Possible factors at the Coloma WTP may be that increased recreational use of and/or other conditions at Lake Natoma contribute coliform when warm summer temperatures in the canal favor coliform growth.

Within the reach of the Lower American River, median fecal coliform densities do not increase from upstream to downstream, but average coliform densities do. The average values are more affected than median values by outlier samples, which for coliform, are mostly peaks during wet months and storm events. Thus, the increasing trend of average coliform densities highlights the effect of sources of storm runoff on coliform densities in this reach.

***Giardia* and *Cryptosporidium*.** The *Giardia* and *Cryptosporidium* data suggests that there are generally low concentrations of these protozoa in the American River during any time of the year. It appears likely that storm events contribute to the few occasions of higher counts. It is important for water treatment plant operators to continue to optimize treatment to remove solids during wet weather and storm events. Because the review of protozoa data for the 2003 Update was based mostly on EPA Method 1622/1623 data, there is more confidence in these findings than had previously been possible. The coliform, *Giardia*, and turbidity data currently indicate that 3/4/2-log reduction for *Giardia*/viruses/*Cryptosporidium*, respectively, is appropriate for water utilities treating American River water. All the water treatment plants are granted 3/4-log reduction credit for *Giardia*/viruses and are likely to be granted at least 2-log reduction credit for *Cryptosporidium*.

Organic Carbon. Peak TOC concentrations occur during wet months and storm events. Average and median levels of TOC along the river range between 1.2 and 1.9 mg/L, below the enhanced treatment trigger of 2.0 mg/L. DOC and SUVA data show that a large part of the TOC is in the dissolved fraction and is humic in nature, indicating that the TOC will contribute to DBP formation. Treated water TOC data show that the water treatment plants effectively reduce TOC levels. Distribution system data for all the utilities indicate that DBP levels are below current drinking water standards and are likely to be below future tighter standards as well.

One intake location has TOC levels higher than 2.0 mg/L. This is the ACWS Coloma WTP intake on the Folsom South Canal. A possible explanation for these higher TOC levels, is that mats of vegetation that grow in the canal due to the canal's relatively shallow, warm, low-flow conditions contribute organic carbon. Despite TOC levels higher than 2.0 mg/L, ACWS is not required to implement enhanced coagulation since the Coloma WTP is a direct filtration plant, not capable of that process.

Volatile and Synthetic Organic Chemicals. Detections of organic chemicals in the river are sporadic and infrequent. Out of a total of 3,643 organic analyses during the period 1998 through 2002, the CMP reported only 111 low level detections of VOCs and SOCs along the Lower American River. The most likely source of most of these VOCs and SOCs is urban runoff; monitoring data for urban runoff discharges show most of the VOCs and SOCs detected in the river have been detected in urban runoff discharges. There were also two anomalous instances of VOC detections in the Lower American River above MCLs, for 1,2-dichloroethane and dichloromethane. Monitoring data from the water utilities included a few additional organic chemical detections: one detection of 1,4-dioxane and seven detections of NDMA, below the PQL, at the ACWS Coloma WTP, one detection of atrazine at the CWD Carmichael WTP, and one detection of styrene at the City of Sacramento E. A. Fairbairn WTP. The Coloma WTP detections are discussed further as part of the Aerojet discussion. These detections do not pose compliance issues for drinking water.

Arsenic and Hexavalent Chromium. All the raw water arsenic data provided by the water utilities is below the analytical detection limit of 2 μg/L and therefore is below the current MCL of 10 μg/L. So, there is currently no compliance issue related to arsenic levels. All the treated water hexavalent chromium data, provided by the water utilities, is below the analytical detection limit of 1 μg/L. There is currently no MCL for hexavalent chromium and therefore no current compliance issue related to hexavalent chromium levels. The DHS is expected to lower the state arsenic MCL and set a state MCL for hexavalent chromium. However, until the DHS proposes what levels it intends to set for these MCLs, it will remain uncertain whether or not the water utilities will be affected.

5.1.2. Watershed Activities and Discharges

Upper Watershed Stewardship Projects. The upper watershed stewardship projects currently provide leadership in addressing soil erosion of the upper watershed, which results in storm sediment loading and high turbidity levels at downstream water treatment plant intakes during storms. Both projects have made progress over the past five years due, in part, to success in obtaining grant funding. These are long-term, stakeholder-based projects; measurable results and improvements will likely be a long time in coming. Other source water protection issues of interest in the upper watershed (e.g. body contact recreation, septic systems along the South Fork, etc.) may be included later if the stewardship projects continue to thrive. Participation of the upper watershed water utilities will be a key factor in determining whether or not these projects incorporate source water protection issues in a meaningful way.

Changes Since the 1998 Update

Use of average fecal and *E. coli* data shows a less pronounced increasing upstream to downstream coliform trend along the Lower American River than previously shown by the use of total coliform data.

EPA Method 1622/1623 data provide increased confidence in the previous finding that *Giardia* and *Cryptosporidium* in the river are likely present infrequently and at low concentrations.

The upper watershed stewardship projects obtained grant funds and continued work towards control of sources of erosion in the upper watershed. The South Fork stewardship project was begun within the last three years.

New restrooms have been installed and/or are being renovated in a number of recreation areas in the watershed.

There is now a plan for managing whitewater recreation on the South Fork.

The Pumpout and Restroom Campaign was launched and promotes the use of restrooms and the pumpout at Folsom Lake and the use of restrooms along the Lower American River.

The Lake Natoma Nimbus Flat area was renovated, which has led to an expanded non-migratory waterfowl population and increased quantities of goose and duck waste.

Efforts of the County-Cities Board of Homelessness has reduced illegal camping (with its associated trash and human waste problems) in the American River Parkway.

Rapid development and urbanization continue in the Folsom Lake basin and the lower reaches of the upper watershed.

A few special monitoring studies have provided better information on Sacramento urban runoff levels of TOC, SUVA, and various pathogenic microorganisms.

Groundwater treatment at the Aerojet Superfund Site is now more comprehensive, covering most known contaminants. More comprehensive testing has not identified additional contaminants. Reuse alternatives are being discussed for all the currently treated groundwater as well as for a new groundwater treatment facility.

There have been a number of SSOs into the American River.

The EPA began developing regulations to bring sanitary collection systems under the NPDES permit process. These regulations are currently under review and their final form is uncertain.

The City of Folsom sanitary collection system is now under NPDES Permit.

ARWTC agencies established direct notification procedures with emergency response agencies and the ARWTC established procedures within the group regarding communication of river spill notification information.

Body Contact Recreation. Body contact recreation occurs throughout the American River on all the major reservoirs and river reaches. Recreation is a specific purpose for some of the reservoirs and river reaches and in general is considered an important public amenity in the watershed. Folsom Lake is the only reservoir in the American river watershed that has direct intakes for some of the participating water utilities. The Pumpout and Restroom Campaign promotes pumpout and restroom use at Folsom Lake as well as restroom use along the Lower American River.

Body contact recreation contributes microorganisms to the river through urination, defecation, and a natural shedding/washing of the body. Principal factors affecting the degree of microbial contamination are the number of people and people's behavior. People's behavior is affected by the availability of restroom facilities and is also affected by whether individuals follow a stewardship ethic. Coliform data occasionally suggests that recreational use is sometimes related to elevated coliform densities but overall there is a limited ability to discern impacts from the monitoring data.

The river reaches and reservoirs that are most downstream in the river system are the most used, due primarily to their proximity to the Sacramento metropolitan area. The different agencies that manage recreation on the reservoirs and river reaches exercise agency specific procedures and criteria for control of carrying capacity, determination of number of restroom facilities, and public outreach. New restrooms have been installed and/or are being renovated by some agencies in a number of areas.

One identified problem area is at the most downstream reach of the Lower American River where congregations of recreational boats during summer weekends can result in visible sewage contamination.

Lower American Riparian Corridor. There are several sanitary issues of concern along the Lower American Riparian corridor that involve deposition of fecal waste on near shore areas. During storms, this waste may wash into the American River upstream of the Lower American River water utilities' intakes and may contribute, to some degree, to the coliform peaks associated with wet weather and storm events. These issues are: (1) goose and duck waste contributed by the increased non-migratory waterfowl population at Nimbus Flat on Lake Natoma; (2) dog waste in areas of the American River Parkway where neighborhood enclaves have local access points to the parkway and at Paradise Beach; and (3) human waste at illegal campsites in the most downstream reaches of the Lower American River.

Urban Runoff. Urban runoff is of interest to the water utilities diverting from the Lower American River and is of increasing interest to the Folsom Lake water utilities as urbanization of the Folsom Lake basin and the lower reaches of the upper watershed continues. Urbanization adds to the impervious cover in a drainage basin, and thus contributes to more intense flows and increased sediment loading to the river during storms. Monitoring data on urban runoff discharges also show that urban runoff is a source of SOC pesticides and VOCs (from urban use and vehicular sources); TOC (from vegetation and green waste, animal waste, and fertilizers); and microorganisms (from fecal waste in the urban environment). As mentioned above, urban runoff is the likely source of most of the VOCs and SOCs detected in the river. It is a source of coliform, protozoa, and TOC, although the ability to compare it to other sources remains limited due primarily to a lack of data on the other sources. It is one of the sources contributing to coliform peaks associated with wet weather and storm events.

The Sacramento Stormwater Management Program implements BMPs that address TOC and fecal waste in urban runoff as well as erosion and sediment control, illegal dumping into storm drains, and general pollution prevention and good housekeeping. This program covers the urbanized area tributary to the Lower American River. Additional municipalities in the urbanizing areas of the Folsom Lake basin and lower reaches of the upper watershed must begin to develop and implement stormwater management programs in 2003.

Aerojet Superfund Site. As a result of past operating and chemical disposal practices, groundwater beneath the Aerojet facility south of Lake Natoma is contaminated with VOCs, 1,4-dioxane, perchlorate, and NDMA. Aerojet pumps and treats the groundwater. In the past, the treated groundwater was both discharged to the American River and reinjected into the aquifer. Now, more treated groundwater is discharged to the American River. Reuse alternatives are being discussed for all the currently treated groundwater as well as for a new treatment facility, and the selection of preferred reuse alternative(s) will affect where the treated groundwater will be discharged in the future.

In the past five years, Aerojet has installed additional treatment facilities so that the contaminated groundwater is treated for all known contaminants with one exception. The exception is that the RWQCB allows perchlorate in the discharge from one groundwater plume that is above the Action Level and relies on dilution to reduce these perchlorate levels to below the Action Level in the river. The groundwater contaminant plumes continue to migrate laterally and deeper. Because of the depth of the plumes, the American River and the Folsom South Canal do not appear to intercept the plumes. The Folsom South Canal may be in hydrologic communication with Buffalo Creek, an impoundment on Buffalo Creek, and a bank of passive infiltration wells between the creek and the canal.

The detection of dichloromethane in the Lower American River, discussed above, may or may not have been associated with the Aerojet site. There have been no perchlorate, NDMA, or 1,4-dioxane detections in the river from 1998 through 2002. The Coloma WTP detected NDMA at its intake several times, below the PQL as well as a single detection of 1,4-dioxane. This Coloma WTP data suggests hydraulic communication between the Folsom South Canal and an Aerojet source of these contaminants such as hydraulic communication with the Buffalo Creek impoundments and infiltration wells.

All the Lower American River water utilities have tracked events related to additional discharges to the river. Due to water utility comments, RWQCB included additional river monitoring requirements related to additional discharges as well as the requirement for notification of downstream water agencies in the event discharge effluent limits are exceeded.

Mather AFB. The reason the former Mather AFB facility was included in this 2003 Update is that there was discussion, within the last five years, of a joint discharge to the American River of treated groundwater from an Aerojet/McDonnell Douglas Corporation plume and a Mather AFB plume. The plan for discharge of the Mather AFB treated groundwater to the American River, however, was abandoned.

Spills. The principal concern related to spills over the past five years has been with SSOs from sanitary collection systems into the American River and Folsom South Canal. A few of the SSOs have corresponded with elevated bacteria levels in the river. This correspondence is noted, but does not indicate a conclusive cause and effect relationship since SSOs generally occur during heavy storm events when other sources also contribute to elevated bacteria levels in the river.

Although there have been several SSOs in the past five years, positive steps have been taken by individual agencies to address and correct circumstances causing SSOs. Funding is a constraint on the pace of some improvements. The pace and scope of sanitary collection system improvements will likely be stepped up if the CMOM regulations contain substantive regulatory requirements. If they do not, then the initiative for further improvements will depend on either the budget and work priorities of each individual collection system agency or direction from the RWQCB to the individual agency. The direction of the CMOM regulations should be clearer at the end of 2003, when the EPA must report to Congress on its intended direction for these regulations.

Several of the ARWTC agencies have notification procedures with these sanitary collection system agencies in the watershed. The SSO spills highlight the importance of the ARWTC spill notification phone tree and timely notification of the water utilities when spills occur. The utilities need this information to make appropriate spill response decisions.

The Next Five Years and Beyond

The TCD at Folsom Dam, which began operation in 2003, has the potential to alter water quality for the Folsom Lake water utilities. The period of record for the next update will demonstrate whether there is any marked water quality change as a result of TCD operations.

EPA Method 1622/1623 *Cryptosporidium* data from the upper watershed and Folsom Lake will be available for evaluation as part of the next update. It is recommended that *Giardia* and *E. coli* data be collected along with the *Cryptosporidium* data.

Over the long term, as upper watershed stewardship projects are implemented, EID, Folsom, FSP, SJWD, and Roseville may be able to measure the effect of these projects on storm sediment loading and turbidity levels at their intakes. Since PCWA currently diverts water infrequently, it may not collect sufficient data to measure any such effects.

Development and urbanization are likely to continue in the Folsom Lake basin and the lower reaches of the upper watershed. This will result in increased urban runoff and increased recreational use of the river and reservoirs.

By the next update, the Phase II stormwater permittees will have developed and begun implementation of stormwater management programs. The Phase I Sacramento Stormwater Management Program will continue its program efforts.

Selection of reuse alternatives for Aerojet Superfund Site treated groundwater may alter the current plan for discharge of the treated groundwater to the American River. Currently, the Mather AFB treated groundwater is not part of the reuse discussion.

All the sanitary collection systems may come under permit if the CMOM regulations contain substantive regulatory requirements. If the CMOM regulations are not substantive, then the initiative for further improvements will depend on the budget/ work priorities of the individual agencies or individual direction from the RWQCB.

5.1.3. Regulatory Compliance

The participating utilities' water treatment plants along the American River are currently in compliance with all the existing drinking water regulations. Treated water levels are below MCLs.

All of the water treatment plants along the American River water must comply with the SWTR and either the Interim Enhanced SWTR or the Long Term 1 Enhanced SWTR and obtain 3-log reduction of *Giardia,* 4-log reduction of viruses and 2-log reduction of *Cryptosporidium* through physical removal and/or chemical inactivation. All of the plants have processes in place to obtain a minimum credit for 3/ 4-log removal of *Giardia*/viruses. All except two water treatment plants (EID Strawberry and CWD Carmichael WTP) are expected to be granted credit for 2-log reduction of *Cryptosporidium* based on treated water turbidity performance. These two utilities will need to coordinate with the DHS to identify the log-reduction credit for their membrane plants.

All the utilities' distribution system monitoring data for TTHMs and HAA5 show that distribution system levels are well below current MCLs. The data indicates that locational RRAs can be expected to be below expected future MCLs, as well.

Existing Regulatory Requirements

To meet regulatory requirements, all the water utilities should continue to conduct Title 22 monitoring; track and record raw, recycled, individual filter and combined filter effluent turbidity data; collect weekly or monthly raw water coliform data; collect monthly raw and treated water TOC (except for EID Strawberry WTP, ACWS Coloma WTP, FSP WTP, and the CWD Carmichael WTP); and monitor their distribution system for TTHMs and HAA5.

To meet regulatory requirements, all the water utilities should submit a Recycle Statement to the DHS by December 2003 (except EID Strawberry WTP, and CWD Carmichael WTP). The SJWD and Roseville should either return recycle water to the headworks upstream of all chemical feed or discuss alternate plans with the DHS.

The EID and the CWD will need to coordinate with the DHS to identify *Cryptosporidium* log-reduction credit for the Strawberry and Carmichael WTPs, respectively.

Future Regulatory Requirements

Most of the water utilities should prepare for collecting raw water *Cryptosporidium* or *E. coli* data as per the upcoming Long Term 2 Enhanced SWTR, depending on population served. The City of Sacramento should be able to grandfather the E. A. Fairbairn WTP Method 1623 data. The EID Strawberry WTP, FSP, and CWD may opt out of this requirement if the DHS grants at least 5.5-log reduction credit for *Cryptosporidium* at their water treatment plants. Monitoring is to begin within six months of promulgation of the Rule for large systems and within 30 months for small systems.

All the water utilities should prepare for conducting disinfection profiling/benchmarking for *Giardia* and viruses as per the upcoming Long Term 2 Enhanced SWTR.

All the water utilities should prepare for conducting the Initial Distribution System Evaluation as per the upcoming Stage 2 D/DBP Rule. The PCWA, Roseville, SJWD, and City of Sacramento, as wholesale utilities, should coordinate this monitoring with their respective consecutive systems. If the utilities show that all distribution system samples for 2002-2004 have TTHM $\leq$40 μg/L and HAA5 $\leq$30 μg/L, then a waiver from the standard monitoring program can be obtained.

Depending on what level the DHS sets, the DHS' development of a revised state MCL for arsenic and a new state MCL for hexavalent chromium may affect the water utilities.

5.2 Recommendations

Table 5-1 presents the recommendations. The three recommendations ranked as high priority address treatment challenges, support regulatory compliance, or pertain to spill response. All the other recommendations involve maintaining or improving the river's source water quality or collection of additional information to improve source water evaluations.

Table 5-1. Recommendations

Recommendation	Implementing Utility	Reason for Recommendation
High Ranking		
1. Continue to optimize treatment processes. Depending on individual treatment plant design and operation, optimization may include: • Monitoring source water quality. • Regular equipment inspection and maintenance. • Optimizing or minimizing plant flow. • Setting internal process water turbidity goals throughout the plant. • Optimizing coagulant type, dose, and conditions. • Monitoring sedimentation loading rates and short circuiting. • Monitoring filter loading rates, backwash procedures, and filter media. • Optimizing disinfection.	All utilities diverting and treating American River water	Based on treatment challenges posed by source water quality, optimization is especially important during wet weather. It may also be important during peak recreational use periods.
2. When monitoring to satisfy requirements of the Long Term 2 Enhanced SWTR, consider analyzing samples using EPA Method 1623 to collect *Cryptosporidium* and *Giardia* data. Also, when collecting the data, consider using any available flexibility in sampling dates to collect some samples during wet weather events or around peak recreational use periods. Flexibility will be limited due to regulatory requirements and laboratory availability, since prescheduling of laboratory time will likely be necessary.	All utilities diverting and treating American River water, except City of Sacramento	For a minimal additional cost of running EPA Method 1623 rather than EPA Method 1622, a more extensive source water protozoa database can be collected. This would be especially helpful for the next update in evaluating *Giardia*/virus log reduction requirements for Folsom Lake and the upper watershed, where there are currently either limited protozoa data or no data.
3. Continue to maintain direct notification and inter-notification procedures established by the ARWTC. Periodically check the currency of the notification agreements and conduct periodic dry-runs to test and improve the procedures.	ARWTC	Spills into the river do occur, and the water utilities need timely notification to make appropriate spill response decisions.

Table 5-1. Recommendations (continued)

Recommendation		Implementing Utility	Reason for Recommendation
		Medium Ranking	
4.	When monitoring coliform to satisfy requirements of the Long Term 1 or Interim Enhanced SWTRs, opt for total and *E. coli* coliform analyses rather than for total and fecal coliform analyses.	EID, FSP, SJWD, Roseville (all other water utilities are currently analyzing for *E. coli*)	*E. coli* is a more specific indicator constituent than fecal coliform, and the collection of *E. coli* data by all the American River water utilities will enhance the river water quality data review for the next update. EID's collection of this monitoring data at the Strawberry WTP will also be useful in reviewing the apparent summer seasonal coliform increase at that location.
5.	Coordinate with the USBR on the collection of additional information on TCD operations to ensure that data are collected that will allow for an evaluation of TCD impacts on turbidity levels, coliform, and TOC concentrations. Identification of the lake level from which the intake water is drawn is important for such an evaluation.	Folsom, FSP, SJWD, Roseville	This data is needed to evaluate the impact of the TCD and thus provide a basis for any needed adjustments with respect to operation of the TCD, water treatment plant operations, and/or source water protection activities.
6.	Continue stakeholder participation in and support of the upper watershed stewardship projects.	PCWA and EID	Participation of the upper watershed water utilities has been important previously and will continue to be a key factor in the success of these projects in the future in addressing sources of erosion and also in determining whether or not these projects eventually incorporate other source water protection issues in a meaningful way.
7.	Continue to support the Pumpout and Restroom Campaign.	EID, Folsom, SJWD, Roseville, ACWS, CWD, City of Sacramento, Sacramento County, and EBMUD	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 Pumpout and Restroom 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.
8.	Consider encouraging the CDPR to make progress on its waterfowl control program at Lake Natoma.	ACWS, potentially with support from the ARWTC	The recent waterfowl population expansion has resulted in increased duck and goose waste at Lake Natoma. The CDPR has posted signs to discourage the public from feeding the waterfowl. If this action is not sufficient to reduce the waterfowl population, then a more comprehensive waterfowl control program may be needed.

Table 5-1. Recommendations (continued)

Recommendation	Implementing Utility	Reason for Recommendation
Medium Ranking (continued)		
9. Consider participating in the project that CUWA is facilitating to install dog-waste dispenser stations along the Lower American River corridor.	ACWS, CWD, City of Sacramento, Sacramento County, and EBMUD	Dog waste is a problem in areas of the American River Parkway where neighborhood enclaves have local access points to the parkway. This waste may be washed into the river during storms. The project being facilitated by CUWA would address this problem through signage, installation of pet waste bag dispenser stations, and posting of local pet waste ordinances with increased enforcement.
10. Evaluate means of addressing the pollution associated with the boats congregating downstream of the Highway 160 bridge during the summer.	City of Sacramento, Sacramento County, and EBMUD	This area is downstream of any American River intake but upstream of the City of Sacramento's Sacramento River intake and the Sacramento County/EBMUD future joint Sacramento River intake. Means of reducing this pollution may include efforts such as public outreach and/or designation and enforcement of the area as a no-discharge zone.
11. Provide input to the Phase II stormwater management programs on constituents and sources of most concern to the drinking water utilities as well as BMPs being implemented by Phase I programs that address these constituents and sources.	ARWTC, especially Folsom, City of Sacramento, and Sacramento County, which are Phase I stormwater permittees.	As urbanization of the area increases, urban runoff discharges will increase. There is an opportunity, while the Phase II stormwater agencies are developing their required programs, to integrate the water utilities' interests into those programs.
12. Continue to track events at the Aerojet site and actively comment, as needed, on proposed changes and new information that have the potential to affect the quality of the Lower American River. Considerations include issues such as the ability of the discharge 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.	ACWS, CWD, City of Sacramento, Sacramento County, EBMUD	The water utilities' participation has been previously important and will be important in the future in ensuring their interests are considered. Cleanup of the Aerojet Superfund Site is ongoing. In the future, new science will likely affect cleanup options, improved laboratory technology will likely affect the ability to detect currently unknown constituents and the EPA and/or DHS may set new drinking water standards for constituents that may be found at the site. Additionally, decisions about reuse alternatives will affect the future volume of discharge to the American River and/or potentially to the Folsom South Canal.
13. Continue to monitor for NDMA and 1, 4-dioxane at the Coloma WTP intake.	ACWS	ACWS has detected low levels of NDMA and 1, 4-dioxane at the Coloma WTP intake. Monitoring should be continued to establish a longer record of these constituents' presence and concentrations, or lack of presence.

Table 5-1. Recommendations (continued)

Recommendation	Implementing Utility	Reason for Recommendation
Low Ranking		
14. As part of the IDSE for Stage 2 D/DBP Rule compliance, consider, if reasonable to do so, tracking which distribution system DBP samples are American River water.	PCWA	In the event that any distribution system compliance issues arise, this data may be useful in evaluating whether American River source water is a factor.

APPENDIX A

Bibliography and Contacts

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Bessette, Karen, (916) 255-3065, Regional Water Quality Control Board, Central Valley Region. Contacted with respect to former Mather AFB cleanup.

Brady, Mike, (916) 875-7018, County of Sacramento Public Works Agency. Contacted with respect to Sacramento regional collection system sanitary sewer overflows.

Chekobi, Robert, (916) 947-8295, City of Sacramento Police Department, Marine Unit. Contacted with respect to boating along the Lower American River.

Dampier, Jill, (530) 885-4527, Auburn State Recreation Area. Contacted with respect to body contact recreation.

Egbert, Mark, (530) 295-5637, MEgbertRCD@netscape.net, Georgetown Divide RCD, www.carcd.org. Contacted with respect to South Fork American River Watershed Stewardship Project.

Erickson, Kyle, (916) 255-3364, Regional Water Quality Control Board. Contacted with respect to City of Placerville sanitary sewer overflows.

Franz, Joseph, (916) 351-3020, Folsom State Prison. Contacted with respect to Folsom State Prison system sanitary sewer overflows.

Gresham, Rich, (530) 885-3046, Placer County RCD, www.placer.ca.gov. Contacted with respect to North and Middle Fork American River Watershed Stewardship Project.

Haberman, Rich and Hultquist, Bob, Department of Health Services. Contacted with respect to DHS acceptance of fecal coliform and *E. coli* data in determining *Giardia* and virus log reduction requirements.

Honeycutt, Dave, (530) 333-4356, Georgetown Divide PUD. Contacted with respect to body contact recreation.

Lubetkin, Lester, (530) 622-5061, El Dorado National Forest. Contacted with respect to body contact recreation.

Lydick, David, (916) 875-6548, County of Sacramento Department of Parks and Recreation. Contacted with respect to body contact recreation and activities along the American River Parkway.

McDonald, Alex, (916) 255-3025, Regional Water Quality Control Board. Contacted with respect to Aerojet Superfund Site.

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Nakaji, Scott, (916) 988-0205, Folsom Lake State Recreation Area. Contacted with respect to body contact recreation and activities along the Lake Natoma Unit of the Folsom State Recreation Area.

Novak, Jeff, (530) 295-2540, El Dorado County. Contacted with respect to body contact recreation.

Petit, Bonny, (530) 265-4531, Tahoe National Forest. Contacted with respect to body contact recreation.

Reese, Crystal, (916) 985-2561, Folsom State Prison. Contacted with respect to Folsom State Prison system sanitary sewer overflows.

Thayer, Elizabeth, (916) 255-3071, Regional Water Quality Control Board. Contacted with respect to City of Colfax treated wastewater spills.

Witt, Doug, (916) 989-8604, California Department of Parks and Recreation. Contacted with respect to body contact recreation.

Wood, Susana Alcala, Supervising Deputy City Attorney, City of Sacramento, Office of the City Attorney. Contacted with respect to illegal camping issues along the American River Parkway.

APPENDIX B

Water Quality Data

- Coordinated Monitoring Program
- East Bay Municipal Utility District
- Sacramento River Watershed Program
- U. S. Geological Survey

Coordinated Monitoring Program

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
8/15/2000	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
11/13/2001	Discovery Park	Cryptosporidium	Amorphous Structure	=	0.6	Organism/L	
12/18/2001	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
1/15/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
11/13/2001	**Discovery Park**	**Cryptosporidium**	**DAPI & DIC Positive**	**=**	**0.1**	**Organism/L**	
12/18/2001	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
1/15/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
11/13/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
12/18/2001	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
1/15/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
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4/3/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Empty	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Empty	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
11/13/2001	**Discovery Park**	**Cryptosporidium**	**Flourescence Antibody**	**=**	**0.8**	**Organism/L**	
12/18/2001	**Discovery Park**	**Cryptosporidium**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	
1/15/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Wet Previous Day

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
5/15/2001	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
11/13/2001	**Discovery Park**	**Cryptosporidium**	**Internal Structure (One)**	**=**	**0.2**	**Organism/L**	
12/18/2001	**Discovery Park**	**Cryptosporidium**	**Internal Structure (One)**	**=**	**0.1**	**Organism/L**	
1/15/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
11/13/2001	Discovery Park	Cryptosporidium	Negative	=	0.4	Organism/L	
12/18/2001	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
1/15/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Negative	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Negative	<	0.1	Organism/L	
8/15/2000	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
2/20/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
11/13/2001	**Discovery Park**	**Cryptosporidium**	**Positive**	**=**	**0.3**	**Organism/L**	
12/18/2001	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
1/15/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
2/5/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
3/5/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
4/3/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
5/7/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
6/4/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
7/9/2002	Discovery Park	Cryptosporidium	Positive	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Positive (Internal Staining)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Positive (Internal Staining)	<	0.1	Organism/L	
8/6/2002	Discovery Park	Cryptosporidium	Positive (Stained Nuclei)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Cryptosporidium	Positive (Stained Nuclei)	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	Amorphous Structure	=	0.2	Organism/L	Dry
2/20/2001	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Giardia	Amorphous Structure	=	0.2	Organism/L	Dry
9/18/2001	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	Amorphous Structure	=	0.6	Organism/L	
12/18/2001	Discovery Park	Giardia	Amorphous Structure	=	0.8	Organism/L	
1/15/2002	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	Amorphous Structure	=	0.1	Organism/L	
3/5/2002	Discovery Park	Giardia	Amorphous Structure	=	0.1	Organism/L	
4/3/2002	Discovery Park	Giardia	Amorphous Structure	=	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	
7/9/2002	Discovery Park	Giardia	Amorphous Structure	=	0.2	Organism/L	
8/6/2002	Discovery Park	Giardia	Amorphous Structure	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Amorphous Structure	=	0.3	Organism/L	
10/1/2002	Discovery Park	Giardia	Amorphous Structure	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
2/20/2001	**Discovery Park**	**Giardia**	**DAPI & DIC Positive**	**=**	**0.1**	**Organism/L**	**Wet Previous Day**
5/15/2001	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
7/17/2001	**Discovery Park**	**Giardia**	**DAPI & DIC Positive**	**=**	**0.1**	**Organism/L**	**Dry**
9/18/2001	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
10/16/2001	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
12/18/2001	**Discovery Park**	**Giardia**	**DAPI & DIC Positive**	**=**	**0.1**	**Organism/L**	
1/15/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
3/5/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
4/3/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
7/9/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
10/1/2002	Discovery Park	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	Empty	=	0.2	Organism/L	Dry
2/20/2001	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Discovery Park	Giardia	Empty	=	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
9/18/2001	Discovery Park	Giardia	Empty	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	Empty	=	0.8	Organism/L	
12/18/2001	Discovery Park	Giardia	Empty	=	0.2	Organism/L	
1/15/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
3/5/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
4/3/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
7/9/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	Empty	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
10/1/2002	Discovery Park	Giardia	Empty	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
12/19/2000	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.4**	**Organism/L**	**Dry**
2/20/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	**Wet Previous Day**
5/15/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	**Dry**
7/17/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.3**	**Organism/L**	**Dry**
9/18/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	**Dry**
10/16/2001	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	
11/13/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**1.4**	**Organism/L**	
12/18/2001	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**1.1**	**Organism/L**	
1/15/2002	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	
2/5/2002	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	
3/5/2002	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	
4/3/2002	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.1**	**Organism/L**	
5/7/2002	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	
7/9/2002	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.2**	**Organism/L**	
8/6/2002	Discovery Park	Giardia	Flourescence Antibody	<	0.2	Organism/L	
9/3/2002	**Discovery Park**	**Giardia**	**Flourescence Antibody**	**=**	**0.3**	**Organism/L**	
10/1/2002	Discovery Park	Giardia	Flourescence Antibody	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
2/20/2001	**Discovery Park**	**Giardia**	**Internal Structure**	**=**	**0.1**	**Organism/L**	**Wet Previous Day**
5/15/2001	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
7/17/2001	**Discovery Park**	**Giardia**	**Internal Structure**	**=**	**0.1**	**Organism/L**	**Dry**
9/18/2001	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
12/18/2001	**Discovery Park**	**Giardia**	**Internal Structure**	**=**	**0.1**	**Organism/L**	
1/15/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
3/5/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
4/3/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
7/9/2002	Discovery Park	Giardia	Internal Structure	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	Internal Structure (One)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Internal Structure (One)	<	0.1	Organism/L	
10/1/2002	Discovery Park	Giardia	Internal Structure (One)	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	Internal Structures (>One)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Internal Structures (>One)	<	0.1	Organism/L	
10/1/2002	Discovery Park	Giardia	Internal Structures (>One)	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	Negative	=	0.4	Organism/L	Dry
2/20/2001	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Wet Previous Day

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
5/15/2001	Discovery Park	Giardia	Negative	=	0.1	Organism/L	Dry
7/17/2001	Discovery Park	Giardia	Negative	=	0.2	Organism/L	Dry
9/18/2001	Discovery Park	Giardia	Negative	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	Negative	=	1.4	Organism/L	
12/18/2001	Discovery Park	Giardia	Negative	=	0.6	Organism/L	
1/15/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	Negative	=	0.1	Organism/L	
3/5/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
4/3/2002	Discovery Park	Giardia	Negative	=	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
7/9/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	Negative	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Negative	=	0.2	Organism/L	
10/1/2002	Discovery Park	Giardia	Negative	<	0.1	Organism/L	
8/15/2000	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
9/19/2000	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
10/17/2000	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
11/7/2000	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
12/19/2000	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
2/20/2001	**Discovery Park**	**Giardia**	**Positive**	**=**	**0.1**	**Organism/L**	**Wet Previous Day**
5/15/2001	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
7/17/2001	**Discovery Park**	**Giardia**	**Positive**	**=**	**0.1**	**Organism/L**	**Dry**
9/18/2001	Discovery Park	Giardia	Positive	<	0.1	Organism/L	Dry
10/16/2001	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
11/13/2001	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
12/18/2001	**Discovery Park**	**Giardia**	**Positive**	**=**	**0.4**	**Organism/L**	
1/15/2002	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
2/5/2002	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
3/5/2002	**Discovery Park**	**Giardia**	**Positive**	**=**	**0.1**	**Organism/L**	
4/3/2002	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
5/7/2002	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
6/4/2002	Discovery Park	Giardia	Positive	<	0.1	Organism/L	
7/9/2002	**Discovery Park**	**Giardia**	**Positive**	**=**	**0.1**	**Organism/L**	
8/6/2002	Discovery Park	Giardia	Positive (Internal Staining)	<	0.2	Organism/L	
9/3/2002	**Discovery Park**	**Giardia**	**Positive (Internal Staining)**	**=**	**0.1**	**Organism/L**	
10/1/2002	Discovery Park	Giardia	Positive (Internal Staining)	<	0.1	Organism/L	
8/6/2002	Discovery Park	Giardia	Positive (Stained Nuclei)	<	0.2	Organism/L	
9/3/2002	Discovery Park	Giardia	Positive (Stained Nuclei)	<	0.1	Organism/L	
10/1/2002	Discovery Park	Giardia	Positive (Stained Nuclei)	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Amorphous Structure	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	DAPI & DIC Positive	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
12/19/2000	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Empty	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Flourescence Antibody	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Internal Structure	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Internal Structure (One)	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Negative	<	0.1	Organism/L	
8/15/2000	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	Dry

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
10/17/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
12/19/2001	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
1/16/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
2/6/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
3/6/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
4/3/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
5/8/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
6/5/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
7/10/2002	Nimbus	Cryptosporidium	Positive	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Positive (Internal Staining)	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Positive (Internal Staining)	<	0.1	Organism/L	
8/7/2002	Nimbus	Cryptosporidium	Positive (Stained Nuclei)	<	0.1	Organism/L	
9/4/2002	Nimbus	Cryptosporidium	Positive (Stained Nuclei)	<	0.1	Organism/L	
8/15/2000	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Amorphous Structure	<	0.1	Organism/L	
9/4/2002	Nimbus	Giardia	Amorphous Structure	=	0.2	Organism/L	
8/15/2000	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	DAPI & DIC Positive	<	0.1	Organism/L	
9/4/2002	**Nimbus**	**Giardia**	**DAPI & DIC Positive**	**=**	**0.1**	**Organism/L**	
8/15/2000	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Empty	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
9/4/2002	Nimbus	Giardia	Empty	<	0.1	Organism/L	
8/15/2000	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	

CMP Giardia and Cryptosporidium Monitoring Data

SampleDate	Location	Parameter	ResultType	Sign	Result	Unit	Weather
3/6/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Flourescence Antibody	<	0.1	Organism/L	
9/4/2002	**Nimbus**	**Giardia**	**Flourescence Antibody**	**=**	**0.3**	**Organism/L**	
8/15/2000	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Internal Structure	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Internal Structure (One)	<	0.1	Organism/L	
9/4/2002	**Nimbus**	**Giardia**	**Internal Structure (One)**	**=**	**0.1**	**Organism/L**	
8/7/2002	Nimbus	Giardia	Internal Structures (>One)	<	0.1	Organism/L	
9/4/2002	Nimbus	Giardia	Internal Structures (>One)	<	0.1	Organism/L	
8/15/2000	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Negative	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Negative	<	0.1	Organism/L	
9/4/2002	Nimbus	Giardia	Negative	=	0.2	Organism/L	
8/15/2000	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
9/19/2000	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
10/17/2000	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
11/7/2000	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
12/19/2000	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
2/20/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	Wet Previous Day
5/15/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
7/17/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
9/19/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	Dry
10/17/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	
12/19/2001	Nimbus	Giardia	Positive	<	0.1	Organism/L	
1/16/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
2/6/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
3/6/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
4/3/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
5/8/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
6/5/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
7/10/2002	Nimbus	Giardia	Positive	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Positive (Internal Staining)	<	0.1	Organism/L	
9/4/2002	Nimbus	Giardia	Positive (Internal Staining)	<	0.1	Organism/L	
8/7/2002	Nimbus	Giardia	Positive (Stained Nuclei)	<	0.1	Organism/L	
9/4/2002	**Nimbus**	**Giardia**	**Positive (Stained Nuclei)**	**=**	**0.1**	**Organism/L**	
		# Samples	# Presumed	% Presumed	# Confirn	% confirmed	
Nimbus	Giardia	20	1	5%	1	5%	
	Cryptosporidium	20	0	0%	0	0%	
Discovery Park	Giardia	22	12	55%	3	14%	
	Cryptosporidium	21	2	10%	1	5%	

East Bay Municipal Utility District

EBMUD - American River Water Quality Monitoring Program
Summary
(mid-1997 to February 7, 2000)

SUMMARY	FLOW	PH	TEMP-ERATURE	TURBIDITY	TOTAL DISSOLVED SOLIDS	ALKALINITY: TOTAL AS CACO3	HARDNESS: TOTAL	CHLORIDE	LIGHT TRANSMIT.: SECCHI DISK DEPTH	COLOR	CALCIUM	MAGNESIUM
	MGD	pH units	deg C	NTU	mg/L	mg/L	mg/L	mg/L	inches	color unit	ug/L	ug/L
Nimbus Dam												
Average	2959	7.7	15.1	2.9	44	21	19	1.6	92	9	5102	1825
Median	2476.04	7.7	15.4	1.1	41	21	19	1.6	84	7	5150	1745
10th Percentile	1315.9	7.1	9.6	0.5	27.8	18	15	1.1	30	5	3930	1300
90th Percentile	5937	8.6	21.0	7.3	56	24	23	2.0	156	15.7	5995	2490
Minimum	646	6.2	1.1	0.3	15	14	12	1.0	12	3	3630	1210
Maximum	22620	9.7	25.8	25	200	28	27	3	228	29	6750	3150
# of Samples	280	281	281	202	109	276	109	106	277	104	106	106
Fairbairn WTP												
Average		7.7	14.3	1.9	42	21	19	1.6	98	8	5106	1852
Median		7.6	14.4	1.0	41	21	19	1.6	96	7	5170	1770
10th Percentile		7.1	9.0	0.4	30	17.9	15	1.1	36	5	3958	1342
90th Percentile		8.5	20.2	4.9	55	24	24	2.0	145.2	15	6166	2516
Minimum		6.3	-0.6	0.1	6	14	14	1.0	12	2	3680	1230
Maximum		9.7	24.7	15	72	28	29	2.7	204	34	6530	3110
# of Samples		270	269	190	103	270	103	102	270	102	103	103
Hwy 160												
Average		7.7	14.0	2.3	40	22	20	1.5	116	7	5129	2007
Median		7.8	14.3	0.9	40.5	22	21.5	1.5	132	6	5280	2070
10th Percentile		7.4	10.1	0.5	27	18	16	1.2	36	5	4426	1463
90th Percentile		8.1	17.6	6.8	56	24	22	1.6	168	10	5655	2538
Minimum		6.2	8.8	0.5	15	16	15	1.2	36	4	3900	1240
Maximum		8.5	21.5	9.5	67	28	28	1.9	192	14	5830	2590
# of Samples		62	61	44	26	58	26	24	59	23	24	24
I-5 Bridge												
Average		7.7	14.8	2.0	41	21	19	1.8	87	9	5159	1864
Median		7.5	14.3	1.2	40	21	19	1.85	84	7	5205	1630
10th Percentile		7.1	9.0	0.5	30	17	15	1.1	36	5	3900	1381
90th Percentile		8.9	22.2	4.6	52	25	24	2.2	132	16	6091	2593
Minimum		5.9	1.1	0.2	6	14	14	1.0	12	3	3780	1270
Maximum		9.7	27.7	14	80	28	30	3	192	32	6600	3460
# of Samples		213	213	142	78	201	78	78	213	90	78	78

Source: EBMUD Lab.
Note: non-detects calculated as equal to detection limit.

EBMUD - American River Water Quality Monitoring Program
Summary
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SUMMARY	POTASSIUM	SODIUM	BROMIDE	SULFATE	NITRATE AS N	NITRITE AS N	AMMONIA AS N	ORTHO-PHOSPHATE AS P	TOTAL PHOSPHATE AS P	CHLORO-PHYLL A	TOTAL ORGANIC CARBON	TOC (0.45U FILTERED)
	ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L
Nimbus Dam												
Average	**1306**	**2107**	**0.010**	**2.0**	**0.06**	**0.010**	**0.013**	**0.021**	**0.028**	**2.9**	**1.5**	**1.3**
Median	**672.5**	**2105**	**0.010**	**1.9**	**0.031**	**0.004**	**0.01**	**0.006**	**0.016**	**2.0**	**1.4**	**1.2**
10th Percentile	552	1755	0.010	1.3	0.003	0.004	0.005	0.005	0.008	0.94	1.2	1.1
90th Percentile	3000	2485	0.010	2.8	0.22	0.05	0.0217	0.10	0.040	6.16	1.95	1.5
Minimum	503	1670	0.010	1.2	0.003	0.004	0.005	0.005	0.005	0.41	0.97	0.8
Maximum	6240	2740	0.016	3.4	0.23	0.05	0.13	0.20	0.52	25	5.2	1.8
# of Samples	106	106	114	105	113	103	114	113	114	108	196	196
Fairbairn WTP												
Average	**1309**	**2064**	**0.010**	**2.0**	**0.13**	**0.010**	**0.012**	**0.025**	**0.017**	**2.2**	**1.5**	**1.2**
Median	**658**	**2040**	**0.010**	**1.95**	**0.049**	**0.004**	**0.009**	**0.007**	**0.014**	**1.65**	**1.4**	**1.2**
10th Percentile	560	1772	0.010	1.4	0.003	0.004	0.005	0.006	0.008	0.964	1.2	1.0
90th Percentile	2080	2398	0.010	2.8	0.221	0.05	0.023	0.10	0.032	3.2	1.91	1.4
Minimum	508	1630	0.010	1.2	0.003	0.004	0.005	0.005	0.005	0.1	0.92	0.9
Maximum	6240	2570	0.016	3.4	5.0	0.05	0.11	0.30	0.078	28	7.2	3.1
# of Samples	103	103	102	102	100	101	103	102	103	102	190	190
Hwy 160												
Average	**613**	**2123**	**0.010**	**2.1**	**0.06**	**0.004**	**0.027**	**0.012**	**0.025**	**1.6**	**1.6**	**1.4**
Median	**591**	**2155**	**0.010**	**2.3**	**0.034**	**0.004**	**0.016**	**0.007**	**0.02**	**1.35**	**1.4**	**1.2**
10th Percentile	543.4	1909	0.010	1.5	0.004	0.004	0.0079	0.006	0.0127	0.85	1.2	1.1
90th Percentile	695.6	2327	0.010	2.6	0.143	0.004	0.0252	0.02	0.048	2.2	1.9	1.6
Minimum	525	1690	0.010	1.2	0.003	0.004	0.005	0.006	0.009	0.6	1.2	1.0
Maximum	793	2420	0.012	2.8	0.2	0.004	0.3	0.06	0.1	6.5	3.6	3
# of Samples	24	24	30	23	30	22	30	30	30	26	41	41
I-5 Bridge												
Average	**1456**	**2117**	**0.012**	**2.0**	**0.14**	**0.012**	**0.012**	**0.031**	**0.018**	**2.0**	**1.5**	**1.2**
Median	**1000**	**2140**	**0.010**	**1.9**	**0.05**	**0.004**	**0.008**	**0.008**	**0.014**	**1.5**	**1.4**	**1.2**
10th Percentile	581	1780	0.010	1.4	0.00	0.004	0.005	0.006	0.010	0.8	1.2	1.0
90th Percentile	3000	2450	0.010	3.0	0.23	0.05	0.024	0.10	0.029	2.8	1.8	1.4
Minimum	538	1580	0.010	1.3	0.003	0.004	0.005	0.005	0.006	0.2	0.97	0.28
Maximum	6240	2610	0.140	3.4	2.0	0.05	0.069	0.40	0.089	26	3.4	2.2
# of Samples	78	78	78	78	77	77	78	77	78	77	154	152

Source: EBMUD Lab.
Note: non-detects calculated as equal to detection limit.

EBMUD - American River Water Quality Monitoring Program

Summary

(mid-1997 to February 7, 2000)

SUMMARY	UV ABSORB-ANCE @254	SUVA	TOTAL COLIFORMS	E COLI	TRIHALO-METHANES (Form. Pot.)	CHLORO-FORM (Form. Pot.)	BROMO-DICHLORO-METHANE (Form. Pot.)	BROMO-FORM (Form. Pot.)	DIBROMO-CHLORO-METHANE (Form. Pot.)	2-METHYL-ISO-BORNEOL (MIB)	GEOSMIN	CRYPTO-SPORIDIUM	GIARDIA <1=ND
	abs	mg-cm/L	MPN/100 mL	MPN/100 mL	ug/L	ug/L	ug/L	ug/L	ug/L	ng/L	ng/L	#/10L	cysts/10L
Nimbus Dam													
Average	**0.047**	**3.76**	**470**	**66**	**57**	**54**	**2.3**	**0.15**	**0.11**	**0.6**	**2.0**	**0.5**	
Median	**0.035**	**2.83**	**130**	**30**	**56.5**	**55**	**2.3**	**0.15**	**0.10**	**0.5**	**1.9**	**0.5**	**0.5**
10th Percentile	0.025	2.00	23	7	43	40	1.8	0.15	0.10	0.5	0.9	0.5	0.5
90th Percentile	0.080	6.24	1100	133	69	67	2.8	0.15	0.10	0.6	2.7	0.5	1.4
Minimum	0.014	1.15	2	2	42	40	1.5	0.15	0.10	0.5	0.5	0.5	0.5
Maximum	0.26	19.23	16000	1700	80.1	78	3.2	0.15	0.25	1.5	6.4	0.5	3
# of Samples	195	195	198	198	28	28	28	28	28	40	40	11	9
Fairbairn WTP													
Average	**0.041**	**3.32**	**1164**	**113**	**71**	**69**	**2**	**0**	**0**	**0.9**	**4.3**	**0.5**	**2.3**
Median	**0.035**	**3.17**	**240**	**23**	**86**	**83**	**2.7**	**0.15**	**0.1**	**0.9**	**4.1**	**0.5**	**1.8**
10th Percentile	0.025	2.08	50	8	47.6	46.2	1.5	0.15	0.1	0.5	1.9	0.5	0.5
90th Percentile	0.064	5.38	2050	130	87.6	85.4	2.94	0.15	0.1	1.5	6.9	0.5	4.4
Minimum	0.012	0.92	7	2	38	37	1.2	0.15	0.1	0.5	0.5	0.5	0.5
Maximum	0.18	8.57	16000	3000	88	86	3	0.15	0.1	2.3	10	0.5	5
# of Samples	187	187	186	186	3	3	3	3	3	19	19	6	4
Hwy 160													
Average	**0.039**	**2.85**	**1650**	**391**	**56**	**54**	**2**	**0**	**0**	**0.6**	**3.3**	**0.7**	**1.9**
Median	**0.031**	**2.67**	**500**	**30**	**50**	**48**	**2.4**	**0.15**	**0.1**	**0.5**	**2.9**	**0.5**	**1.0**
10th Percentile	0.026	2.00	116	12	42.4	39	1.64	0.15	0.1	0.5	1.1	0.5	0.8
90th Percentile	0.061	3.81	2820	205	78.4	75.4	3.2	0.15	0.49	0.8	4.8	0.8	4.0
Minimum	0.023	1.56	50	2	40	39	1.4	0.15	0.1	0.5	0.5	0.5	0.5
Maximum	0.096	6.86	16000	9000	88	85	3	0.15	0.65	1.5	10	2	4
# of Samples	41	41	44	44	9	9	9	9	9	13	13	9	7
I-5 Bridge													
Average	**0.043**	**3.60**	**1517**	**111**	**62**	**59**	**2.4**	**0.15**	**0.13**	**0.7**	**4.5**		
Median	**0.038**	**3.36**	**300**	**30**	**61.5**	**60**	**2.4**	**0.15**	**0.1**	**0.5**	**3.7**		
10th Percentile	0.026	2.25	92	13	46	44	1.7	0.15	0.10	0.5	1.8		
90th Percentile	0.068	5.73	3000	170	81	77	3.1	0.15	0.24	1.3	7.8		
Minimum	0.013	1.00	23	2	40	38	1.3	0.15	0.10	0.5	0.5		
Maximum	0.17	11.79	16000	3000	88	85	5.6	0.15	0.41	1.5	15		
# of Samples	153	151	152	152	32	32	32	32	32	42	42		

Source: EBMUD Lab.
Note: non-detects calculated as equal to detection limit.

EBMUD
Giardia and Cryptosporidium Monitoring

Locator	Collect Date	Analyte	Presump	Conf	Units	Locator	Collect Date	Analyte	Presump	Conf	Units	Weather
FAIRBAIRN WTP	3/22/99	Cryptosporidium	<0.1	<0.1	oocysts/L							wet
FAIRBAIRN WTP	4/12/99	Cryptosporidium	<0.1	<0.1	oocysts/L							wet previous day
FAIRBAIRN WTP	5/10/99	Cryptosporidium	<0.1	<0.1	oocysts/L	FAIRBAIRN WTP	5/10/99	Giardia	<0.1	<0.1	cysts/L	dry
FAIRBAIRN WTP	6/1/99	Cryptosporidium	<0.1	<0.1	oocysts/L	FAIRBAIRN WTP	6/1/99	Giardia	<0.1	<0.1	cysts/L	dry
FAIRBAIRN WTP	7/6/99	Cryptosporidium	<0.1	<0.1	oocysts/L	FAIRBAIRN WTP	7/6/99	Giardia	0.3	<0.1	cysts/L	dry
FAIRBAIRN WTP	8/9/99	Cryptosporidium	<0.1	<0.1	oocysts/L	FAIRBAIRN WTP	8/9/99	Giardia	0.5	0.1	cysts/L	dry

0/6 Crypto Confirmed at EAF

1/4 Giardia Confirmed at EAF

2 wet season events and 4 dry season events

4 dry season events

EBMUD
Giardia and Cryptosporidium Monitoring

Locator	Collect Date	Analyte	Presump	Conf	Units	Locator	Collect Date	Analyte	Presump	Conf	Units	Weather
HWY 160 BRIDGE	3/22/99	Cryptosporidium	<0.1	<0.1	oocysts/L							wet
HWY 160 BRIDGE	4/12/99	Cryptosporidium	<0.1	<0.1	oocysts/L							wet previous day
HWY 160 BRIDGE	5/10/99	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	5/10/99	Giardia	0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	6/1/99	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	6/1/99	Giardia	0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	7/6/99	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	7/6/99	Giardia	0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	10/25/99	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	10/25/99	Giardia	<0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	11/8/99	Cryptosporidium	0.2	0.1	oocysts/L	HWY 160 BRIDGE	11/8/99	Giardia	0.4	0.1	cysts/L	wet
HWY 160 BRIDGE	12/6/99	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	12/6/99	Giardia	0.2	<0.1	cysts/L	dry
HWY 160 BRIDGE	1/10/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	1/10/00	Giardia	0.4	<0.1	cysts/L	dry
HWY 160 BRIDGE	2/28/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	2/28/00	Giardia	0.3	<0.1	cysts/L	wet
HWY 160 BRIDGE	3/21/00	Cryptosporidium	0.11	<0.11	oocysts/L	HWY 160 BRIDGE	3/21/00	Giardia	0.11	<0.11	cysts/L	dry
HWY 160 BRIDGE	4/17/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	4/17/00	Giardia	<0.1	<0.1	cysts/L	wet
HWY 160 BRIDGE	5/15/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	5/15/00	Giardia	0.2	<0.1	cysts/L	wet
HWY 160 BRIDGE	6/19/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	6/19/00	Giardia	<0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	7/18/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	7/18/00	Giardia	0.4	<0.1	cysts/L	dry
HWY 160 BRIDGE	8/21/00	Cryptosporidium	0.1	0.1	oocysts/L	HWY 160 BRIDGE	8/21/00	Giardia	0.2	<0.1	cysts/L	dry
HWY 160 BRIDGE	9/18/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	9/18/00	Giardia	0.2	<0.1	cysts/L	dry
HWY 160 BRIDGE	10/16/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	10/16/00	Giardia	0.2	<0.1	cysts/L	dry
HWY 160 BRIDGE	11/20/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	11/20/00	Giardia	<0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	12/18/00	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	12/18/00	Giardia	0.2	<0.1	cysts/L	dry
HWY 160 BRIDGE	1/29/01	Cryptosporidium	0.1	0.1	oocysts/L	HWY 160 BRIDGE	1/29/01	Giardia	0.4	<0.1	cysts/L	wet
HWY 160 BRIDGE	2/26/01	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	2/26/01	Giardia	<0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	3/19/01	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	3/19/01	Giardia	<0.1	<0.1	cysts/L	wet previous day
HWY 160 BRIDGE	4/16/01	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	4/16/01	Giardia	0.1	<0.1	cysts/L	dry
HWY 160 BRIDGE	9/24/01	Cryptosporidium	<0.1	<0.1	oocysts/L	HWY 160 BRIDGE	9/24/01	Giardia	0.1	<0.1	cysts/L	wet

3/25 Crypto Confirmed at HWY 160

1/23 Giardia Confirmed at HWY 160

14 wet season events and 11 dry season events

EBMUD
Giardia and Cryptosporidium Monitoring

Locator	Collect Date	Analyte	Presump	Conf	Units	Locator	Collect Date	Analyte	Presump	Conf	Units	Weather
NIMBUS DAM	7/18/00	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	7/18/00	Giardia	<0.1	<0.1	cysts/L	dry
NIMBUS DAM	6/18/01	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	6/18/01	Giardia	<0.1	<0.1	cysts/L	dry
NIMBUS DAM	7/16/01	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	7/16/01	Giardia	<0.1	<0.1	cysts/L	dry
NIMBUS DAM	8/20/01	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	8/20/01	Giardia	<0.1	<0.1	cysts/L	dry
NIMBUS DAM	9/24/01	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	9/24/01	Giardia	0.1	<0.1	cysts/L	wet
NIMBUS DAM	10/15/01	Cryptosporidium	<0.1	<0.1	oocysts/L	NIMBUS DAM	10/15/01	Giardia	<0.1	<0.1	cysts/L	dry

0/6 Crypto Confirmed at Nimbus

0/6 Giardia Confirmed at Nimbus

5 dry season events and 1 wet season event

5 dry season events and 1 wet season event

Sacramento River Watershed Program

SampleDate	Method	AnalyteCode	Detection	Result	ReportingLimit	Units
9/21/1999	EPA 1638M	Ag_tot	ND		0.02	µg/L
9/21/1999	EPA 8321A	Aldicarb	ND		0.4	µg/L
9/21/1999	SM 403	Alk_tot	yes	18	1	mg/L
9/21/1999	EPA 619	Ametryn	ND		0.5	µg/L
9/21/1999	EPA 8321A	Aminocarb	ND		0.4	µg/L
9/21/1999	EPA 350.3	Ammon	ND		0.1	mg/L
9/26/2001	EPA 350.3	Ammonia	ND		0.2	mg/L
11/5/2001	EPA 350.3	Ammonia	ND		0.2	mg/L
2/23/2002	EPA 350.3	Ammonia	ND		0.2	mg/L
3/8/2002	EPA 350.3	Ammonia	ND		0.2	mg/L
5/16/2002	EPA 350.3	Ammonia	ND		0.2	mg/L
9/21/1999	FGS-059.2	As_dis	yes	0.258	0.05	µg/L
9/21/1999	**FGS-059.2**	**As_tot**	**yes**	**0.262**	**0.05**	**µg/L**
9/21/1999	EPA 619	Atraton	ND		0.5	µg/L
9/21/1999	EPA 619	Atrazine	ND		0.5	µg/L
9/21/1999	EPA 8141A	Azinphos-methyl	ND		1	µg/L
9/21/1999	EPA 8321A	Barban	ND		3.5	µg/L
9/21/1999	EPA 8321A	Benomyl	ND		0.4	µg/L
9/21/1999	EPA 8141A	Bolstar	ND		0.1	µg/L
9/21/1999	EPA 8321A	Bromacil	ND		0.4	µg/L
9/21/1999	EPA 6010A	Ca_tot	yes	4.09	0.2	mg/L
9/21/1999	EPA 8321A	Carbaryl	ND		0.07	µg/L
9/21/1999	EPA 8321A	Carbofuran	ND		0.07	µg/L
9/21/1999	EPA 1638M	Cd_dis	yes	0.004	0.005	µg/L
9/21/1999	EPA 1638M	Cd_tot	ND		0.005	µg/L
9/21/1999	EPA 8321A	Chloroxuron	ND		0.4	µg/L
9/21/1999	EPA 8321A	Chlorpropham	ND		3.5	µg/L
9/21/1999	EPA 8141A	Chlorpyrifos	ND		0.05	µg/L
9/21/1999	EPA 300.0	Cl	yes	1.24	0.1	mg/L
9/21/1999	probe	Con_spec	yes	44		µmhos/cm
9/26/2001	probe	Con_spec	yes	71.4	0.1	µmhos/cm
11/5/2001	probe	Con_spec	yes	63.4	0.1	µmhos/cm
2/23/2002	probe	Con_spec	yes	100	0.1	µmhos/cm
3/8/2002	probe	Con_spec	yes	118.8	0.1	µmhos/cm
5/16/2002	probe	Con_spec	yes	139.1	0.1	µmhos/cm
9/21/1999	EPA 8141A	Coumaphos	ND		0.1	µg/L
9/21/1999	**EPA 1638M**	**Cr_tot**	**yes**	**1.311**	**0.1**	**µg/L**
9/21/1999	EPA 1638M	Cu_dis	yes	0.179	0.01	µg/L
9/21/1999	EPA 1638M	Cu_tot	yes	0.3	0.01	µg/L
9/21/1999	EPA 619	Cyanazine	ND		0.5	µg/L
9/21/1999	EPA 8141A	Def	ND		0.1	µg/L
9/21/1999	EPA 8141A	Demeton-s	ND		0.2	µg/L
9/21/1999	EPA 8141A	Diazinon	ND		0.05	µg/L
9/21/1999	EPA 8141A	Dichlorvos	ND		0.2	µg/L
9/21/1999	EPA 8141A	Dimethoate	ND		0.1	µg/L
9/21/1999	EPA 8141A	Diphenamid	ND		0.1	µg/L
9/21/1999	EPA 8141A	Disulfoton	ND		0.1	µg/L
9/21/1999	EPA 8321A	Diuron	ND		0.4	µg/L
9/26/2001	probe	DO	yes	8.24	0.01	mg/L
11/5/2001	probe	DO	yes	7.8	0.01	mg/L
2/23/2002	probe	DO	yes	10.9	0.01	mg/L
3/8/2002	probe	DO	yes	9.7	0.01	mg/L
5/16/2002	probe	DO	yes	8.9	0.01	mg/L
9/26/2001	SM 9230C	Enterococcus	yes	180	1	CFU/100 mL
11/5/2001	SM 9230C	Enterococcus	yes	42	1	CFU/100 mL
2/23/2002	SM 9230C	Enterococcus	yes	10	1	CFU/100 mL

3/8/2002	SM 9230C	Enterococcus	yes	36	2	CFU/100 mL
5/16/2002	SM 9230C	Enterococcus	yes	6	2	CFU/100 mL
9/21/1999	EPA 8141A	Ethion	ND		0.1	µg/L
9/21/1999	EPA 8141A	Ethoprop	ND		0.1	µg/L
9/21/1999	EPA 6010A	Fe_tot	yes	0.0641	0.01	mg/L
9/21/1999	EPA 8141A	Fensulfothion	ND		0.2	µg/L
9/21/1999	EPA 8141A	Fenthion	ND		0.1	µg/L
9/21/1999	EPA 8321A	Fenuron	ND		0.4	µg/L
9/21/1999	EPA 8321A	Fluometuron	ND		0.4	µg/L
9/21/1999	EPA 6010A	K_tot	ND		0.5	mg/L
9/21/1999	EPA 8321A	Linuron	ND		0.4	µg/L
9/21/1999	EPA 8141A	Malathion	ND		0.1	µg/L
9/21/1999	EPA 8141A	Merphos	ND		0.1	µg/L
9/21/1999	EPA 8141A	Methidathion	ND		0.1	µg/L
9/21/1999	EPA 8321A	Methiocarb	ND		0.4	µg/L
9/21/1999	EPA 8321A	Methomyl	ND		0.07	µg/L
9/21/1999	EPA 8141A	Methyl_Trithion	ND		0.2	µg/L
9/21/1999	EPA 8141A	Mevinphos	ND		0.7	µg/L
9/21/1999	EPA 8321A	Mexacarbate	ND		0.8	µg/L
9/21/1999	EPA 6010A	Mg_tot	yes	1.31	0.05	mg/L
9/21/1999	EPA 6010A	Mn_tot	yes	0.00805	0.005	mg/L
9/21/1999	EPA 8321A	Monuron	ND		0.4	µg/L
9/21/1999	EPA 6010A	Na_tot	yes	1.84	0.2	mg/L
9/21/1999	EPA 8141A	Naled	ND		0.5	µg/L
9/21/1999	EPA 8321A	Neburon	ND		0.4	µg/L
9/21/1999	EPA 1638M	Ni_dis	yes	0.31	0.02	µg/L
9/21/1999	EPA 1638M	Ni_tot	yes	0.45	0.02	µg/L
9/21/1999	EPA 300.0	Nitrate	ND		0.1	mg/L
9/26/2001	EPA 300.0	Nitrate	ND		0.05	mg/L
11/5/2001	EPA 300.0	Nitrate	ND		0.05	mg/L
2/23/2002	EPA 300.0	Nitrate	yes	0.071	0.05	mg/L
3/8/2002	EPA 300.0	Nitrate	yes	0.099	0.05	mg/L
5/16/2002	EPA 300.0	Nitrate	ND		0.05	mg/L
9/21/1999	EPA 300.0	Nitrite	ND		0.1	mg/L
9/26/2001	EPA 300.0	Nitrite	ND		0.02	mg/L
11/5/2001	EPA 300.0	Nitrite	ND		0.02	mg/L
2/23/2002	EPA 300.0	Nitrite	ND		0.02	mg/L
3/8/2002	EPA 300.0	Nitrite	ND		0.02	mg/L
5/16/2002	EPA 300.0	Nitrite	ND		0.02	mg/L
9/21/1999	EPA 300.0	OrthoP	ND		0.5	mg/L
9/26/2001	EPA 300.0	OrthoP	ND		0.01	mg/L
11/5/2001	EPA 300.0	OrthoP	ND		0.01	mg/L
2/23/2002	EPA 300.0	OrthoP	ND		0.01	mg/L
3/8/2002	EPA 300.0	OrthoP	ND		0.01	mg/L
5/16/2002	EPA 300.0	OrthoP	yes	0.011	0.01	mg/L
9/21/1999	EPA 8321A	Oxamyl	ND		0.4	µg/L
9/26/2001	EPA 365.3	P_tot	ND		0.02	mg/L
11/5/2001	EPA 365.3	P_tot	ND		0.02	mg/L
2/23/2002	EPA 365.3	P_tot	ND		0.02	mg/L
3/8/2002	EPA 365.3	P_tot	ND		0.02	mg/L
5/16/2002	EPA 365.3	P_tot	ND		0.02	mg/L
9/21/1999	EPA 8141A	Parathion_ethyl	ND		0.1	µg/L
9/21/1999	EPA 8141A	Parathion_methyl	ND		0.1	µg/L
9/21/1999	EPA 1638M	Pb_dis	yes	0.016	0.005	µg/L
9/21/1999	EPA 1638M	Pb_tot	yes	0.071	0.005	µg/L
9/21/1999	probe	pH	yes	7.97		standard units
9/26/2001	probe	pH	yes	8.13	0.01	standard units

11/5/2001	probe	pH	yes	7.71	0.01	standard units
2/23/2002	probe	pH	yes	7.74	0.01	standard units
3/8/2002	probe	pH	yes	7.45	0.01	standard units
5/16/2002	probe	pH	yes	7.62	0.01	standard units
9/21/1999	EPA 8141A	Phorate	ND		0.1	µg/L
9/21/1999	EPA 8141A	Phosalone	ND		0.1	µg/L
9/21/1999	EPA 8141A	Phosmet	ND		1	µg/L
9/21/1999	EPA 619	Prometon	ND		0.5	µg/L
9/21/1999	EPA 8141A	Prometon	ND		0.1	µg/L
9/21/1999	EPA 619	Prometryn	ND		0.5	µg/L
9/21/1999	EPA 8321A	Propachlor	ND		3.5	µg/L
9/21/1999	EPA 619	Propazine	ND		0.5	µg/L
9/21/1999	EPA 8321A	Propham	ND		3.5	µg/L
9/21/1999	EPA 8321A	Propoxur	ND		0.4	µg/L
9/21/1999	EPA 8141A	Prowl	ND		0.1	µg/L
9/21/1999	EPA 8141A	Ronnel	ND		0.1	µg/L
9/21/1999	EPA 8321A	Siduron	ND		0.4	µg/L
9/21/1999	SM 4500-Si D	Silica	yes	10.1	0.021	mg/L
9/21/1999	EPA 619	Simazine	ND		0.5	µg/L
9/21/1999	EPA 8141A	Simazine	ND		0.5	µg/L
9/21/1999	EPA 619	Simetryn	ND		0.5	µg/L
9/21/1999	EPA 160.1	TDS	yes	18	5	mg/L
9/21/1999	EPA 8321A	Tebuthiuron	ND		0.4	µg/L
9/21/1999	probe	Temp	yes	18.5		°C
9/26/2001	probe	Temp	yes	19.9	0.1	°C
11/5/2001	probe	Temp	yes	18.6	0.1	°C
2/23/2002	probe	Temp	yes	13.1	0.1	°C
3/8/2002	probe	Temp	yes	10.3	0.1	°C
5/16/2002	probe	Temp	yes	17.1	0.1	°C
9/21/1999	EPA 619	Terbuthylazine	ND		0.5	µg/L
9/21/1999	EPA 619	Terbutryn	ND		0.5	µg/L
9/21/1999	EPA 351.2	TKN	ND		0.5	mg/L
9/26/2001	EPA 351.3	TKN	ND		0.5	mg/L
11/5/2001	EPA 351.3	TKN	ND		0.5	mg/L
2/23/2002	EPA 351.3	TKN	ND		0.5	mg/L
3/8/2002	EPA 351.3	TKN	ND		0.5	mg/L
5/16/2002	EPA 351.3	TKN	ND		0.5	mg/L
9/21/1999	EPA 8141A	Trichloronate	ND		0.1	µg/L
9/21/1999	EPA 8141A	Trifluralin	ND		0.1	µg/L
9/26/2001	SM 5910B	UVA254	yes	0.072	0.003	1/cm
11/5/2001	SM 5910B	UVA254	yes	0.034	0.003	1/cm
2/23/2002	SM 5910B	UVA254	yes	0.044	0.003	1/cm
3/8/2002	SM 5910B	UVA254	yes	0.051	0.003	1/cm
5/16/2002	SM 5910B	UVA254	yes	0.0388	0.003	1/cm
9/21/1999	EPA 1638M	Zn_dis	yes	0.38	0.05	µg/L
9/21/1999	EPA 1638M	Zn_tot	yes	0.44	0.05	µg/L

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Site Name	Dates	**Arsenic (micrograms/L)**	Barium (micrograms/L)	**Chromium (micrograms/L)**	Manganese (micrograms/L)	Nickel (micrograms/L)	Zinc (micrograms/L)	Aluminum (micrograms/L)
American River at Sacramento, CA	3/18/1996	**<1**	12	**<1.0**	6	1	1	14
American River at Sacramento, CA	4/5/1996	**<1**	12	**<1.0**	3	<1.0	1	12
American River at Sacramento, CA	5/15/1996	**<1**	11	**<1.0**	3	<1.0	1	9
American River at Sacramento, CA	6/12/1996	**<1**	10	**<1.0**	2	<1.0	<1.0	29
American River at Sacramento, CA	7/19/1996	**<1**	10	**<1.0**	2	<1.0	<1.0	10
American River at Sacramento, CA	8/13/1996	**<1**	11	**<1.0**	2	<1.0	<1.0	7
American River at Sacramento, CA	9/13/1996	**<1**	11	**<1.0**	2	<1.0	<1.0	6
American River at Sacramento, CA	10/11/1996	**<1**	12	**<1.0**	2	<1.0	<1.0	7
American River at Sacramento, CA	11/12/1996	**<1**	11	**<1.0**	4	<1.0	1	9
American River at Sacramento, CA	12/6/1996	**<1**	11	**<1.0**	11	<1.0	<1.0	7
American River at Sacramento, CA	1/10/1997	**<1**	8	**<1.0**	5	<1.0	<1.0	47
American River at Sacramento, CA	2/5/1997	**<1**	8	**<1.0**	8	1	2	12
American River at Sacramento, CA	3/24/1997	**<1**	10	**<1.0**	2.7	<1.0	<1.0	9.1
American River at Sacramento, CA	4/25/1997	**<1**	11	**<1.0**	4.6	<1.0	<1.0	9.4
American River at Sacramento, CA	5/15/1997	**<1**	9.6	**<1.0**	3.3	<1.0	1.8	7.2
American River at Sacramento, CA	6/12/1997	**<1**	11	**<1.0**	2	<1.0	2.2	7.5
American River at Sacramento, CA	7/25/1997	**<1**	9.7	**<1.0**	1.8	<1.0	1.2	7
American River at Sacramento, CA	8/19/1997	**<1**	11	**<1.0**	1.7	1.3	2.8	5.7
American River at Sacramento, CA	9/15/1997	**<1**	11	**<1.0**	3	<1.0	11	7.6
American River at Sacramento, CA	10/24/1997	**<1**	10	**<1.0**	1.5	<1.0	<1.0	5.6
American River at Sacramento, CA	11/21/1997	**<1**	12	**<1.0**	3.7	<1.0	3.9	5.9
American River at Sacramento, CA	12/11/1997	**<1**	14	**1.4**	3.1	<1.0	<1.0	5.3
American River at Sacramento, CA	1/23/1998	**<1**	12	**<1.0**	2.5	<1.0	<1.0	7.9
American River at Sacramento, CA	2/12/1998	**<1**	11	**<1.0**	3	1.1	2.6	10
American River at Sacramento, CA	3/12/1998	**<1**	12	**<1.0**	6.5	<1.0	1.2	8.4
American River at Sacramento, CA	4/16/1998	**<1**	11	**<1.0**	2.5	<1.0	<1.0	10

Site Name	Date	**Simazine (nanogram/L)**
American River at Sacramento, CA	2/21/1996	**<22**
American River at Sacramento, CA	3/18/1996	**32**
American River at Sacramento, CA	4/5/1996	**<22**
American River at Sacramento, CA	5/15/1996	**E10**
American River at Sacramento, CA	6/12/2011	**6.6**
American River at Sacramento, CA	6/12/1996	**<22**
American River at Sacramento, CA	7/19/1996	**<22**
American River at Sacramento, CA	8/13/1996	**E7**
American River at Sacramento, CA	9/13/1996	**<22**
American River at Sacramento, CA	10/11/1996	**<22**
American River at Sacramento, CA	11/12/1996	**<22**
American River at Sacramento, CA	12/6/1996	**<22**
American River at Sacramento, CA	1/10/1997	**<22**
American River at Sacramento, CA	2/5/1997	**<22**
American River at Sacramento, CA	3/24/1997	**<22**
American River at Sacramento, CA	4/25/1997	**<22**
American River at Sacramento, CA	5/15/1997	**<22**
American River at Sacramento, CA	6/12/1997	**<22**
American River at Sacramento, CA	7/25/1997	**<22**
American River at Sacramento, CA	8/19/1997	**<22**
American River at Sacramento, CA	9/15/1997	**<22**
American River at Sacramento, CA	10/24/1997	**<22**
American River at Sacramento, CA	11/21/1997	**<22**
American River at Sacramento, CA	12/11/1997	**<22**
American River at Sacramento, CA	1/23/1998	**<22**
American River at Sacramento, CA	2/12/1998	**<22**
American River at Sacramento, CA	3/12/1998	**<22**
American River at Sacramento, CA	4/16/1998	**<22**

Site Name	Dates	Dissolved Organic Carbon (mg/L as C)	Suspended Organic Carbon (mg/L) as C
American River at Sacramento, CA	2/21/1996	6.4	1.7
American River at Sacramento, CA	3/18/1996	3.7	0.4
American River at Sacramento, CA	4/5/1996	1.3	<0.10
American River at Sacramento, CA	5/15/1996	1.5	0.2
American River at Sacramento, CA	6/12/1996	1.4	0.2
American River at Sacramento, CA	7/19/1996	1.4	0.3
American River at Sacramento, CA	8/13/1996	1.5	0.4
American River at Sacramento, CA	9/13/1996	1.5	0.4
American River at Sacramento, CA	10/11/1996	1.6	0.3
American River at Sacramento, CA	11/12/1996	1.9	0.2
American River at Sacramento, CA	12/6/1996	1.5	0.5
American River at Sacramento, CA	1/10/1997	1.8	1
American River at Sacramento, CA	2/5/1997	1.6	0.5
American River at Sacramento, CA	3/24/1997	1.2	0.2
American River at Sacramento, CA	4/25/1997	1.3	
American River at Sacramento, CA	5/15/1997	1.1	0.2
American River at Sacramento, CA	6/12/1997	1.5	0.1
American River at Sacramento, CA	7/25/1997	1.3	0.2
American River at Sacramento, CA	8/19/1997	1.3	0.2
American River at Sacramento, CA	9/15/1997	1.3	0.9
American River at Sacramento, CA	10/24/1997	1.2	<0.20
American River at Sacramento, CA	11/21/1997	1.2	0.2
American River at Sacramento, CA	12/11/1997	1.5	0.3
American River at Sacramento, CA	1/23/1998	1.9	0.2
American River at Sacramento, CA	2/12/1998	1.6	0.2
American River at Sacramento, CA	3/12/1998	1.4	0.2
American River at Sacramento, CA	4/16/1998	1.6	<0.20

APPENDIX C

Title 22 Drinking Water Monitoring Constituent List

Title 22 Drinking Water Monitoring Constituent List
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Classification	Contaminant	Regulation	MCL (mg/L)
Inorganics (Section 64432)			
	Aluminum	DHS	1
	Antimony	Phase V	0.006
	Arsenic	NPDWR	0.05
	Barium	DHS	1
	Beryllium	Phase V	0.004
	Cadmium	Phase II	0.005
	Chromium	DHS	0.05
	Cyanide	Phase V	0.2
	Mercury	Phase II	0.002
	Nickel	Phase V	0.1 [1]
	Selenium	Phase II	0.05
	Thallium	Phase V	0.002
Fluoride (Section 64432)			
	Fluoride	DHS	1.4 - 2.4
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 as N
Asbestos (Section 64432.2)			
	Asbestos	Phase II	7 MFL (>10um)
Secondary Standards (Section 64449, Table 64449-A)			
	Aluminum	DHS	0.2
	Color	DHS	15 Units
	Copper	DHS	1
	Corrosivity	DHS	non-corrosive
	Foaming Agents	DHS	0.5
	Iron	DHS	0.3
	Manganese	DHS	0.05
	Methyl tert butyl ether	DHS	0.005
	Odor-Threshold	DHS	3 Units
	Silver	DHS	0.1
	Thiobencarb	DHS	0.001
	Turbidity	DHS	5 NTU
	Zinc	DHS	5
Secondary Standards (Section 64449, Table 64449-B)			
	Total Dissolved Solids	DHS	500/1000/1500 [2]
	Specific Conductance	DHS	900/1600/2200 [2]
	Chloride	DHS	250/500/600 [2]
	Sulfate	DHS	250/500/600 [2]
General Mineral (Section 64449 (c) (2))			

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	Bicarbonate	DHS	MO
	Carbonate	DHS	MO
	Hydroxide Alkalinity	DHS	MO
	Calcium	DHS	MO
	Magnesium	DHS	MO
	Sodium	DHS	MO
	Hardness	DHS	MO
(Volatile) Organic Chemicals (Section 64444, Table 64444-A (a))			
	Benzene	DHS	0.001
	Carbon Tetrachloride	DHS	0.0005
	o-Dichlorobenzene (1,2-DCB)	Phase II	0.6
	p-Dichlorobenzene (1,4-DCB)	DHS	0.005
	1,1-Dichloroethane	DHS	0.005
	1,2-Dichloroethane	DHS	0.0005
	1,1-Dichloroethylene	DHS	0.006
	cis-1,2-Dichloroethylene	DHS	0.006
	trans-1,2-Dichloroethylene	DHS	0.01
	Dichloromethane (Methylene chloride)	Phase V	0.005
	1,2-Dichloropropane	Phase II	0.005
	1,3-Dichloropropene	DHS	0.0005
	Ethylbenzene	Phase II	0.7
	Methyl tert butyl ether	DHS	0.013
	Monochlorobenzene	DHS	0.07
	Styrene	Phase II	0.1
	1,1,2,2-Tetrachloroethane	DHS	0.001
	Tetrachloroethylene	Phase II	0.005
	Toluene	DHS	0.15
	1,2,4-Trichlorobenzene	Phase V	0.07
	1,1,1-Trichloroethane	Phase I	0.2
	1,1,2-Trichloroethane	Phase V	0.005
	Trichloroethylene	Phase I	0.005
	Trichlorofluoromethane	DHS	0.15
	1,1,2-Trichloro-1,2,2-Triflouroethane	DHS	1.2
	Vinyl Chloride	DHS	0.0005
	Xylenes (total)	DHS	1.75
(Non-Volatile Synthetic) Organic Chemicals (Section 64444, Table 64444-A (b))			
	Alachlor	Phase II	0.002
	Atrazine	Phase II	0.003
	Bentazon	DHS	0.018
	Benzo(a)pyrene	Phase V	0.0002
	Carbofuran	DHS	0.018
	Chlordane	DHS	0.0001
	2,4,-D	Phase II	0.07
	Dalapon	Phase V	0.2
	1,2-Dibromo-3-chloropropane	Phase II	0.0002
	Di (2-ethylhexyl) Adipate	Phase V	0.4
	Di (2-ethylhexyl) Phthalate	DHS	0.004
	Dinoseb	Phase V	0.007
	Diquat	Phase V	0.02
	Endothall	Phase V	0.1

Title 22 Drinking Water Monitoring Constituent List
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	Endrin	Phase V	0.002
	Ethylene Dibromide	Phase II	0.00005
	Glyphosate	Phase V	0.7
	Heptachlor	DHS	0.00001
	Heptachlor Epoxide	DHS	0.00001
	Hexachlorobenzene	Phase V	0.001
	Hexachlorocyclopentadiene	Phase V	0.05
	Lindane	Phase II	0.0002
	Methoxychlor	Phase II	0.04
	Molinate	DHS	0.02
	Oxamyl (vydate)	Phase V	0.2
	Pentachlorophenol	Phase II	0.001
	Picloram	Phase V	0.5
	PCBs	Phase II	0.0005
	Simazine	Phase V	0.004
	Thiobencarb	DHS	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
Unregulated Chemicals (Section 64450, Table 64450)			
	Dichlorodifluoromethane	DHS	MO (if vulnerable) - 1.0 [3]
	1,2,3-Trichloropropane	DHS	MO (if vulnerable) - 5.0E-06 [3]
	Ethyl tert butyl ether	DHS	MO (if vulnerable)
	Tert amyl methyl ether	DHS	MO (if vulnerable)
	Perchlorate	DHS	MO (if vulnerable) - 0.004 [3]
	Boron	DHS	MO (if vulnerable) - 1.0 [3]
	Chromium +6	DHS	MO (if vulnerable)
	Vanadium	DHS	MO (if vulnerable) - 0.05 [3]
	Tert butyl alcohol	DHS	MO (if vulnerable) - 0.012 [3]
Unregulated Contaminant Monitoring Regulation - List 1			
	2,4-Dinitrotoluene	UCMR	MO
	2,6-Dinitrotoluene	UCMR	MO
	Acetochlor	UCMR	MO
	DCPA mono-acid degradate	UCMR	MO
	DCPA di-acid degradate	UCMR	MO
	4,4'-DDE	UCMR	MO
	EPTC	UCMR	MO
	Molinate [4]	UCMR	MO
	Methyl tert-butyl ether [5]	UCMR	MO
	Nitrobenzene	UCMR	MO
	Perchlorate [6]	UCMR	MO - 0.004 [3]
	Terbacil	UCMR	MO
Unregulated Contaminant Monitoring Regulation - List 2			
	Diuron	UCMR	MO (if randomly selected)
	Linuron	UCMR	MO (if randomly selected)
	Prometon	UCMR	MO (if randomly selected)
	2,4,6-Trichlorophenol	UCMR	MO (if randomly selected)

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	2,4-Dichlorophenol	UCMR	MO (if randomly selected)
	2,4-Dinitrophenol	UCMR	MO (if randomly selected)
	2-methyl-phenol	UCMR	MO (if randomly selected)
	Alachlor ESA	UCMR	MO (if randomly selected)
	1,2-Diphenylhydrazine	UCMR	MO (if randomly selected)
	Diazinon	UCMR	MO (if randomly selected) - 0.006 [3]
	Disulfoton	UCMR	MO (if randomly selected)
	Fonofos	UCMR	MO (if randomly selected)
	Terbufos	UCMR	MO (if randomly selected)
	Aeromonas	UCMR	MO (if randomly selected)
	RDX	UCMR	MO (if randomly selected)
	Nitrobenzene	UCMR	MO (if randomly selected)
Unregulated Contaminant Monitoring Regulation - List 3			
	Lead-210	UCMR	MO (if selected based on vulnerability)
	Polonium-210	UCMR	MO (if selected based on vulnerability)
	Cyanobacteria	UCMR	MO (if selected based on vulnerability)
	Echoviruses	UCMR	MO (if selected based on vulnerability)
	Coxsackieviruses	UCMR	MO (if selected based on vulnerability)
	Heliobacter pylori	UCMR	MO (if selected based on vulnerability)
	Microsporidia	UCMR	MO (if selected based on vulnerability)
	Caliciviruses	UCMR	MO (if selected based on vulnerability)
	Adenoviruses	UCMR	MO (if selected based on vulnerability)
Natural Radioactivity (Section 64441)			
	Gross Alpha Particle Activity	NPDWR	15 pCi/L
	Radium 226	DHS	MO
	Radium 226 & 228	NPDWR	5 pCi/L
	Uranium	DHS	20 pCi/L
Man-Made Radioactivity (Section 64443)			
	Tritium	DHS	20,000 pCi/L
	Strontium-90	DHS	8 pCi/L
	Gross Beta Particle Activity	NPDWR	50 pCi/L

MO - Monitored Only

[1]- DHS MCL lower than EPA, EPA remanded in 1995

[2] -Recommended/Upper/Short Term Limits

[3] -DHS Action Level

[4] -Monitored as an regulated chemical for DHS Section 64444-A (b)

[5] -Monitored as a primary and secondary chemical for DHS Sections 64444-A and 64449-A

[6] -Monitored as an unregulated chemical for DHS Section 64450

THIS LIST DOES NOT INCLUDE TREATMENT TECHNOLOGIES AND TURBIDITY MONITORING UNDER THE SURFACE WATER TREATMENT RULE AND DISTRIBUTION SYSTEM MONITORING UNDER THE TOTAL COLIFORM RULE, THE LEAD AND COPPER RULE, AND THE STAGE 1 D/DBP

APPENDIX D

Water Utility Source Water Protection Activities and Actions on 1998 Update Recommendations

- Summary of Water Utility Actions on 1998 Update Recommendations
- City of Sacramento Actions on 1998 Update Recommendations
- Pumpout and Restroom Campaign Materials
- Spill Notification Materials
- Status of Selected NPDES Permit Facilities in the American River Watershed

Summary of Water Utility Actions on 1998 Update Recommendations

Summary of Water Agency Actions on 1998 Update Recommendations

Recommendation	Agency	Action
HIGH PRIORITY		
1. Optimize treatment during storms and other critical periods such as high recreational use times.	All * except Sacramento County and EBMUD	PCWA - has expanded its Foothill WTP for improved capacity, they experiment with alternative chemicals and dosing, and improved wastewater handling and return facilities. EID - raised its Folsom Lake intake to avoid denser lower quality bottom water affected by snowmelt. FSP – lowers flow rate and uses both clarifier and filters when intake NTU is high. Folsom – changed primary coagulant from alum to polyaluminum chloride. Improved mixing prior to coagulation. Provided streaming current to pace coagulant feed. Improved flocculation prior to sedimentation with increased detention times in basins #1 and #2. SJWD – plant is continuously optimized with NTU goal of < 0.10 and actual monthly average of 0.03. Roseville – optimizes treatment. ACWS – continual optimization is standard, also one additional log of disinfection is added during elevated coliform bacteria counts in the intake water. CWD – constructed a microfiltration membrane plant to remove particles greater than 0.2 microns. City of Sacramento – continues to optimize treatment.
2. When pathogen analytical methods become substantially more exact, consider collecting additional pathogen data.	All * except Sacramento County	The ARWTC members are aware that the EPA has certified Method 1622/23 for analysis of *Giardia* and *Cryptosporidium*, an improvement over the previous ICR Method, especially for *Cryptosporidium*. EID is working on implementation of a Method 1623 sampling plan with sample collection to begin in 2003. The City of Sacramento began in 1999 and is continuing into 2003, to collect Method 1623 data, at its E. A. Fairbairn WTP. The City of Sacramento and Sacramento County, through the Coordinated Monitoring Program, have co-sponsored the collection of Method 1623 data at Nimbus Dam and Discovery Park.
3. Remain involved throughout the design, construction, and operational phases of the Folsom Dam temperature control device project.	Folsom Roseville SJWD FSP	The temperature control device, with the support of the Water Forum, which includes Folsom, Roseville, and SJWD as well as other ARWTC members, has been installed on Folsom Dam. The gates will be manipulated to shunt water from the upper part of the lake to the intake pipe for Folsom, Roseville, SJWD, and the FSP. This will mean warmer, more near-surface lake water for these Folsom Lake utilities and cooler water for Lake Natoma and the Lower American River. The Folsom Lake utilities are working with the USBR to optimize operation and minimize impacts to water treatment processes. Currently additional water quality monitoring is being conducted for selected constituents.
4. Ensure that spill notification procedures are in place so that each agency can be assured it will receive timely notification in the event of a hazardous material spill into the river system.	All * except Sacramento County and EBMUD	Procedures have been established within the ARWTC to communicate on spills. This included development of a phone tree, work towards a standard spill reporting form, and dry runs to test communication procedures. Several of the ARWTC members also have direct notification agreements with various agencies in the watershed and have conducted internal training and implemented internal tracking procedures.

Recommendation	Agency	Action
		HIGH PRIORITY
5. Develop and implement a public education campaign targeted to responsible recreational use of the river system.	All * except Sacramento County	The City of Sacramento began its Pumpout and Restroom Public Education Campaign on the Sacramento River in 2000. The campaign was extended to Folsom Lake in 2001 and to the Lower American River in 2002. The following ARWTC members are now co-sponsors of the campaign: EID, Folsom, Roseville, SJWD, ACWS, CWD, Sacramento County, and EBMUD. Folsom is involved in bilge water recovery to help keep contaminants out of Folsom Lake. The City of Sacramento has also worked to continue to assess conditions along the Lower American River and facilitate (through California Urban Water Agencies) a grant-funded recreational project on the Lower American River that would expand public education and pollution prevention efforts with respect to recreational use. Sacramento County and EBMUD have supported these efforts.
		MEDIUM PRIORITY
6. Provide planning and space at new or expanded WTPs to allow for potential installation of alternative facilities to meet future regulatory requirements.	All *	PCWA – redundant coagulant feed and storage; sand ballasted clarification. EID – evaluating alternative site for El Dorado Hills WTP 2nd expansion. FSP – N/A. Folsom – as part of recent and current expansions, space has been allowed for ozone disinfection facilities SJWD – will be considered in design of future facilities Roseville – accomplished through Roseville WTP master plan. ACWS – has been provided. CWD – has identified space to meet future needs for alternative disinfection and/or fluoride treatment. City of Sacramento – holds space for ozone or UV and conservative design criteria for conventional filtration.
7. Continue to monitor distribution system DBPs and disinfection practices to ensure that future anticipated DBP standards are not exceeded.	All * except Sacramento County and EBMUD	PCWA has not run the Foothill Plant on American River water when the samples were collected. EID – quarterly monitoring, relocated chlorine points at the WTP. FSP – collected semi-annual sample for both TTHM and HAA5 analysis in 2002 Folsom – reservoirs are monitored for chlorine residuals. Turnover of water in storage reservoirs closely monitored. Increased sampling for chlorine residual in distribution system. Increased monitoring of DBPs in distribution system above required per regulations to find areas of greatest residence time. SJWD, Roseville, ACWS, CWD, and City of Sacramento – have monitored distribution system DBPs and disinfection practices as required.
8. Conduct coliform monitoring upstream and downstream of Strawberry to better identify the potential effects of septic systems.	EID	EID collected 42 fecal coliform samples between December 1999 and December 2002. The average of all samples was 5 MPN/100 mL and the median of all samples was non-detect. When samples were separated into summer (May through September) and winter (October through April) conditions, higher levels were seen in the summer months. The summer average was 11 MPN/100 mL and the median was 4 MPN/100 mL. This may support the potential impact of septic systems or possibly other factors.

Recommendation	Agency	Action
MEDIUM PRIORITY		
9. Coordinate the Folsom Lake agencies to monitor raw water in Folsom Lake for MTBE at a higher frequency.	EID Folsom Roseville SJWD FSP	Coordination of monitoring did not occur, but each of these ARWTC members monitored in accordance with regulatory requirements: Folsom, Roseville, and SJWD monitored quarterly for one year under the UCMR. EID monitored quarterly for a 5-year period. Roseville and SJWD, under waivers from DHS, now monitor once every six years. The other utilities monitor annually, as required by DHS. There have been no MTBE detects at any of the utilities' intakes from 1998 through 2002.
10. Meet and confer with the RWQCB and DFG regarding the fish hatcheries to request a limited amount of discharge/river monitoring for coliform levels and TOC.	CWD SSWD * City of Sacramento EBMUD	The City of Sacramento, supported by Sacramento County and EBMUD, has explored the benefit of a hatcheries monitoring study. They have conducted research into fish and pathogens, ascertained what microbiological data have been collected by the hatcheries, taken a tour of the facilities, better characterized flow through the facilities, and developed some conceptual sampling options. No decision has been made at this time on whether or how to proceed with a monitoring study
11. Meet and confer with the RWQCB and Aerojet regarding concerns with potential future additional discharges from Aerojet into the American River system.	ACWS CWD SSWD * City of Sacramento EBMUD	ACWS meets on an ongoing basis with the RWQCB on its concerns re Aerojet. CWD submitted detailed comments to the RWQCB on the new permit for the GET E/F discharge and to the EPA on Aerojet's plan for the western groundwater area. The City of Sacramento has participated in the Community Advisory Group, attended a site tour, and submitted detailed comments to the RWQCB on the new permit for the GET E/F discharge and to the EPA on Aerojet's plan for the western groundwater area.
12. Meet and confer with the County of Sacramento regarding potential improvements in sanitation facilities along the American River Parkway.	CWD SSWD * City of Sacramento EBMUD	The City of Sacramento, supported by Sacramento County and EBMUD, obtained information on the number, spacing, and conditions of restrooms along the American River Parkway along with information on County plans for improving these facilities. When the County Board of Supervisors was considering use of part of the parkway as an off-leash dog park, the City submitted a letter on the potential effects of dog waste washing into the American River. Through California Urban Water Agencies, the City of Sacramento and EBMUD have discussed with County Park ranger staff, the inclusion of water quality stewardship messages on message boards to be installed along the parkway. Also through CUWA, the City of Sacramento and EBMUD are facilitating a project to install dog waste dispenser stations along the parkway and other near-shore parks in the Sacramento area. The City of Sacramento also developed summary information on efforts to reduce illegal camping and homelessness in the parkway.

Recommendation	Agency	Action
LOW PRIORITY		
13. Share information with the continued Technical Committee on work in progress on the Sacramento Stormwater Management Program and in implementing recommendations of the Sacramento River Watershed Sanitary Survey.	City of Sacramento	The City of Sacramento is sharing information with other ARWTC members, as part of the 2003 Update. Information is shared on pathogen and DBP precursor data collected for Sacramento urban runoff, and development of the Sacramento Stormwater Management Program's fecal waste reduction strategy. Other topics on which the City of Sacramento has shared with the ARWTC include partnering on an expanded Pumpout and Restroom Public Education Campaign and efforts to facilitate a grant-funded expanded recreation focused public education efforts (discussed above).
14. Meet and confer with RWQCB staff on wastewater issues in the watershed.	All * except Sacramento County	The ARWTC addressed this issue during scoping of the 2003 Update and has further addressed this in the discussion on spills in the watershed. EID has conferred with the RWQCB with respect to septic systems in the watershed and the Placerville WWTP. ACWS has conferred with the RWQCB with respect to sewage spills into Lake Natoma and the Folsom South Canal. Folsom and FSP have conferred with the RWQCB about sewage spills from their own wastewater systems.
15. Begin the process of encouraging expansion into El Dorado County of the American River Coordinated Resources Management Plan, which is currently active in Placer County.	EID	EID staff have participated in the South Fork American River Watershed Group and anticipate being more consistently involved in the future .

ARWTC = American River Watershed Technical Committee

<u>ARWTC members</u>

PCWA = Placer County Water Agency
EID = El Dorado Irrigation District
Folsom = City of Folsom
FSP = Folsom State Prison
SJWD = San Juan Water District
Roseville = City of Roseville
ACWS = Arden Cordova Water Service
CWD = Carmichael Water District
City of Sacramento
SSWD = Sacramento Suburban Water District (former Arcade Water District and Northridge Water District)
EBMUD = East Bay Municipal Utility District
Sacramento County = County of Sacramento Department of Water Resources

*The SSWD did not take action on the recommendations, as they did not anticipate use of surface water in the future. SSWD has not used surface water from the American River since November 1997.

The EBMUD and Sacramento also have special case circumstances:

- The EBMUD participated in the 1998 Update, but thereafter determined to take its water allotment out of the Sacramento River downstream of the American River confluence. Nevertheless, the EBMUD has remained interested and active in watershed efforts on the American River, particularly the Lower American River which is closest to their future intake.
- Sacramento County did not participate in the 1998 Update. The County plans to take water out of the Sacramento River at the same location as EBMUD. The County has been interested and active in watershed efforts on the Lower American River.

City of Sacramento Actions on 1998 Update Recommendations

SANITATION FACILITIES ALONG THE AMERICAN RIVER PARKWAY

The City of Sacramento, along with the Sacramento County Department of Water Resources and EBMUD:

- Sponsored Archibald & Wallberg Consultants to interview County ranger staff in 2002 on recreational and sanitary issues in the Parkway. The County ranger stated that (1) the horse trail receives little use and causes little fecal contamination, (2) fecal waste from dogs is a problem where neighborhood enclaves have access points to the Parkway, and (3) that there are an adequate number of restrooms evenly spaced along the Parkway for recreational users, except for one area of the Parkway that has been subject to vandalism The County rangers have prioritized older restrooms for renovation/replacement, the pace of work being dependent on funding. Funding is actively sought and has been received from California Department of Boating and Waterways grant programs and from State Park Bond Act grant programs. Homeless encampments, which generate trash and fecal material, are a persistent problem in the downstream part of the Parkway (see attached summary). The County ranger also stated that there is no public education in the Parkway re sanitary issues and pet waste nor do rangers currently post or enforce local pet waste ordinances.
- Provided a letter to the County Department of Parks and Recreation, in concert with EBMUD and the County Department of Water Resources, re dog waste as a potential concern for adding disease causing organisms to the river system.
- Obtained funding and sponsorship from the California Urban Water Agencies for a project to identify practical source water protection control measures related to control of fecal waste caused by recreational use. This project is called the Recreation Pathogen Pollution Prevention Project; its goal is to identify control measures at the conceptual level and match those control measures with willing sponsors and potential grant funding sources. The geographic area of the project is the Lower American River, the Sacramento River downstream of the Feather River confluence, and the Delta. One of the ideas being further investigated is to install dog waste dispenser stations along the American River Parkway.

Summary of Activities re Homeless Encampments along the American River Parkway, 1998 – June 2003

There is a continuous though shifting population of homeless people in the American River Parkway. Homeless people camp in the parkway, mostly downstream of the Business 80 bridge crossing, close to social services in downtown Sacramento (see attached map). Many of the camps are near the river. A few encampments are also found between the Howe Avenue and Business 80 bridge crossings.

Formation of the County-Cities Board of Homelessness

In 1998, the Sacramento County-Cities Board of Homelessness was formed, and initiated a new effort to offer social services and relocate homeless people in Sacramento County. As part of this effort, County and City staff made three field trips into the parkway homeless camps in 1999 to offer an array of services including:

- Transitional housing programs
- Free bus transportation to relatives who agree to house the homeless
- Transitional shelters
- Assistance in finding employment
- Housing/counseling/medication program for the mentally ill

Numbers of Homeless People in the Parkway. The parkway chief ranger states that this 1999 effort resulted in a decrease in numbers of homeless people in the parkway from about 300 to about 100 to 150 people. Estimates of homeless people in the parkway in earlier years ranged from 300 to 900. The chief ranger said that in 2003 the number of homeless people in the parkway is probably less than 100, most of which may be characterized as service resistant, i.e. people unwilling to accept help to change their homeless lifestyle.

On August 23, 2001, City and County law enforcement officers participated in a "point in time" count of homeless people throughout Sacramento County. This included open spaces, transitional housing and emergency shelters. The total count for all open spaces in the County was 130; therefore, only a subset of those 130 people would have been in the parkway open space. These numbers are in general agreement with the estimates of the parkway chief ranger. The total count including those in transitional housing and emergency shelters was 1,600.

Increased Law Enforcement and Prosecution Efforts. In 2001, two rangers were assigned fulltime to parkway homeless people issues. These rangers (1) direct homeless people to available social services, (2) cite and arrest service resistant homeless people for unlawful camping, and (3) direct and participate in cleanup of the homeless camps. Because of the increased attention from parkway rangers, there are fewer large permanent camps. Homeless people continue to enter the parkway, make temporary overnight camps, and then vacate the parkway during the day.

The City of Sacramento Attorney's Office takes the lead on prosecutions for the charge of unlawful camping and the charge of storage of personal property on public and private property. In 2002, the Attorney's office began keeping records of the number of charges. In 2002, there were 257 such charges in the parkway. From January through June 2003, there were 99 such charges in the parkway.

Cleanup of Homeless Camps. The camps become littered with debris, garbage, and sewage – litter, used toilet paper, human waste, discarded syringes, food wrapper, old clothes, etc (see attached photographs). Park rangers clean up the 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 noted in the Sacramento County & Cities Board on Homelessness' Five Year Plan, there is "substantial documentation of high incidence of diseases among the homeless population."

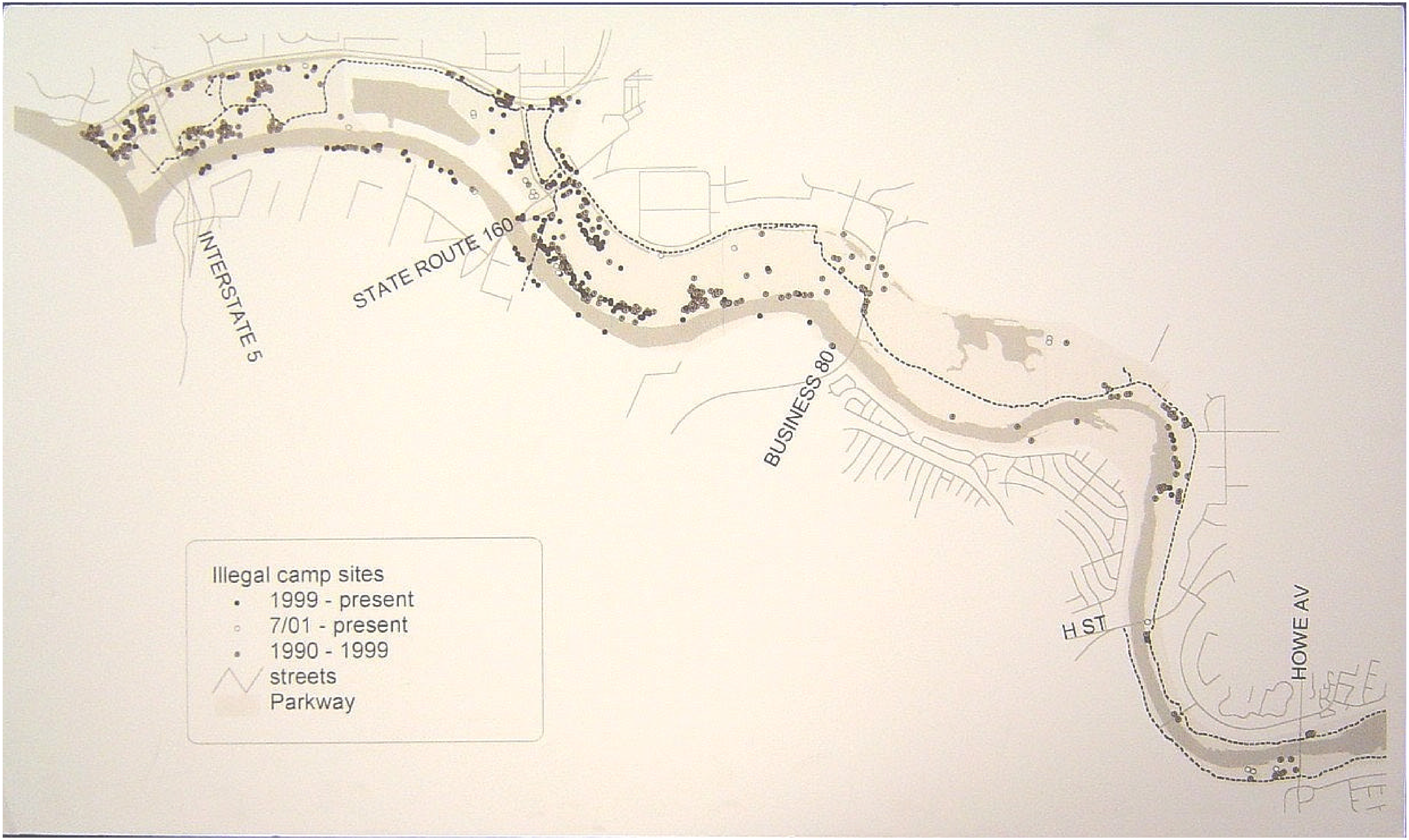
According to the chief parkway ranger, during 1999 about 15 tons of trash was removed from homeless camps in the parkway. Since the full-time assignment of two rangers, the amount of trash picked up has averaged about 60 tons per year.

County-Cities Board of Homelessness Five Year Plan. In March 2002, the Sacramento County-Cities Board on Homelessness completed its five year plan to reduce homelessness in the County. The plan has many elements that address housing, substance abuse treatment, services for the mentally ill, healthcare, job training, access totransportation, public safety, veterans outreach, and enforcement. Of particular interest from a source water protection point of view are the plan's statements on (1) the necessity to deal differently with the service resistant, (2) the need for dedicated funds for continued cleanup efforts, and (3) plans to install lighting and pathways in parkway areas that would encourage more community use and discourage homeless use. Implementation of the plan is funding dependent, on federal, state, and local government sources.

Discussion

The formation of the County-Cities Board on Homelessness with the associated outreach and enforcement efforts has significantly reduced the number of homeless people in the parkway and cleaned up a considerable amount of the trash associated with the camps. It is unfortunate, but understandable, that cleanup efforts do not include pick up of human waste.

The full-time assignment of two park rangers to parkway homeless issues is also a significant step, resulting in more enforcement and more trash pickup. Enforcement, including prosecution by the City of Sacramento Attorney's Office, is clearly an important factor for the parkway since most of the remaining homeless people in the parkway are reportedly service resistant.


INTERSTATE 5
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BUSINESS 80
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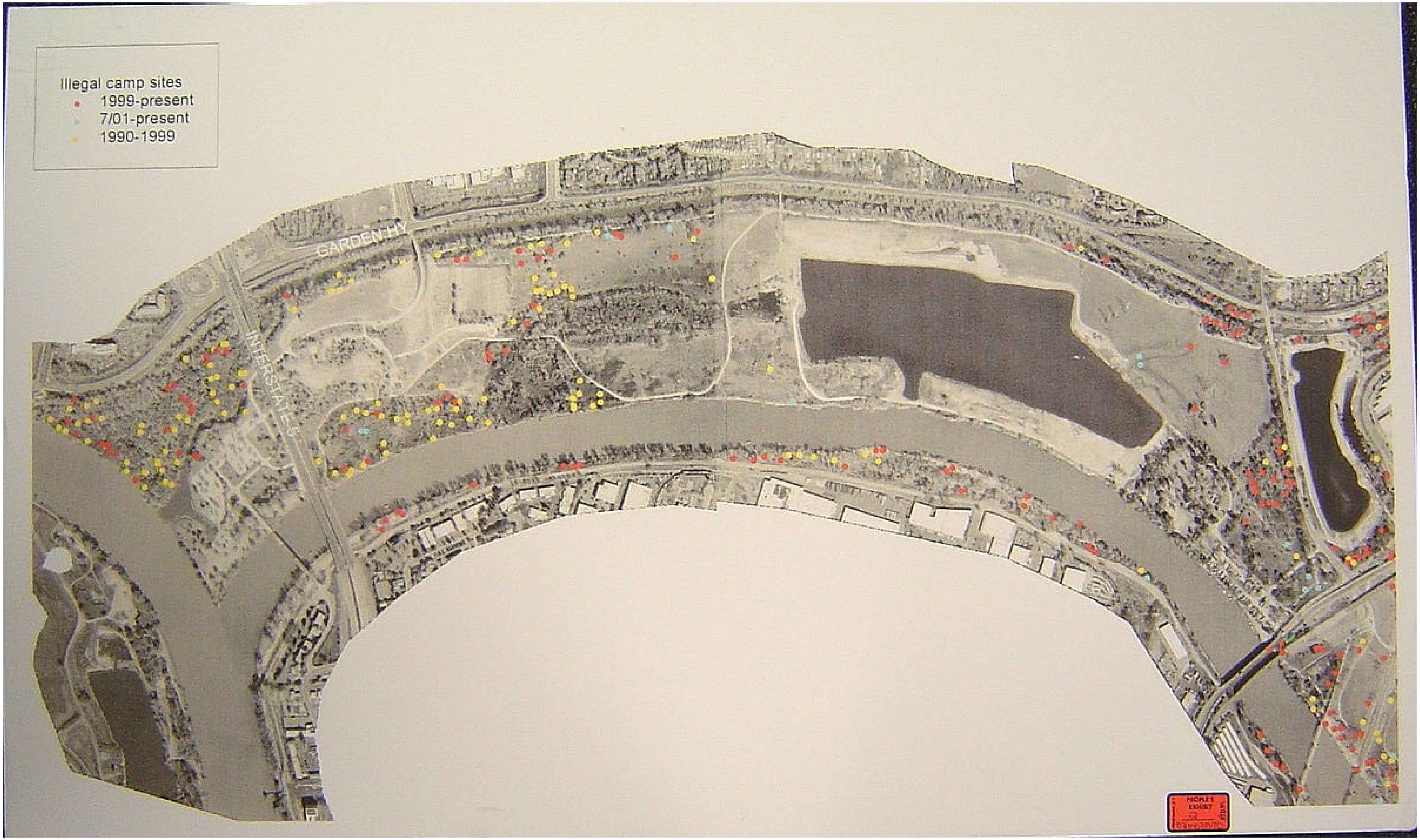
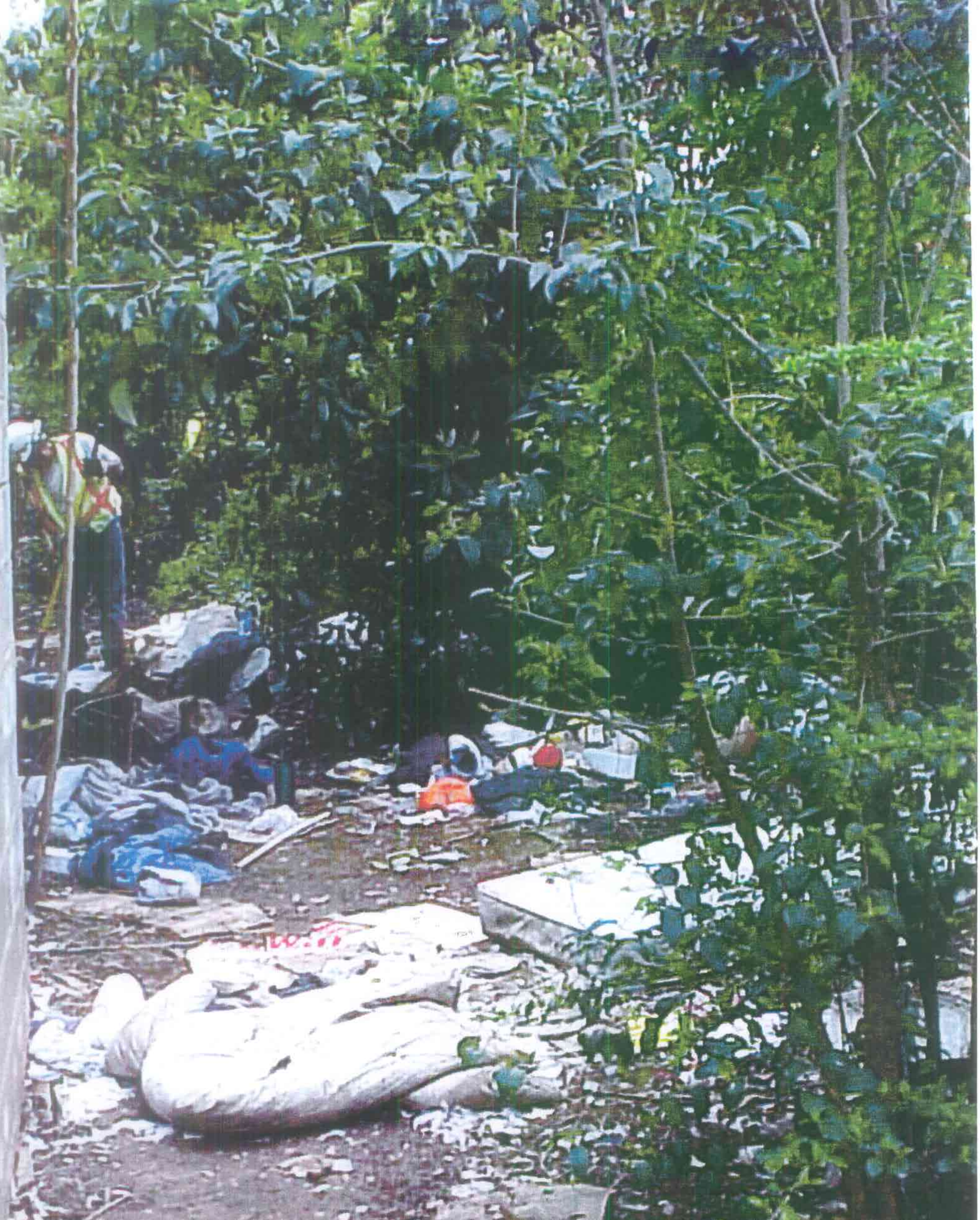
Illegal camp sites
1999 - present
7/01 - present
1990 - 1999
streets
Parkway


Illegal camp sites
1999-present
7/01-present
1990-1999
GARDEN HY
INTERSTATE 5



PUBLIC EDUCATION TARGETING RIVER RECREATION

The City of Sacramento:

- Worked with RWQCB staff to place local recreation projects on the RWQCB's 2001 Central Valley Regional Board Chapter of the Watershed Management Initiative. Desired projects included, for example, promotion of pumpouts and restroom facilities and promotion of dog waste pickup. Appendix 2 of that document lists projects that were approved by RWQCB staff as priority projects for SWRCB grant funds. Placement of preferred projects on that list was a step by the City of Sacramento to facilitate competition for grant funds for those projects.
- Extended its Sacramento River public education campaign to promote use of pumpouts and restrooms to Folsom Lake and the Lower American River. The campaign was extended to Folsom Lake in 2001 and the Lower American River in 2002. Partner agencies were brought in as sponsors, including many members of the American River Watershed Technical Committee. The campaign centers on distribution of "give-aways" and brochures showing the location of pumpouts and restrooms. A regional brochure shows Folsom Lake, the Lower American River, and part of the Sacramento River. The 2002 and 2003 campaigns included coordination with the City of Folsom's bilge management outreach program. Materials are distributed at Folsom Lake access points, the Folsom Lake Marina, local recreational-related retail outlets, and at other points. Materials were also distributed through field surveys and through public outreach events with the help of the US Coast Guard Auxiliary and the bilge management outreach program. Public service announcements were developed and distributed for play on local radio stations and; radio interviews were also done and given local radio station airtime. Surveys, conducted by student assistants, provide feedback on the success of the program. The 2003 season includes enhancements to the regional brochure and development of a coloring book for distribution at several locations including State Parks at Folsom Lake, the American River Interpretive Center, and Sacramento County Parks. Campaign materials are in Appendix D.

INFORMATION SHARING WITH THE ARWTC ON THE SACRAMENTO STORMWATER MANAGEMENT PROGRAM

With respect to work of the Sacramento Stormwater Management Program, the City of Sacramento is one of six co-permittee agencies, which are required under an NPDES Permit to reduce pollutants in urban runoff discharges to the maximum extent practicable. Other permittees include the County of Sacramento Department of Water Resources, the City of Folsom, the City of Galt, the City of Citrus Heights, and the City of Elk Grove. The Sacramento Stormwater Management Program is in the process of developing a Fecal Waste Reduction Strategy. The goal of this strategy is to reduce the contribution to urban runoff of fecal material from human and domestic animal sources. Activities to be implemented as part of this strategy include:

- Ensuring that the permittees that own and operate sanitary collection systems comply with the most recent NPDES permit requirements to track and prevent sanitary sewer overflows.
- Possible development of a public outreach brochure informing private property owners about acceptable methods for cleaning up sanitary sewer overflows that they are responsible for.
- Continued implementation of an Illicit Connection Program that prevents and corrects cross connections between the sanitary sewer and storm drain system.
- Public education on the need to pick up pet waste. Several of the permittees currently include the pet waste topic through a number of methods. Under the most recent NPDES permit, all the permittees will be required to address the topic of pet waste in their public education materials.
- Kennel facilities will be inspected through an agreement with the Sacramento County Environmental Management Department.
- The City of Sacramento and City of Folsom will continue to install and service dog waste dispenser stations at selected parks as part of a pilot program. City of Sacramento park staff observations suggest the dispensers are effective at reducing dog waste. An effectiveness evaluation will be conducted prior to determining whether the dispenser station program should be expanded or otherwise modified. The City of Sacramento currently has 16 dog-waste dispenser stations at 12 parks and plans to install signs at several additional parks. The City of Folsom currently has 12 dog-waste dispenser stations.
- Identify livestock confined animal facility operations (CAFOs) within the area tributary to the permittees' storm drainage system and provide this list to the RWQCB. The RWQCB is currently revising and strengthening its regulatory requirements for CAFOs.
- Further assess equestrian facilities and hobby farm areas as sources of fecal waste prior to determining whether additional action (other than the current practice of responding to complaints) is warranted.
- Continued implementation of best management practices that remove fecal material from the storm drain system, namely street sweeping practices, storm drain system infrastructure maintenance operations, and detention basin settling.

DISCHARGES FROM AEROJET

The City of Sacramento:

- Attended and tracked several meetings in 2001 and 2002 of the Community Advisory Group on Aerojet Superfund Issues.
- Attended a 2001 tour of Aerojet with the Community Advisory Group.
- Submitted comments letters (which are attached) to EPA in January 2001 and to the RWQCB in April 2002 with regard, respectively, to the proposed plan to address groundwater contamination in the western area of the Aerojet site and the subsequent revised NPDES Permit for the American River Study Area and GET E/F. The City commented on specific chemicals of concern, the need for contingency plans to cease discharge, the need for notification in the event discharge effluent limits are exceeded, and requests for receiving water monitoring. The City's comments were substantially addressed in the July 2002 Revised NPDES Permit. The permit explicitly states that the discharge to surface waters shall not cause the degradation of the water supply. In addition, RWQCB staff provided the City verbal assurance that more monitoring would be required, as appropriate, if new water quality problems arise or if permit conditions are not met.

SPILL NOTIFICATION PROCEDURES

The City of Sacramento:

- Established direct notification procedures with emergency response agencies, wastewater treatment plants, and other agencies in the American River watershed These agencies (see attached list which covers both the City's water treatment plants) have agreed to provide the City with direct notification of spills, of which they have knowledge, that enter or threaten to enter the river system. The City contacts these agencies annually to ensure the agreement is still in place and to update contact phone numbers, etc.
- Participated in establishing procedures within the American River Watershed Technical Committee re communication on spills into the American River system. This included (1) development of a phone tree, (2) working towards a standard spill reporting form, and (3) dry runs to test the communication procedures. All the utilities participated. In particular, the City of Sacramento assisted in overall coordination, the City of Folsom established the initial phone tree, and the San Juan Water District assisted in coordinating the dry runs. A full dry run test was conducted in May 2002 and a partial dry run test was conducted in November 2002. The City spill reporting form is attached.
- Continues work on internal procedures and coordination with other divisions within the City re spill communication and response (see attached internal communication tree).
- Conducted operator training re spill communication and response (see attached operator procedures).
- Conducted an annual internal evaluation for the past three years, to facilitate improving its spill communication and response procedures.
- Developed a spill report database enabling it to categorize and analyze spills. Spill information and type and frequency graphs for 2001 and 2002 are attached.

Direct Notification Contacts

Agency	Type of Agency
Sacramento and American Rivers	
Agency	**Type of Agency**
Regional Water Quality Control Board, Central Valley Region	State regulatory agency
County of Sacramento Environmental Management Department	Emergency response
City of Sacramento Fire Department	Emergency response
Sacramento Regional Wastewater Treatment Plant - collection system	Sanitary sewer collection system
US Army Corps of Engineers	Levee projects
Placer County Office of Emergency Services	Emergency response
American River	
City of Folsom	Wastewater treatment plant
City of Colfax	Wastewater treatment plant
US Bureau of Reclamation	Folsom Dam operation
Folsom State Prison	Sanitary sewer collection system
County of Sacramento Regional Parks and Recreation District	American River Parkway
California Department of Parks and Recreation	Lake Natoma and Folsom Lake State Recreation Area
El Dorado County Environmental Health	Emergency response
City of Placerville	Wastewater treatment plant
Sacramento River	
Yolo County Environmental Health Department	Emergency response
Sutter County Community Services Department	Emergency response
Colusa County Environmental Health Department	Emergency response
City of Live Oak Wastewater Treatment Plant	Wastewater treatment plant
Yuba City Wastewater Treatment Plant	Wastewater treatment plant
City of Marysville Wastewater Treatment and Reclamation Facility	Wastewater treatment plant
US Air Force- Beale AFB Wastewater Treatment Plant	Wastewater treatment plant
Sacramento River via the Natomas East Main Drainage Canal	
Roseville City Fire Department	Emergency response
City of Roseville Regional Wastewater Treatment Plant	Wastewater treatment plant
Placer County Sewer Maintenance District Wastewater Treatment Plant No.3	***Wastewater treatment plant***

DEPARTMENT OF UTILITIES

SPILL NOTIFICATION FORM

NAME ______________________ **DATE** __________ **TIME** __________

LOCATION: **(1) CITY OPERATOR** ☐ **(2) CONTROL 12** ☐ **(3) SAC CONTROL** ☐

(4) FIELD SERVICES ☐ **(5) PLANT SERVICES** ☐ **(6) EAFWTP** ☐ **(7) SRWTP** ☐

If a call is received regarding a hazardous material spill, record as much of the information as possible below.

PERSON WHO NOTIFIED YOU:

NAME ______________________

AGENCY ______________________ **PHONE NUMBER**____(____)_______- __________

SPILL INFORMATION

TIME AND DURATION OF SPILL (note if spill is ongoing): ....

EXACT LOCATION OF SPILL: ....

....

SOURCE OF SPILL, IF KNOWN ....

....

TYPE /DESCRIPTION OF SPILL: ....

....

....

VOLUME / AMOUNT OF SPILL: ....

IS THE SPILL UNDER CONTROL SO IT WON'T ENTER A WATERWAY?..........

....

DID THE SPILL ENTER A WATERWAY OR A STORM DRAIN?..........

WHO ORIGINATED THE SPILL?

NAME ....

AGENCY..........

PHONE (…..)…..…-………………..

WHO IS HANDLING ON-SITE SPILL RESPONSE?

NAME ....

AGENCY..........

PHONE (…..)…..…-………………..

COMMENTS

....

Form Reviewed by ______________________***(Supervisor)***

Date______________________.

DEPARTMENT OF UTILITIES

SPILL NOTIFICATION FORM

NOTIFICATIONS (Refer to Appropriate Spills Procedure for Notification Information)

(1) CITY OPERATOR	Name	Time

(2) CONTROL12 (3) SAC CONTROL	Name	Time
☐ City Operator		
☐ SRWTP		
☐ EAFWTP		
☐ On-call Plant Services Supervisor		
☐ OTHER		

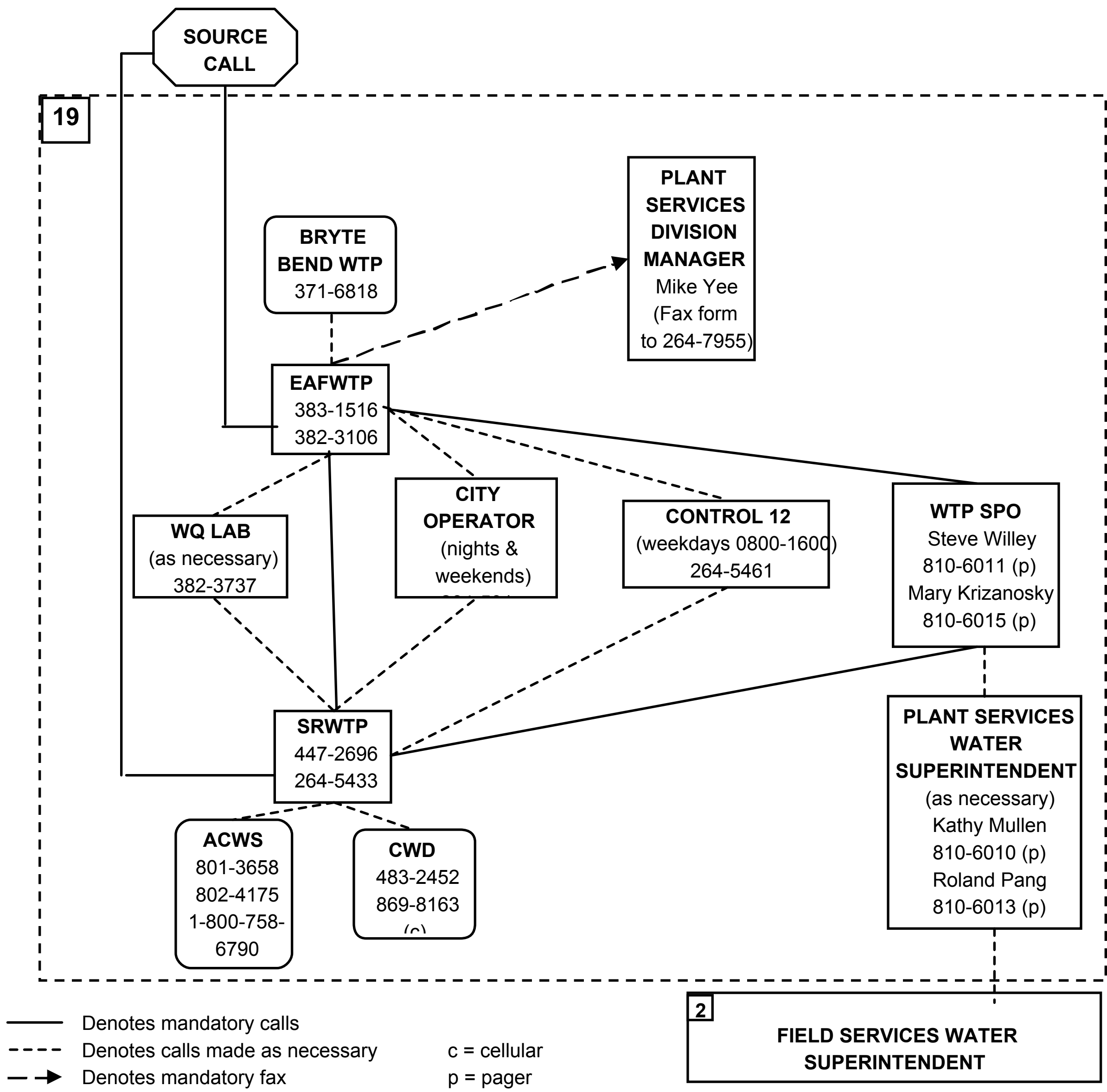
(4) FIELD SERVICES	Name	Time

(5) PLANT SERVICES	Name	Time

(6) EAFWTP	Name	Time
☐ On-Call SPO		
☐ SRWTP		
☐ Control 12		
☐ City Operator		
☐ Bryte Bend WTP		
☐ Fax to Mike Yee		
☐ OTHER		

(7) SRWTP	Name	Time
☐ On-Call SPO		
☐ EAFWTP		
☐ Control 12		
☐ City Operator		
☐ ACWS		
☐ CWD		
☐ OTHER		

Figure1.2
Water Treatment Plant Spill Procedures



Note: This figure is provided for informational purposes only for the 2003 American River Watershed Sanitary Survey Update. The latest version of the chart should be used for actual spill notification purposes.

RIVER SPILLS PROCEDURE

When there is a hazardous material spill, either or both of the Water Treatment Plants may be notified by the City Operator, the Sacramento Fire Department Dispatch, County Environmental Management Department or any of the agencies listed in the River Spills binder. There also may be a case where a river spill is noticed and reported by plant personnel or the public. **If a call from anyone regarding a hazardous material spill is received, and this includes a call from an operator at the other plant, the following procedures should be followed:**

1. All information received should be entered on a Spill Report Form located in the binder in the control room labeled River Spills. This information should also be entered in the Operations Logbook. As soon as you receive a call notifying you of a hazardous material spill, use the Spill Report Forms in the River Spills binder to assist you in determining what information you need to record.

2. Record and document as much information as possible including; the nature of the spill or substance observed, the exact location of the spill, the time of the spill, and the name, agency and phone number of the person reporting the incident to you. **Also include the names of anyone you notified regarding the spill, including the operators at the other plant and the SPO.**

3. Notify a Supervising Plant Operator immediately of the situation. The SPO will notify the Superintendents, as necessary.

4. If the spill is already at or near the plant intake, it will be necessary to immediately shut down the Low Lift pumps.

5. Notify the operators at the other plant of the situation.

6. The SPO may direct you to contact the Water Quality Lab to notify a chemist that a river sample may need to be taken.

7. EAFWTP operators will fax a copy of the Spill Report Form to Mike Yee, Fax Number 264-7955 as soon as possible.

8. If the call is received Monday through Friday from 0800 to 1600, excluding holidays, notify Control 12 at 264-5226 or 5227.

9. Anytime other than Monday through Friday 0800 to 1600, or on holidays, notify the City Operator at 264-5011, request Hazmat Call-Out, and pass on the following information:
   - Your name and title
   - Your phone number
   - Time you received the call regarding the spill
   - Location of the spill
   - Source of the spill, if known
   - Description of the spill
   - When the spill occurred
   - Has the material gotten in the river?

10. If the spill is on the American River, the operators at SRWTP will:

- Notify Arden Cordova Water Service at 916-801-3658 or 916-802-4175
- or 1-800-758-6790. (Call these numbers in order until a person is reached.)
- Notify Carmichael Water District at 916-483-2452. If no answer, call 916-869-8163 and leave a message with the answering service and state that this is an emergency call.
- Record the name of the person you notified and the time of the call.

If the spill is on the Sacramento River, the operators at EAFWTP will:

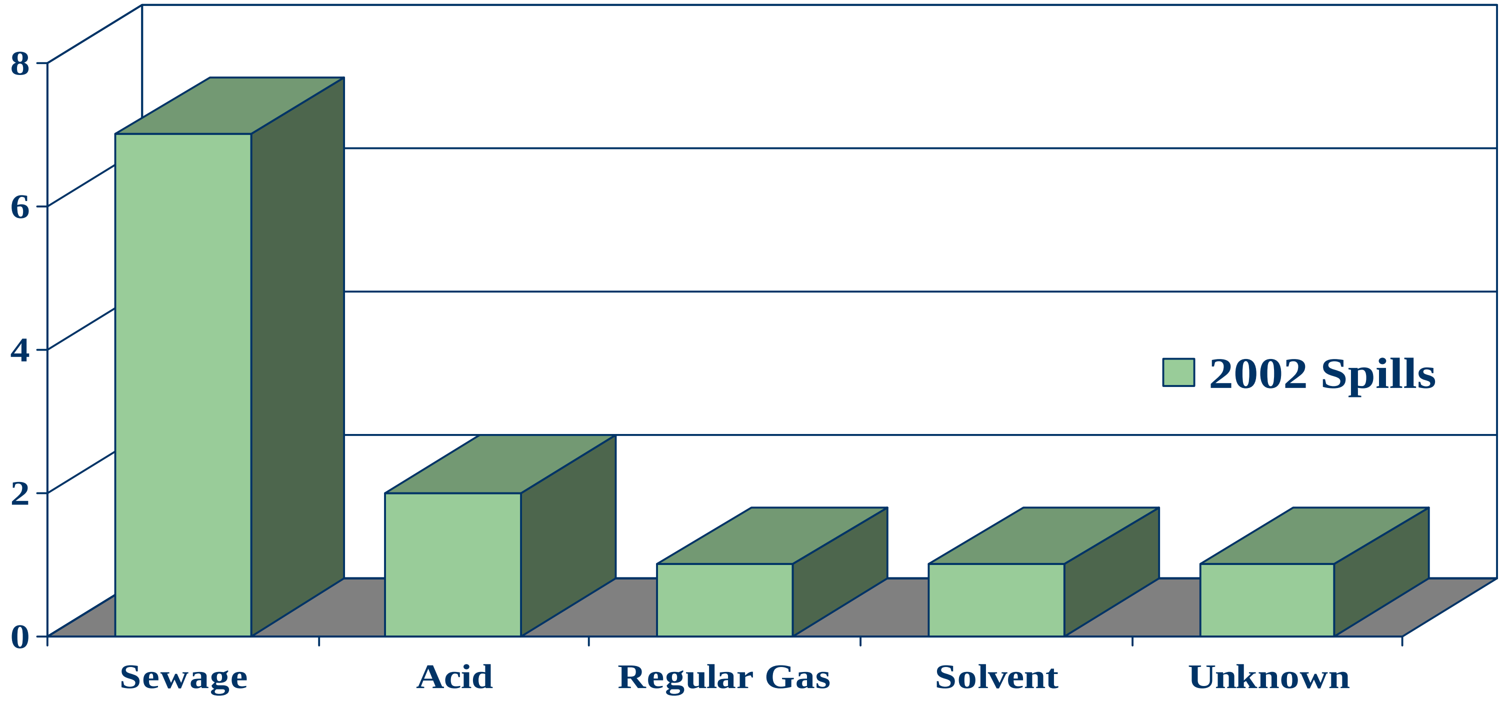
- Notify Bryte Bend Water Treatment Plant at 916-371-6818.
- Record the name of the person you notified and the time of the call.

11. Record in the Operations Logbook what action was taken in response to the spill.

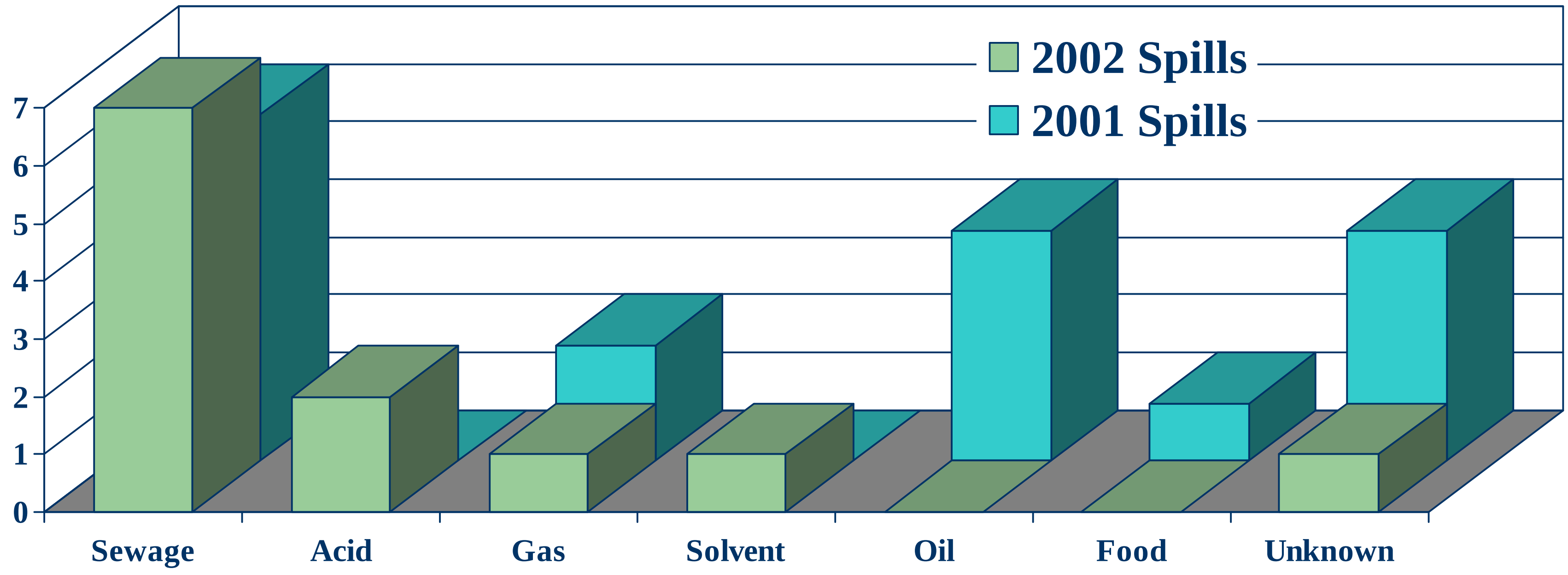
12. Put the completed original Spill Form in SPO=s box and put a copy into the Spills binder.

13. If you receive any additional information about the spill or if you receive any other notifications about the same spill after you have already completed the spill form, include the additional information in the Comments section of the Spill Report Form. This could include any pertinent information about clean-up, further details about the spill, the name, time and agency of anyone else reporting the spill to you. The form should be marked ARevised@ and re-faxed to Mike Yee with the additional information.

Spill Analysis 2002
American River – Type



Multi-Year Spill Trends on the American River - Type



FISH HATCHERIES DISCHARGE/RIVER MONITORING

The City of Sacramento from 1999, and in concert with the County of Sacramento and EBMUD starting in 2001/2002:

- Conducted some research into fish and pathogens. In 1999, a City student assistant ascertained that the fish at the hatcheries (rainbow trout, steelhead trout, and Chinook salmon) are all salmonid species and that the salmonid gut is a relatively sterile environment. In 2001 the City sponsored Montgomery Watson Harza to conduct a literature review of fish and pathogens. This literature review showed that fish can be carriers and hosts for total coliform although not fecal coliform or *E. coli*; and can be carriers of *Giardia* species and *Cryptosporidium* species, although not *G. lamblia* or *C. parvum*.
- Obtained partial results of a Department of Fish and Game (DFG) antibiotic resistance monitoring study. DFG staff have sampled hatcheries' influent water as well as water from the settling ponds and are comparing the data sets to determine whether antibiotic dosing practices influence different bacteria species. The relevance of this antibiotic resistance monitoring study to the City's interest in a possible study is that none of the coliform identified by DFG are enterobacteriaceae, of which coliform are a member.
- In 2002, the City, along with Sacramento County Department of Water Resources and EBMUD, sponsored Archibald & Wallberg Consultants to prepare a memo describing conceptual sampling options. The memo discussed the number of samples and level of difference between influent and effluent levels that would be needed to determine whether the hatcheries are a source of coliforms, protozoa, and also total organic carbon.
- In late 2002, hatcheries staff provided a tour of the facility attended by City staff, Archibald & Wallberg Consultants, and Montgomery Watson Harza.
- In early 2003, Archibald & Wallberg Consultants ascertained that there were no microbiological monitoring data other than the resistance study mentioned above and also, further discussed flow through the facilities.

WASTEWATER ISSUES

The City of Sacramento:

- Reviewed the summary of RWQCB contacts, prepared by Archibald & Wallberg Consultants during scoping of the 2003 Update. A tabular summary of the discussions is included later in this Appendix.
- Has direct and/or indirect notification contacts in place that should cover wastewater spills from all the wastewater treatment and collection systems in the watershed (see associated discussion on spill notification).

INFORMATION SHARING WITH THE ARWTC ON SACRAMENTO RIVER SOURCE WATER PROTECTION

Sacramento River Watershed Sanitary source water protection recommendations for the City of Sacramento that are relevant to the American River watershed are as follows:

- Participate as a stakeholder in development of the RWQCB's Drinking Water Policy (see associated discussion on other watershed management efforts).
- Continue the Pumpout Public Education Campaign (see associated discussion on recreational pubic education).
- Explore grant opportunities and stakeholder interest for a regional recreational public education campaign (see associated discussion on recreational public education).
- Encourage collection of data by the Sacramento Stormwater Management Program on *Giardia*, *Cryptosporidium*, and *E. coli* in Sacramento urban runoff. This study was completed in 2002 and the results are shared in Section 3 of this report.
- Complete the City of Sacramento SUVA special study on urban runoff. This study was completed in 2003 and the results are shared in Section 3 of this report.

OTHER WATERSHED MANAGEMENT EFFORTS

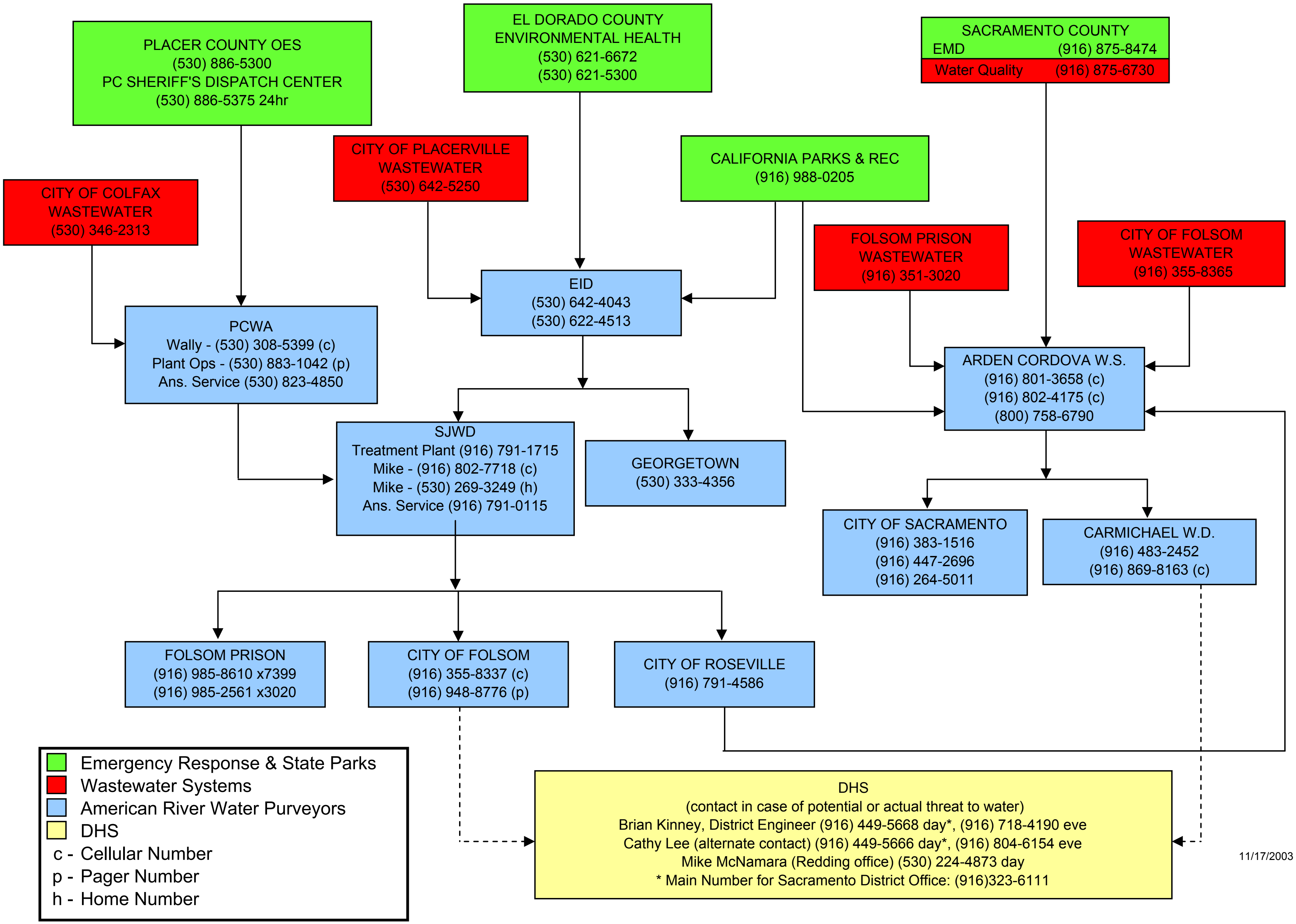
The City of Sacramento:

- Tracks and comments on the RWQCB's development of its Drinking Water Policy. The City had commented directly and also through its membership in California Urban Water Agencies, which has been one of the key organizations spearheading development of the Drinking Water Policy. City comments have focused on input into drinking water constituents of interest and that the Policy approach must include nonpoint sources as well as point sources.
- Participates in the Sacramento River Watershed Program (SRWP), particularly by providing input on drinking water constituents of interest and that the SRWP monitoring program should include these constituents, where feasible.
- Participates through the Water Forum on efforts to develop a new flow management plan for the Lower American River. This effort is focused on optimizing Folsom Dam releases for fish habitat. Any new release schedule may have effects on water temperature, algal growth, and other water quality parameters.
- Submitted a comments letter to the Department of Toxic Substances Control in April 2001 with regard to the Draft Remedial Action Plan for Perchlorate Cleanup at Mather AFB, which proposed discharge of treated groundwater to the American River. The City requested certain assurances on specific chemicals of concern, the need for contingency plans to cease discharge, the need for notification in the event discharge effluent limits are exceeded, and requests for receiving water monitoring. Discharge to the American River was later dropped as a disposal alternative for the treated groundwater.
- Provides monitoring data on the Sacramento and American Rivers in the Sacramento area through partial sponsorship of the Sacramento Coordinated Monitoring Program.

Pumpout and Restroom Campaign Materials

Spill Notification Materials

AMERICAN RIVER WATER PURVEYORS
EMERGENCY NOTIFICATION CHART



Important Note: This is the version of the phone tree available at the time of completion of the American River Watershed Sanitary Survey 2003 Update. The most recent version of the phone tree should be used for emergency notifications.

Emergency Spill Notification Phone Log

Your Name________________________ Date____________ Time____________ Phone (_____) ____________

Agency____ Job Title______________________________

Notified By

Name__________________________ Date____________ Time____________ Phone (_____) ____________

Agency____ Job Title______________________________

Spill Information

Location of the spill____

Time____________ Is the spill ongoing? Yes No N/A Amount?______________________

Type/Material of spill____

____

Is there a likelihood of the spill entering a waterway? Yes No N/A

Will the spill enter a stormdrain? Yes No N/A

Describe____

Has the spill been contained? Yes No N/A By Whom?___________________________________

Phone (_____) _____________

Who originated the spill? Name___________________________

Agency____

Phone (_____) _____________

Call Forwarded

Name__________________________ Date____________ Time____________ Phone (_____) ____________

Agency____ Job Title______________________________

Comments

____

____

____

Please fax a copy of the completed log sheet to Gayne Johnson at SJWD (916) 791-0133

Status of Selected NPDES Permit Facilities in the American River Watershed

**STATUS OF SELECTED NPDES PERMIT FACILITES
IN THE AMERICAN RIVER WATERSHED**

RWQCB Engineer	**Facility**
Kyle Erickson 255-3364	Camino Lumber Mill Permit is up for renewal in 2002. No significant changes in last several years.
Kyle Erickson 255-3364	Hangtown Wastewater Treatment Plant Permit reissued in 2001. Plant has tertiary treatment. Plant has solved some of its previous I & I problems that have caused wet weather partially treated sewage discharges– did smoke testing followed by liner placement and manhole repairs.
Beth Thayer 255-3071	City of Colfax Wastewater Treatment Plant Permit reissued in 2001. The 2001 Permit requires the plant to disinfect all effluent (rather than just its reservoir pond seepage) and contains a work schedule for solving the plant's capacity problems.
Pat Leary 255-3023	California Office of State Printing The plant had ceased to use the contaminated well (contaminated by the nearby railyard plume) that was responsible for passing groundwater contaminants through the plant and into its cooling water discharge. There are no current water quality problems with the discharge or with the remaining well. The remaining well continues to be monitored, since it is potentially vulnerable to the railyard contamination.
Steve Rosenbaum 255-3131	City of Sacramento 28th Street Landfill Cleanup at the landfill has been a fairly steady state operation for the last several years. Leachate is still collected and discharged to the sanitary sewer. Gas extraction continues to keep the groundwater VOC levels down. The RWQCB is currently evaluating the City's Corrective Action Plan to determine whether any additional measures may be needed or whether the current actions are sufficient.
George Lockwood 255-3054	Non –discharging community wastewater systems Of the 15 small community systems covered in the 1998 Update, one has ceased operations, six have had no changes, and the rest have made modifications required by the RWQCB to repair systems, install monitoring wells, expand their disposal area, or otherwise improve their capacity. The RWQCB has had more active oversight of these systems in the last several years.

Contacts were made by Archibald & Wallberg Consultants in 2002, to determine whether these facilities should be reviewed as part of the 2003 Update.

APPENDIX E

Individual Utility Information

- Placer County Water Agency
- El Dorado Irrigation District
- City of Folsom
- Folsom State Prison
- San Juan Water District
- City of Roseville
- Arden Cordova Water Service
- Carmichael Water District
- City of Sacramento

Placer County Water Agency

System Summary, PCWA

WATER SYSTEM:		
Utility Name		Placer County Water Agency
Service Area		Placer County
Number Customers - Retail/Wholesale		
PWSID No.		CA3110025
SOURCE:		
Name		North Fork American River
Entitlement and Amount		
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		Ballasted clarification
State Approved Plant Capacity (MGD)		40 MGD
Capacity Flow Range (MGD)		5-40 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	0 MGD
	Summer (Apr-Sep)	25 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22 - General Parameters, Organics
	Treated Water	None for 100% American River
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	Chlorine gas; 0.5 mg/L
pH Adjustment	Chemical and Dose	lime; unknown
Chemical Addition	Chemical, Purpose & Dose	Alum-Flocculation, PAC-Taste and Odor
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
Post-Chlorination	Chemical and Dose	Chlorine gas; 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; 15 gpm/sf
	Filter -to-Waste Facilities	Yes - Pumped to Headworks
pH Adjustment	Chemical and Dose	Caustic
Wastewater Handling	Facility	Reclamations Ponds
	Sources	Filter Backwash, Sludge Lagoon Decant
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Sludge Lagoons
	Sources	Sedimentation Basin Sludge
	Decant Recycle Location	To Reclamation Ponds
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)	8 MGD
	Summer (Apr-Sep)	15 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22 - General Parameters, Organics
	Treated Water	For 100% A. River: 1 wk in Oct, 3 wks in Nov, turb only

System Summary, PCWA

UNIT PROCESSES:		
Recycle Water	Flow	<10% Plant Flow
	Frequency	As Needed
Pre-Chlorination	Chemical and Dose	Gas Chlorine 0.5 mg/L
Chemical Addition	Chemical, Purpose & Dose	Alum, non-ionic polymer-Flocculation, PAC-Taste and Odor
Rapid Mix	Volume Basin	2610 gals
	Type of Mixing	Mechanical
	Mixing Energy (G)	700
Flocculation	No. of Basins	2
	Volume Basin	155.6k gals
	Type of Flocculators	Horizontal Shaft
	Mixing Energy	70/50/30
Sedimentation	No. of Basins	2
	Volume Basin	628k gals
	Surface Load Rate	2000 gpd/lf
	Method of Sludge Removal	Chain and Flight
Chemical Addition	Chemical, Purpose & Dose	Polymer-Floc Aid
Post-Chlorination	Chemical and Dose	Chlorine gas; 1.2 mg/L
Filtration	No. of Filters	4
	Type of Filter	Dual media
	Filter Box Volume	35.4k gals
	Underdrain Type	Leopold under graded gravel
	Media: Type, Depth, Area	Sand, anthracite (10"/17")
	Filtration Rate	5 gpm/sf
	Backwash: Criteria,Rate	LOH, time; 15 gpm/sf
	Filter -to-Waste Facilities	yes
pH Adjustment	Chemical and Dose	Caustic
Wastewater Handling	Facility	Reclamations Ponds
	Sources	Filter Backwash, Sludge Lagoon Decant
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Sludge Lagoons
	Sources	Sedimentation Basin Sludge
	Decant Recycle Location	To Reclamation Ponds
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	31 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DHS	Steve Watson
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

AGENCY NAME: Placer County Water Agency
SOURCE: American River
TYPE OF WATER Raw

Sample Date		TOC Sample Results	Alkalinity Sample Results
11/20/1998	mg/L	0.49	NA
8/9/1999	mg/L	0.66	NA
11/2/1999	mg/L	1.2	NA
9/5/2000	mg/L	1.5	23
3/1/2001	mg/L	1.6	29
6/14/2001	mg/L	1.6	21
9/19/2001	mg/L	0.66	35
11/27/2001	mg/L	2.3	33
1/30/2002	mg/L	0.96	33
2/23/2002	mg/L	1.4	29
3/13/2002	mg/L	0.78	32
4/11/2002	mg/L	1	22
5/15/2002	mg/L	1	23
6/12/2002	mg/L	0.7	23
7/10/2002	mg/L	1.2	24
8/8/2002	mg/L	1.3	23
9/11/2002	mg/L	1.6	23
10/16/2002	mg/L	1.1	40
11/20/2002	mg/L	1.6	23

AGENCY NAME: Placer County Water Agency
Source: American River
TYPE OF WATER: Raw

Year	1996		1997		1998		1999		2000		2001		2002		2003	
Month Sampled	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	E. Coli Coliform
JAN	11	2	220	8	80	14	26	4	11	2	22	2	170	8	10	2
FEB	50	2	11	2	1600	70	500	2	170	4	11	2	34	4	90	2
MAR	23	4	13	8	23	10	900	2	140	4	50	2	27	2	23	2
APR	280	110	2	2	70	7	110	2	50	2	27	11	80	17	8	4
MAY	8	2	27	2	11	2	70	4	11	2	17	8	26	2	30	23
JUN	80	30	80	11	110	2	17	4	50	2	170	50	80	4	50	4
JUL	80	30	240	8	50	4	17	4	80	11	30	2	300	70	140	8
Month Sampled	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	E. Coli Coliform	Total Coliform	E. Coli Coliform	Total Coliform	E. Coli Coliform
AUG	70	2	22	2	130	2	70	2	80	14	22	4	1600	8		
SEP	26	9	900	30	500	2	20	2	50	2	130	4	350	4		
OCT	30	2	110	4	130	2	11	2	80	7	300	2	130	2		
NOV	50	17	23	4	170	4	220	14	14	2	500	80	50	11		
DEC	20	4	300	8	500	8	9	2	70	4	1600	50	80	2		
Totals	728	214	1948	89	3374	127	1970	44	806	56	2879	217	2927	134	351	45
Average	61	18	162	7	281	11	164	4	67	5	240	18	244	11	29	4
Median	40	4	54	6	120	4	48	2	60	3	40	4	80	4	30	4

(light green) = LESS THAN

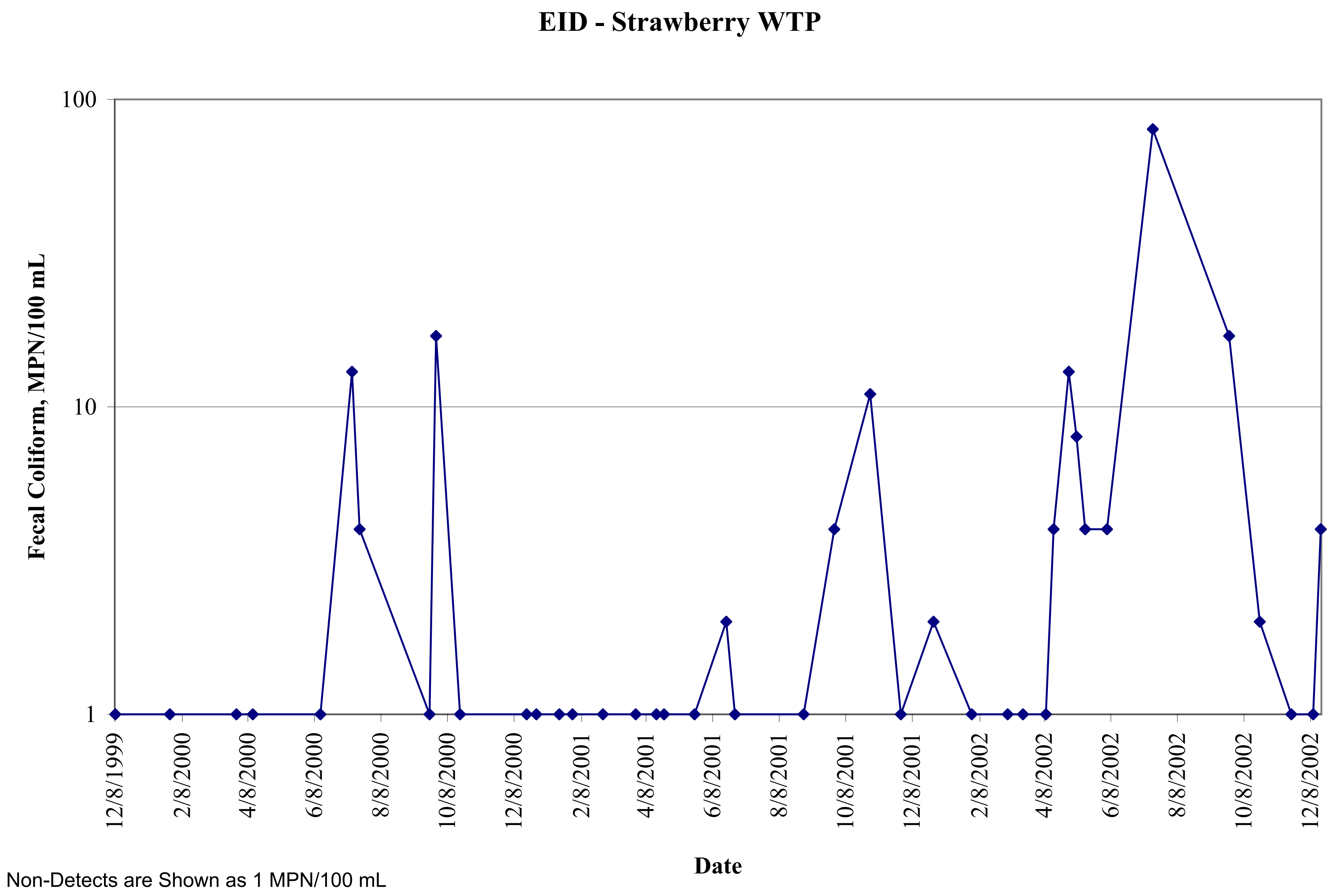
(red) = GREATER THAN

System Summaries, EID

WATER SYSTEM:		
Utility Name		El Dorado Irrigation District
Service Area		El Dorado County
Number Customers - Retail/Wholesale		
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		Fish Screens and Temperature Control Device
WTP:		
Name		El Dorado Hills WTP
Type of Treatment		Conventional WTP
State Approved Plant Capacity (MGD)		18 MGD
Capacity Flow Range (MGD)		0 - 18 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	2 - 3 MGD
	Summer (Apr-Sep)	3 - 9.6 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	Cl2 - 2 mg/L
pH Adjustment	Chemical and Dose	Soda Ash 1 - 3 mg/L
Grit Basin	Volume Basin	
Chemical Addition	Chemical, Purpose & Dose	Alum /Polymer - 5.0 mg/L/1.0 mg/L
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Static Mixer
	Mixing Energy (G)	N/A
Flocculation/Sedimentation	No. of Basins	Upflow Clarifier
	Volume Basin	
	Surface Load Rate	7.5 - 10 gpm/sf
	Method of Sludge Removal	Clarifier Blowoff
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	20 gpm/sf
	Filter -to-Waste Facilities	yes
Post-Chlorination	Chemical and Dose	chlorine
pH Adjustment	Chemical and Dose	soda ash 2 - 4 mg/L
Wastewater Handling	Facility	Wastewater Tank
	Sources	Filter Backwash, Filter Waste Washwater, Upflow Clarifier Blowoff
	Decant Recycle Location	??
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	7 MGD
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)		
Capacity Flow Range (MGD)		
Average Daily Flow (MGD)	Winter (Oct-Mar)	100 gpm
	Summer (Apr-Sep)	100 gpm

System Summaries, EID

Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	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 40 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	DHS	Brian Kinney
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart



EID - Strawberry WTP
100
10
1
Fecal Coliform, MPN/100 mL
12/8/1999
2/8/2000
4/8/2000
6/8/2000
8/8/2000
10/8/2000
12/8/2000
2/8/2001
4/8/2001
6/8/2001
8/8/2001
10/8/2001
12/8/2001
2/8/2002
4/8/2002
6/8/2002
8/8/2002
10/8/2002
12/8/2002
Date
Non-Detects are Shown as 1 MPN/100 mL

TOC RESULTS

RW 1600 Strawberry		Monthly Average	RAA	RW 1200 El Droado Hills WTP		Monthly Average	RAA
2/29/2000	1.5			6/20/2000	1.5		
6/13/2000	2			9/13/2000	1	0.99	
9/27/2000	0.51	0.51		9/20/2000	0.97	0.98	
10/19/2000	1.5	1.5		10/4/2000	0.97	1.1	
12/28/2000	0.88	0.88		10/18/2000	0.98	1.2	
2/27/2001	0.96	0.96		12/6/2000	1.1	1.8	
3/29/2001	2.6	2.6		12/20/2000	1.1	1.45	
4/17/2001	1.9	1.95		1/3/2001	1.1	1.2	
4/24/2001	2	1.8		1/17/2001	1.2	1.5	
5/22/2001	1.8	0.93		1/31/2001	1.3	1.15	
6/20/2001	1.1	0.7		2/28/2001	1.8	1.2	
6/28/2001	0.75	1.1		3/14/2001	1.5	1.7	
8/30/2001	0.7	2.5		3/29/2001	1.4	1.23	1.29
9/27/2001	1.1	2.4	1.49	4/25/2001	1.2	1.2	1.31
10/30/2001	2.5	1.7	1.59	5/9/2001	1.2	1.7	1.37
11/27/2001	2.4	1.4	1.58	5/24/2001	1.8	2.1	1.45
12/27/2001	1.7	3.03	1.76	6/6/2001	1.1	1.6	1.49
3/19/2002	1.4	3	1.93	6/21/2001	1.2	1.4	1.45
4/9/2002	2.6	1.9	1.87	7/5/2001	1.1	1.4	1.45
4/16/2002	3.8			7/12/2001	1.2	1.45	1.47
4/30/2002	2.7			7/18/2001	1.2	1.1	1.44
5/7/2002	3.4			9/26/2001	1.7	1.35	1.45
5/15/2002	2.6			10/10/2001	1.2	1.2	1.45
6/4/2002	1.9			10/17/2001	1.2		
				10/24/2001	1.3		
Median	1.85			11/7/2001	1.2		
				11/28/2001	1.2		
				12/19/2001	1.6		
				12/26/2001	1.8		
				1/9/2002	2.1		
				2/20/2002	1.6		
				3/6/2002	1.4		
				4/24/2002	1.4		
				5/8/2002	1.6		
				5/23/2002	1.3		
				6/5/2002	1.1		
				6/19/2002	1.1		
				7/10/2002	1.6		
				7/17/2002	1.1		
				8/14/2002	1.2		
				9/11/2002	1.2		
				Median	1.2		

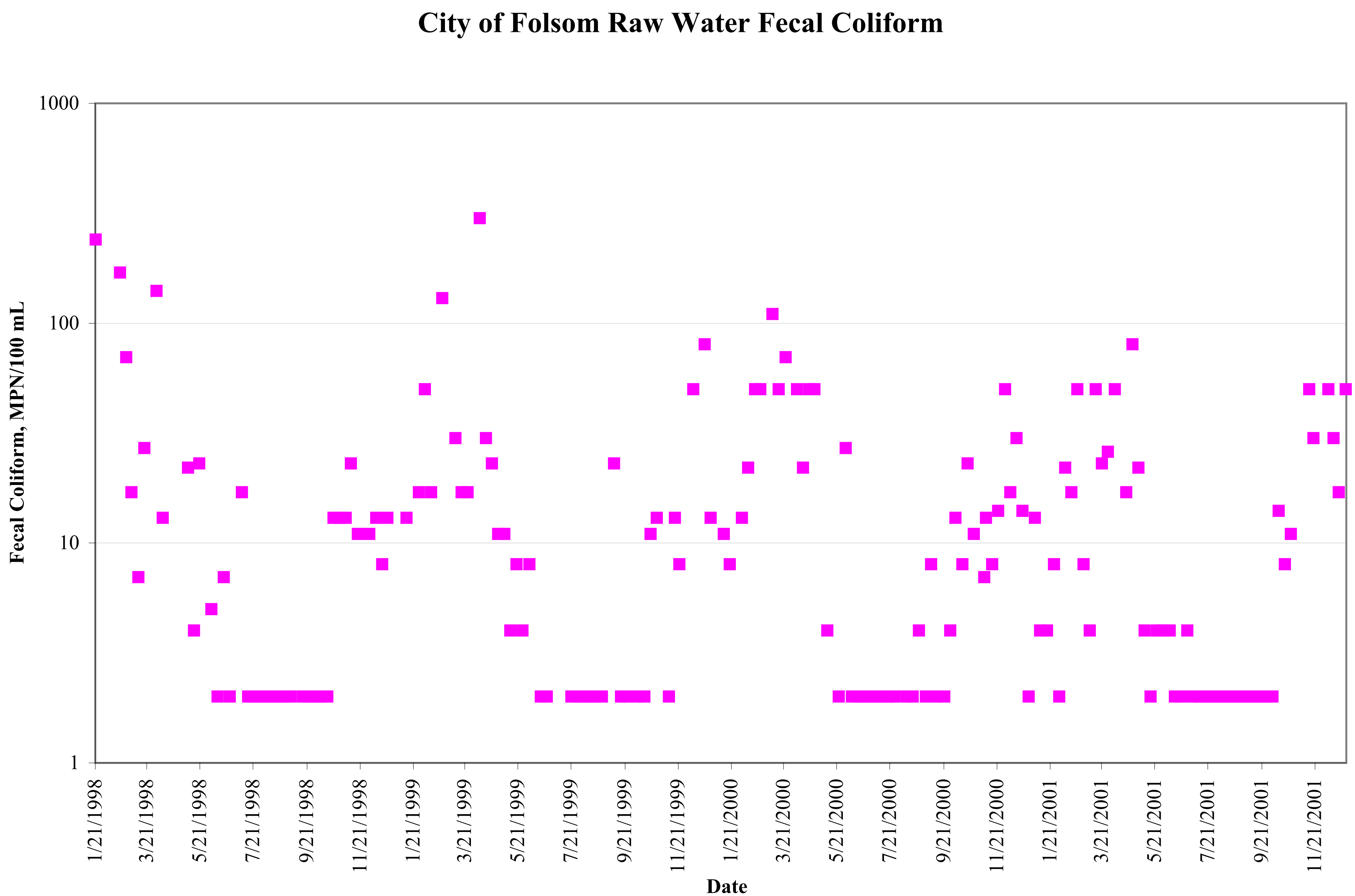
City of Folsom

System Summary, Folsom

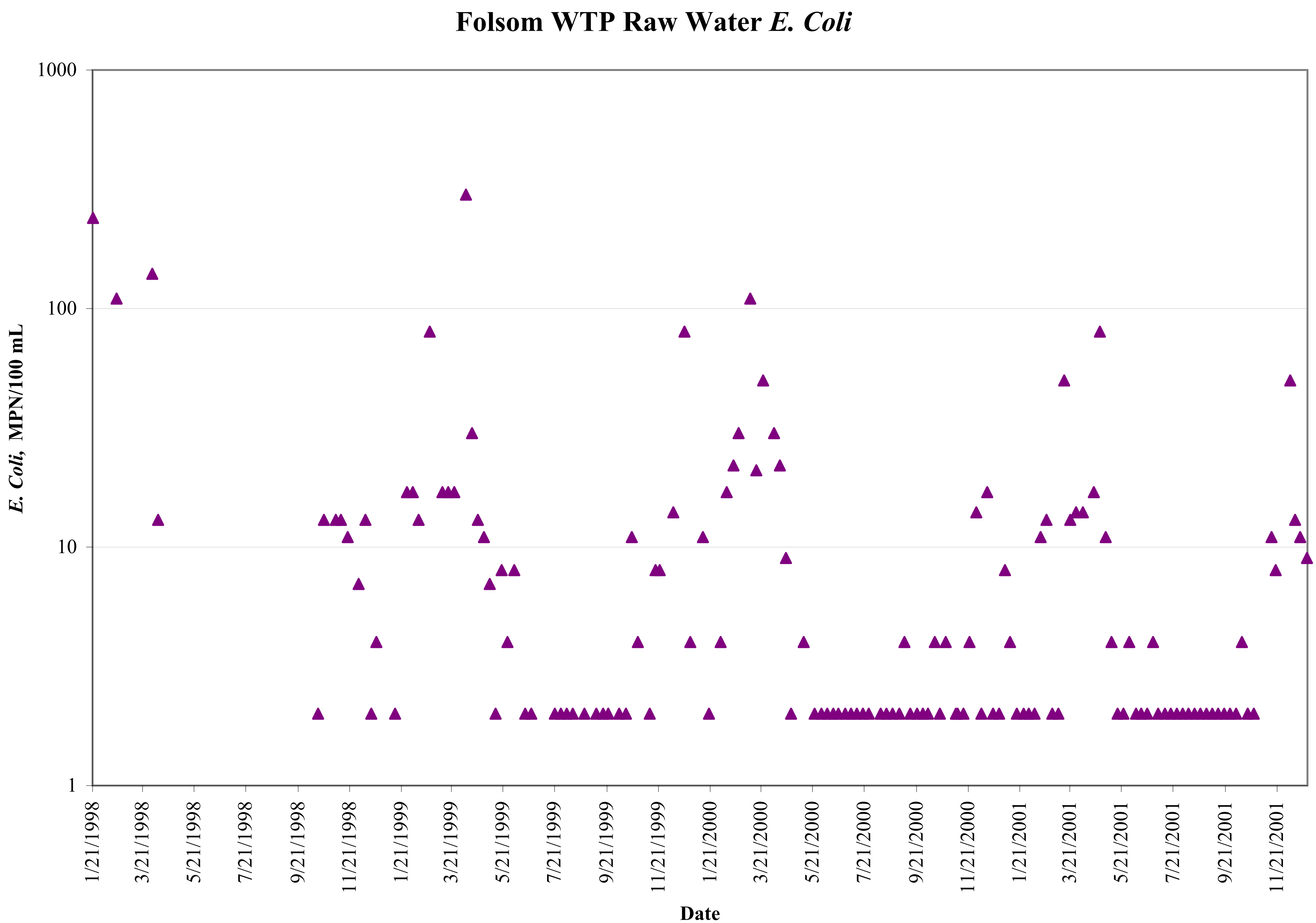
WATER SYSTEM:		
Utility Name		City of Folsom
Service Area		Folsom
Number Customers - Retail/Wholesale		Approx. 16,000 Retail accounts
PWSID No.		CA 3410014
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		27,000 AF/Yr (Water rights -Co-TenancyAgreement with ACWS), 7,000 AF/Yr PL 101-514 by sub-constract 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 - 40 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	12 MGD
	Summer (Apr-Sep)	32 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	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	None
Chemical Addition	Chemical, Purpose & Dose	Polyaluminum chloride - coagulant (2.0 mg/L) Non-ionic Polymer (if needed)
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Hydraulic
Flocculation	No. of Basins	5 (4@3 stages, 1@4 stages)
	Volume Basin	888,500 gallons
	Type of Flocculators	Mechanical - Vertical
	Mixing Energy	Varies
Sedimentation	No. of Basins	5
	Volume Basin	2.343 MG
	Surface Load Rate	1400 gpd/sf
	Method of Sludge Removal	Chain and Flight
Chemical Addition	Chemical, Purpose & Dose	Non-ionic - filter aid (0.010 mg/L)
Filtration	No. of Filters	8
	Type of Filter	Dual Media
	Underdrain Type	Leopold
	Media: Type, Depth, Area	30 inches of 1.2 mm anthracite over 8 inches of 0.5 mm sand - 600 sq.ft
	Filtration Rate	5.0 gpm/sf @ 40MGD
	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 Basin
pH Adjustment	Chemical and Dose	Lime (2.0 mg/L)
Wastewater Handling	Facility	Return Backwash Water Pond
	Sources	Conventional Filter Backwash, Filter Waste Washwater, Sedimentation Basin Sludge, Sludge Lagoon Decant
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
	Facility	Sludge Lagoon
	Sources	Temporary Filter Backwash, ABW Filter Backwash, Sedimentation Basin Sludge
	Decant Recycle Location	Return Backwash Water Pond

System Summary, Folsom

DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	29 MG
Disinfection Booster Stations	Number	1
	Range Cl2 Dosing (mg/L)	0.4 - 0.6 mg/L
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DHS	Cathy Lee
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart



Non-Detects Shown as 2 MPN/100 mL



Non-Detects Shown as 2 MPN/100 mL

Quarterly Report for Disinfection Byproduct Precursors Compliance
For Systems Required to Meet the Enhanced Coagulation or Enhanced Softening Requirements

System Name: City of Folsom - Main

System Number: 3410014

Calendar Year: 2002

Source Water Sample Location: Folsom Lake

Quarter: **4th**

Treated Water Sample Location: Folsom WTP

	Month	Sample Date[1]	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	TOC Percent Removal Achieved[2] (%)	TOC Percent Removal Required[3] (%)	Assigned Value [optional; complete box below if used]	TOC Percent Removal Ratio[4]
Current Year	January	1/16/2002	25	2.4	0.0	100.0	35.0		2.86
	February	2/13/2002	26	2.5	0.0	100.0	35.0		2.86
	March	3/13/2002	24	5.4	0.0	100.0	45.0		2.22
	April	4/17/2002	25	4.1	3.1	24.4	45.0		0.54
	May	5/21/2002	24	0.1	0.1	0.0	35.0		0.00
	June	6/12/2002	25	3.4	3.0	11.8	35.0		0.34
	July	7/17/2002	26	2.7	2.6	3.7	35.0		0.11
	August	8/14/2002	25	2.4	2.0	16.7	35.0		0.48
	September	9/18/2002	25	0.6	0.4	33.3	35.0		0.95
	October	10/17/2002	26	3.2	0.0	100.0	35.0		2.86
	November	11/13/2002	27	4.0	2.1	47.5	35.0		1.36
	December	12/18/2002	25	0.1	0.1	0.0	35.0		0.00
								Running Annual Average (RAA) of TOC Percent Removal Ratio:	1.21

In any month that one or more of the following six conditions are met, the system may assign a monthly value of 1.00 (in lieu of calculating the TOC percent removal ratio) when calculating compliance. <u>If this option is used during any month of this quarter</u>, then enter below the value of the parameter and the sample date for the condition that was met.

__________ 1. Source water TOC < 2.0 mg/L. (may refer to results entered above)
__________ 2. Treated water TOC < 2.0 mg/L. (may refer to results entered above)
__________ 3. Source water SUVA $\leq$ 2.0 L/mg-m.
__________ 4. Finished water SUVA $\leq$ 2.0 L/mg-m.
__________ 5. System practicing softening removes at least 10 mg/L of magnesium hardness (as $CaCO_3$).
__________ 6. System practicing enhanced softening lowers treated water alkalinity to < 60 mg/L (as CaCO3).

Number of paired (source water and treated water) TOC samples taken during the quarter: 6

Is the system in compliance? (i.e. RAA $\geq$ 1.00) ☑ Yes ☐ No

Signature: __________

Date: 1/13/2003

NOTES:

[1] If more than one set of samples is taken during a single month, then a separate sheet should be used for reporting the date, result, TOC percent removal achieved, TOC percent removal required, and TOC percent removal ratio of each sample set. The TOC percent removal ratios for the month should be averaged and then reported on this form to determine the running annual average.

[2] Actual monthly TOC percent removal $= \left(1 - \frac{\text{treated water TOC}}{\text{source water TOC}}\right) \times 100$

[3] The required monthly TOC percent removal is determined from the Step 1 TOC Percent Removal table (right) or from the Step 2 TOC Percent Removal method.

Step 1 Required Removal of TOC			
Source Water TOC (mg/L)	Source Water Alkalinity (mg/L as $CaCO_3$)		
	0-60	>60-120	>120
>2.0-4.0	**35.0%**	**25.0%**	**15.0%**
>4.0-8.0	**45.0%**	**35.0%**	**25.0%**
>8.0	**50.0%**	**40.0%**	**30.0%**

[4] TOC percent removal ratio $= \frac{\text{actual monthly TOC percent removal}}{\text{required monthly TOC percent removal}}$

State of California
Drinking Water Program

Department of Health Services

Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: City of Folsom - Main System No.: 3410014 Year: 2002 Quarter: 3rd

Year:	2002				2003				2004				2005				2006			
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):	3/28	5/21	7/31	11/5																
Site 1	36.0	26.0	22.0	31.9																
Site 2	33.0	38.0	24.0	36.1																
Site 3	40.0	27.0	22.0	31.1																
Site 4	35.0	28.0	20.0	27.8																
Site 5		34.0	29.9	45.0																
Site 6		26.0	21.0	35.0																
Site 7		34.0	21.0	45.0																
Site 8		39.0	38.0	59.0																
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	36.0	31.5	24.7	38.9																
Running Annual Average				32.8																
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	4	8	8	8																

Identify the sample locations in the table below.

Site	Sample Location
1	317 Leidesdorf Street
2	107 Rowberry Drive
3	12423 Folsom Boulevard
4	Folsom Water Treatment Plant
5	1909 Broadford Drive
6	138 Vierra Circle
7	1509 Freswick Drive
8	Nimbus Reservoir
9	
10	
11	
12	

Comments:

Signature

Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Health Services

Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: City of Folsom - Main System No.: 3410014 Year: 2002 Quarter: 3rd

Year:	2002				2003				2004				2005				2006			
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):	3/28	5/21	7/31	11/5																
Site 1	14.9	13.3	29.4	25.4																
Site 2	16.9	16.3	39.5	33.1																
Site 3	15.7	14.6	35.6	29.2																
Site 4	12.8	13.0	31.2	21.4																
Site 5		19.6	41.0	30.0																
Site 6		13.0	15.6	29.0																
Site 7		27.7	27.3	29.2																
Site 8		5.9	39.3	31.0																
Site 9																				
Site 10																				
Site 11																				
Site 12																				
Quarterly Average	15.1	15.4	32.4	28.5																
Running Annual Average				22.9																
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	4	8	8	8																

Identify the sample locations in the table below.

Site	Sample Location
1	317 Leidesdorf Street
2	107 Rowberry Drive
3	12423 Folsom Boulevard
4	Folsom Water Treatment Plant
5	1909 Broadford Drive
6	138 Vierra Circle
7	1509 Freswick Drive
8	Nimbus Reservoir
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

Folsom State Prison

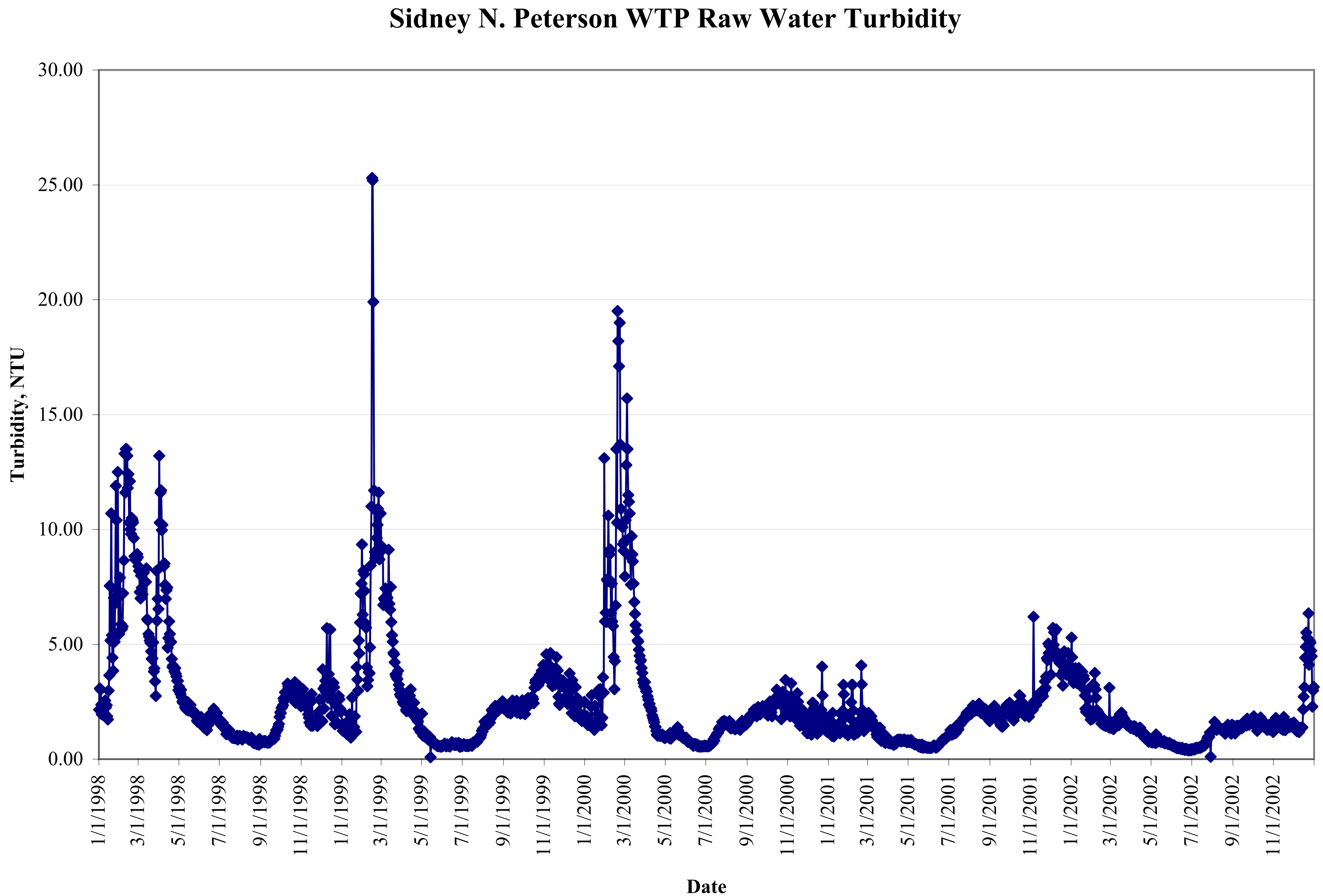
System Summary, FSP

WATER SYSTEM:		
Utility Name		Folsom State Prison
Service Area		Folsom Prison
Number Customers - Retail/Wholesale		
PWSID No.		CA3410032
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		4,000 AF/YR
INTAKE:		
Location and Description		Shared Diversion Facilities at Folsom Dam
Intake Protection Facilities		Fish Screens and Temperature Control Device
WTP:		
Name		FSP Water Treatment Plant
Type of Treatment		Package Filtration Plant
State Approved Plant Capacity (MGD)		4 MGD
Capacity Flow Range (MGD)		0 - 4 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	1.1 MGD
	Summer (Apr-Sep)	1.7 MGD
Hours of Operation		5 AM - 8 PM
Water Quality Parameters Monitored	Raw Water	Turbidity, Temperature, pH, Coliform
	Treated Water	Turbidity, Temperature, pH, Coliform
UNIT PROCESSES:		
Recycle	Amount	<10% Plant Flow
	Frequency	Intermittent
Pre-Chlorination	Chemical and Dose	Chlorine (1 mg/L)
pH Adjustment	Chemical and Dose	Lime
Pre-Sedimentation	Chemical and Dose	Coagulant
	Process	Sand Ballasted Clarification
Chemical Addition	Chemical, Purpose & Dose	Polymer, Floc Aid
Flocculation/Sedimentation	No. of Basins	2
	Volume Basin	Upflow Clarifier
	Method of Sludge Removal	
Chemical Addition	Chemical, Purpose & Dose	Polymer, Filter Aid
Filtration	No. of Filters	2
	Type of Filter	Trimedia - Sand, Anthracite, Garnet
	Filter Box Volume	480 CF
	Underdrain Type	
	Media: Type, Depth, Area	Sand, Anthracite, Garnet (4'), 480 sf
	Filtration Rate	
	Backwash: Criteria,Rate	Time or Headloss
	Filter -to-Waste Facilities	Yes
Post-Chlorination	Chemical and Dose	Chlorine (1 mg/L)
pH Adjustment	Chemical and Dose	Lime
Wastewater Handling	Facility	Reclamations Basins
	Sources	Filter Backwash, Filter-to-Waste Water, Clarifier Blowoff
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	2 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DHS	Brian Kinney
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

San Juan Water District

System Summary, SJWD

WATER SYSTEM:		
Utility Name		San Juan Water District
Service Area		Citrus Heights, Fair Oaks, Folsom, Granite Bay, Orangevale
Number Customers - Retail/Wholesale		21,000 - Retail / 125,426 - Wholesale
PWSID No.		CA 3410021
SOURCE:		
Name		Folsom Reservoir
Entitlement and Amount		73,000 AF/YR (Water Rights and Contracts - USBR, SSWD 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)	42 MGD
	Summer (Apr-Sep)	89 MGD
Hours of Operation		24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	Title 22
UNIT PROCESSES:		
Pre-Chlorination	Chemical and Dose	Chlorine Gas (1.2 mg/L)
Chemical Addition	Chemical, Purpose & Dose	Alum-Coagulant (10 mg/L), Polymer-Coagulant (0.1 mg/L)
Rapid Mix	Volume Basin	56,818 gallons
	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	1.435 MG
	Type of Flocculators	Mechanical - Horizontal
	Mixing Energy	75,55,20 (1/s)
Sedimentation	No. of Basins	2
	Volume Basin	3.555 MG
	Method of Sludge Removal	Vacuum
Chemical Addition	Chemical, Purpose & Dose	Polymer-Filter Aid (0.1 mg/L)
Filtration	No. of Filters	32
	Type of Filter	Gravity Dual Media
	Filter Box Volume	1.5 MG
	Underdrain Type	Plate with Screened Inserts
	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 (8.75 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	DHS	Brian Kinney
	Other WTP's	See American River Watershed Technical CommitteeNotification Chart
	City/County/ State/Federal	See American River Watershed Technical CommitteeNotification Chart


Sidney N. Peterson WTP Raw Water Turbidity
Turbidity, NTU
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1/1/1998
3/1/1998
5/1/1998
7/1/1998
9/1/1998
11/1/1998
1/1/1999
3/1/1999
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7/1/1999
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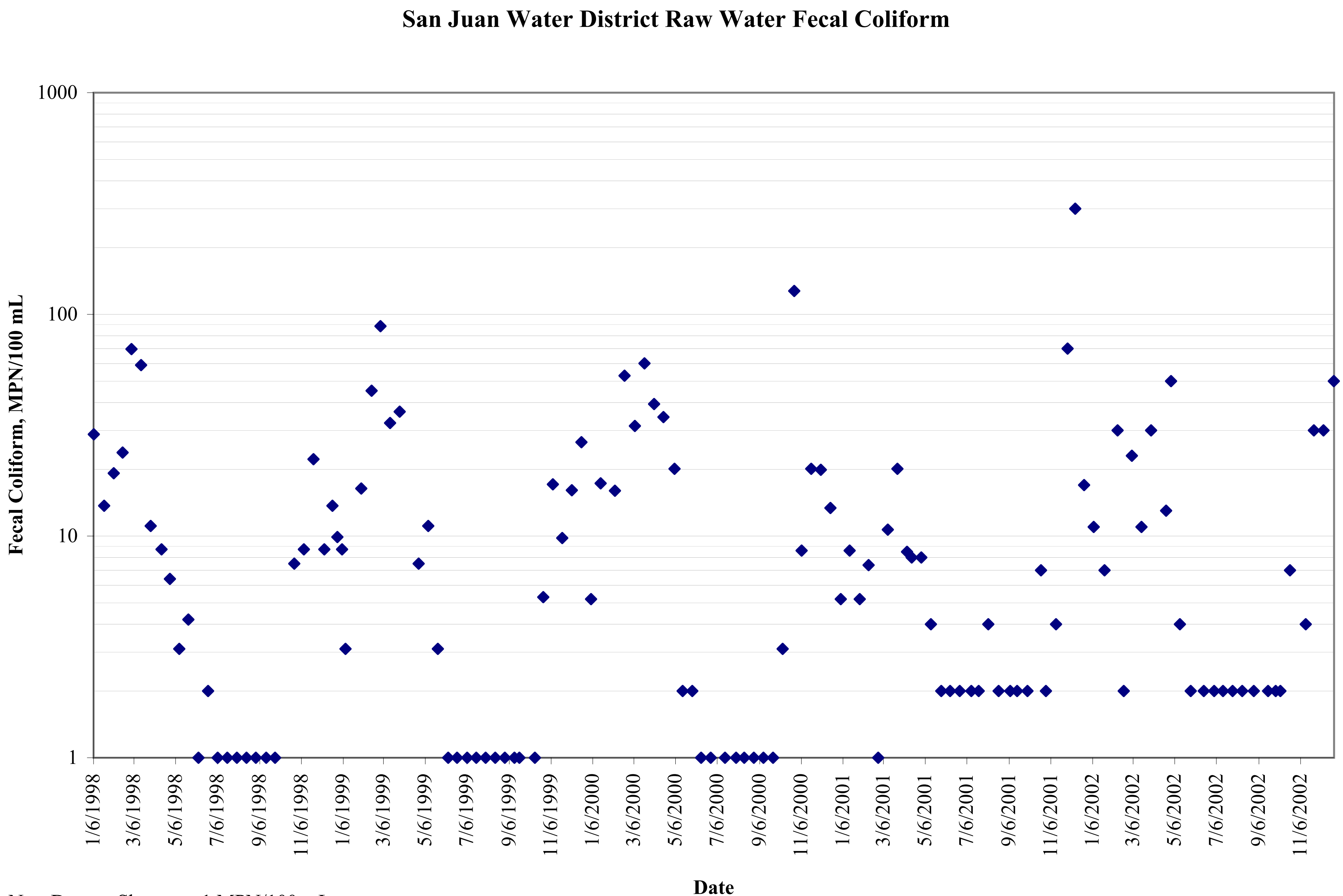


Non-Detects Shown as 1 MPN/100 mL

SJWD - Raw and Treated Water TOC and Alkalinity

GENERAL MINERALS - Misc	Sample Site	Units	12/5/2002	11/13/2002	10/11/2002	9/6/2002	8/9/2002	7/8/2002	6/5/2002	5/3/2002	4/8/2002	3/4/2002	2/6/2002	1/8/2002
Alkalinity	Raw Water	mg/L	22	20	16	21	24	28	28	30	29	28	20	33

TOC	Sample Site	Units	12/5/2002	11/13/2002	10/11/2002	9/6/2002	8/9/2002	7/8/2002	6/5/2002	5/3/2002	4/8/2002	3/4/2002	2/6/2002	1/8/2002
Total Organic Carbon	Raw Water	mg/L	1.5	1.2	1.4	1.5	1.4	1.2	1.3	0.9	1.3	1.5	1.6	1.3
Total Organic Carbon	Treated	mg/L	0.9	1.0	0.9	0.9	1.0	0.9	1.3	1.3	0.9	1.1	1.0	1.3

TOC	Sample Site	Units	11/30/1999	5/5/1999	2/22/1999	12/9/1998	11/2/1998	8/3/1998	5/4/1998	2/2/1998
Total Organic Carbon	Raw Water	mg/L	1.2	1.1	2.9	5.6	1.05	1.1	1.1	1.4

TTHM's - Quarterly

Sample Date	9960 Snowberry Way	8740 Petite Creek Way	8025 Ramsgate Dr	8221 East Hidden Lakes Dr	Average	Running Annual Average **RAA**
	mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
7/28/1999	0.029	0.031	0.025	0.024	0.027	****
8/25/1999	0.027	0.031	0.023	0.025	0.026	****
10/19/1999	0.024	0.024	0.019	0.019	0.021	****
11/30/1999	0.018	0.031	0.026	0.025	0.025	0.025
2/2/2000	0.031	0.030	0.030	0.032	0.031	0.026
4/13/2000	0.028	0.027	0.023	0.024	0.025	0.026
7/10/2000	0.020	0.024	0.019	0.023	0.021	0.026
10/3/2000	0.032	0.031	0.029	0.031	0.031	0.027
2/20/2001	0.022	0.031	0.028	0.030	0.028	0.026
6/11/2001	0.020	0.022	0.024	0.020	0.021	0.025
7/28/2001	0.026	0.027	0.027	0.027	0.027	0.027
10/25/2001	0.030	0.031	0.032	0.029	0.031	0.027
1/8/2002	0.033	0.037	0.040	0.034	0.036	0.029
4/8/2002	0.030	0.031	0.033	0.024	0.029	0.031
7/8/2002	0.027	0.028	0.029	0.029	0.028	0.031
10/11/2002	0.033	0.035	0.035	0.034	0.034	**0.032**
Average	**0.027**	**0.029**	**0.028**	**0.027**	**0.028**	**0.027**

HAA5's - Quarterly

Sample Date	9960 Snowberry Way	8740 Petite Creek Way	8025 Ramsgate Dr	8221 East Hidden Lakes Dr	Average	Running Annual Average **RAA**
	mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
7/28/1999	0.016	0.016	0.016	0.015	0.016	****
8/25/1999	0.014	0.014	0.012	0.012	0.013	****
10/19/1999	0.015	0.015	0.015	0.016	0.015	****
11/30/1999	0.016	0.013	0.014	0.015	0.015	0.015
2/2/2000	0.021	0.016	0.018	0.020	0.019	0.015
4/13/2000	0.021	0.025	0.021	0.021	0.022	0.018
7/10/2000	0.019	0.020	0.018	0.020	0.019	0.019
10/3/2000	0.016	0.015	0.015	0.014	0.015	0.019
2/20/2001	0.017	0.018	0.013	0.013	0.015	0.018
6/11/2001	0.013	0.014	0.014	ND	0.014	0.016
7/28/2001	0.016	0.016	0.015	0.015	0.015	0.015
10/25/2001	0.013	0.012	0.011	0.012	0.012	0.014
1/8/2002	0.020	0.018	0.018	0.016	0.018	0.015
4/8/2002	0.022	0.021	0.018	0.017	0.020	0.016
7/8/2002	0.018	0.016	0.015	0.015	0.016	0.016
10/11/2002	0.014	0.013	0.013	0.013	0.013	**0.017**
Average	**0.017**	**0.016**	**0.015**	**0.016**	**0.016**	**0.016**

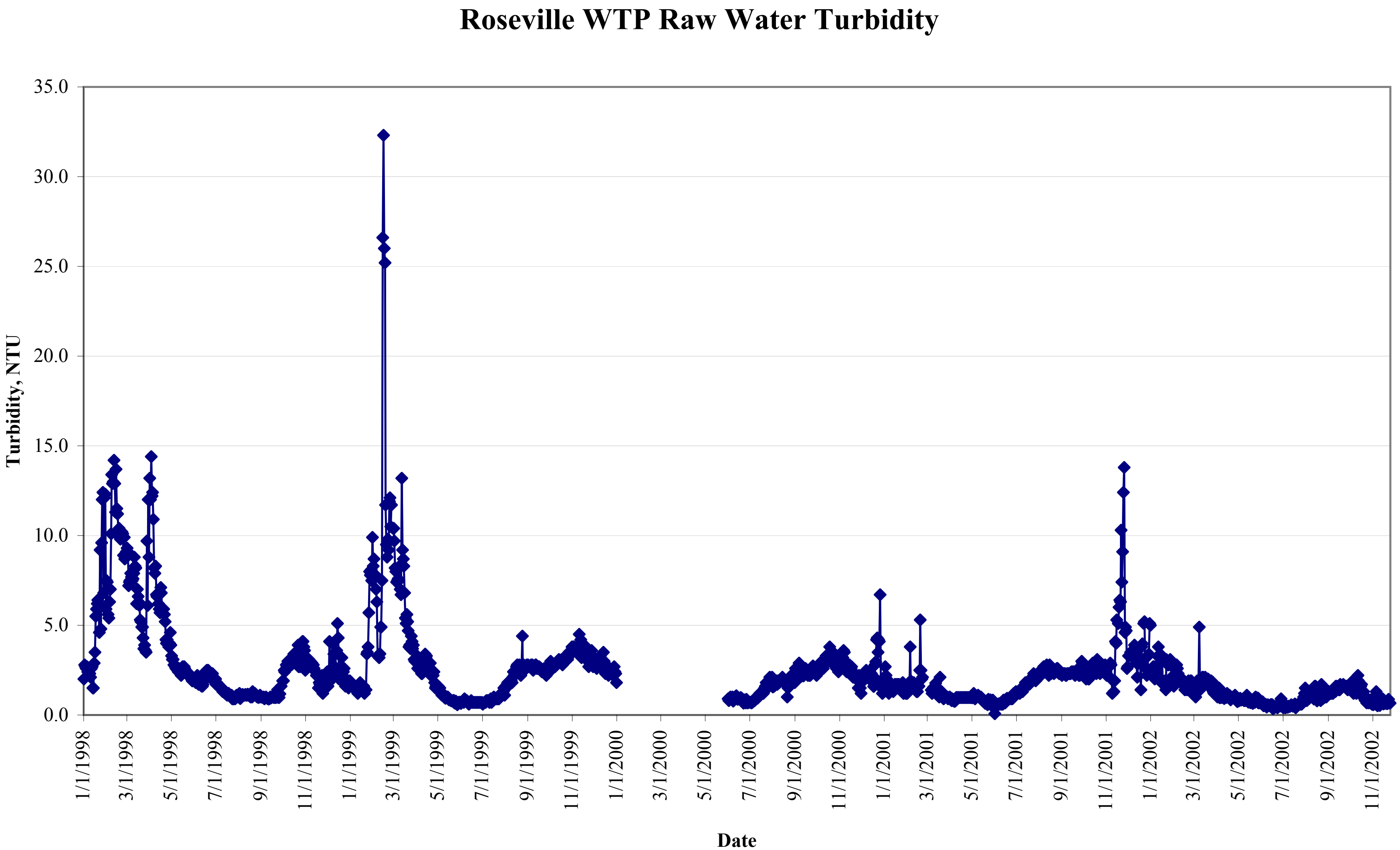
City of Roseville

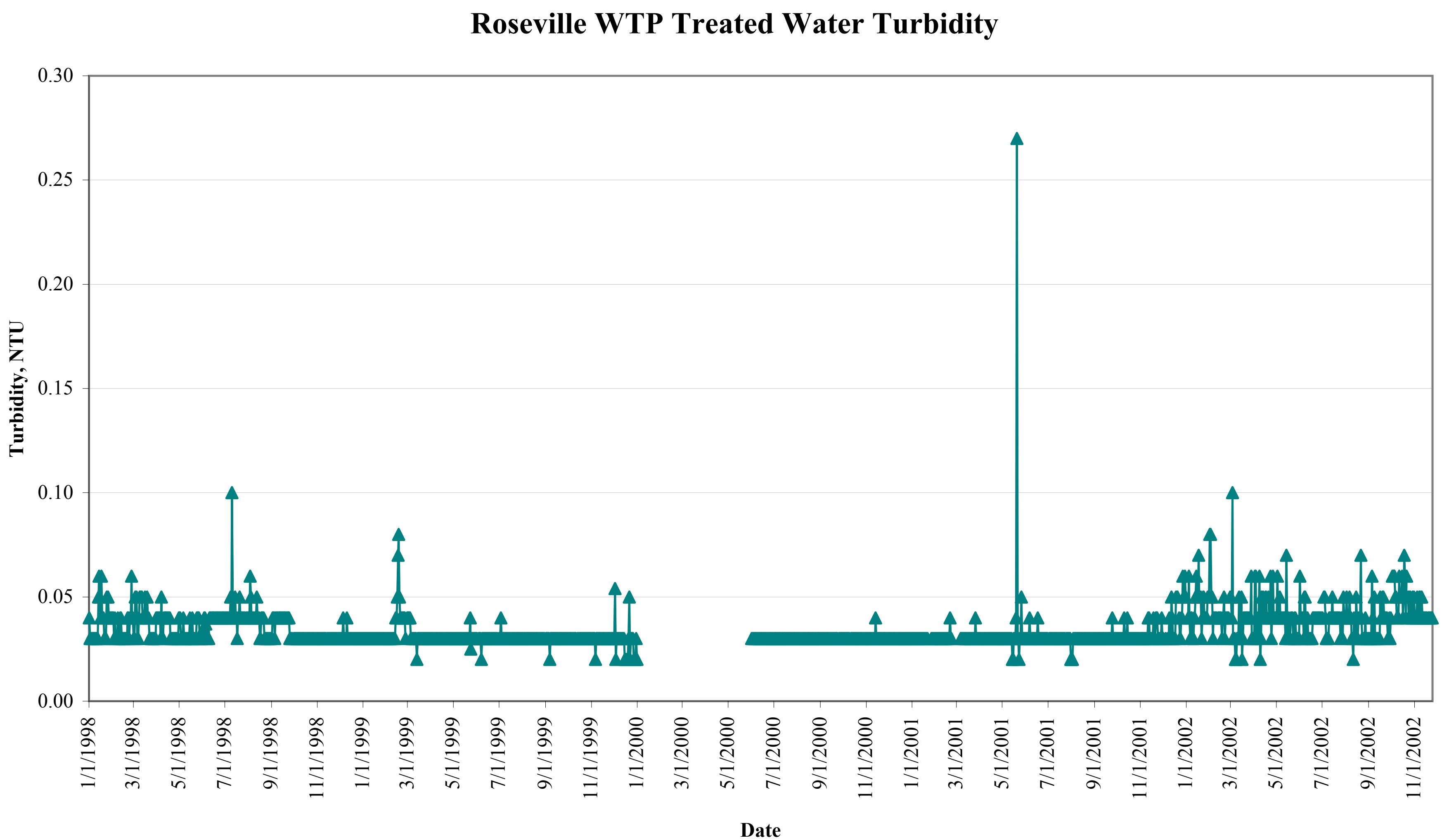
System Summary, Roseville

WATER SYSTEM:		
Utility Name		City of Roseville
Service Area		Roseville
Number Customers - Retail/Wholesale		30,000/0
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)		60 MGD
Operating Flow Range (MGD)		13 - 50 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	Title 22
	Treated Water	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, 1 - 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	8
	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	Sludge Lagoons

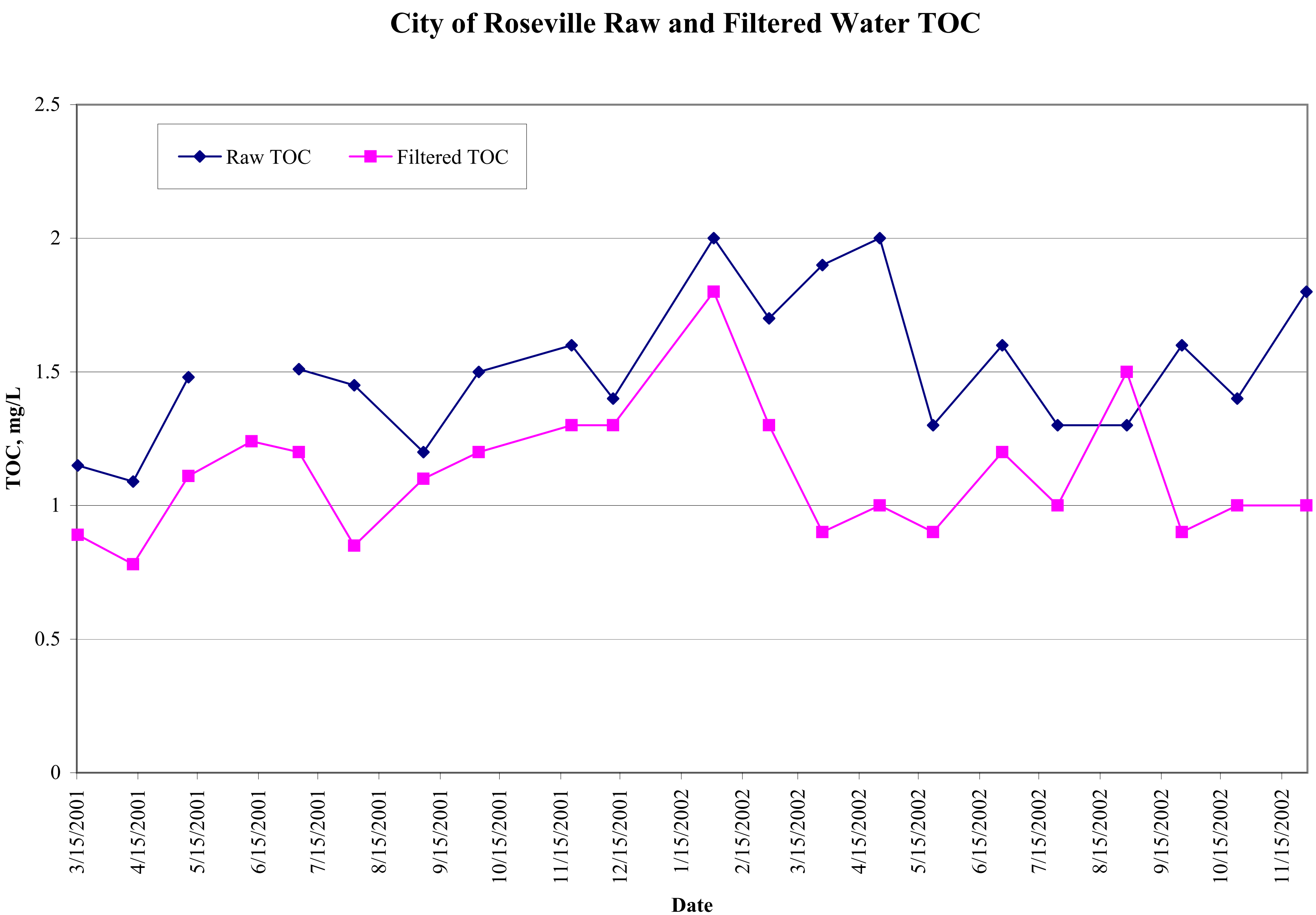
System Summary, Roseville

	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	DHS	Mike McNamara
	Other WTP's	See American River Watershed Technical CommitteeNotification Chart
	City/County/ State/Federal	See American River Watershed Technical CommitteeNotification Chart


Roseville WTP Raw Water Turbidity
Turbidity, NTU
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1/1/1998
3/1/1998
5/1/1998
7/1/1998
9/1/1998
11/1/1998
1/1/1999
3/1/1999
5/1/1999
7/1/1999
9/1/1999
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
Date



Roseville WTP Treated Water Turbidity
Turbidity, NTU
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1/1/1998
3/1/1998
5/1/1998
7/1/1998
9/1/1998
11/1/1998
1/1/1999
3/1/1999
5/1/1999
7/1/1999
9/1/1999
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
Date


City of Roseville Raw and Filtered Water TOC
Raw TOC
Filtered TOC
TOC, mg/L
2.5
2
1.5
1
0.5
0
3/15/2001
4/15/2001
5/15/2001
6/15/2001
7/15/2001
8/15/2001
9/15/2001
10/15/2001
11/15/2001
12/15/2001
1/15/2002
2/15/2002
3/15/2002
4/15/2002
5/15/2002
6/15/2002
7/15/2002
8/15/2002
9/15/2002
10/15/2002
11/15/2002
Date

City of Roseville HAA5

Sample Date	Location	HAA5 (mg/L)	Quarterly Average	RAA
02/09/00	Bel-Air R Water Station	0.025		
02/09/00	Diamond Oaks	0.030		
02/09/00	Johnson Ranch Racquet Club	0.037		
02/09/00	Press Tribune	0.037	0.032	
04/19/00	Bel-Air R Water Station	0.017		
04/19/00	Diamond Oaks	0.023		
04/19/00	Johnson Ranch Racquet Club	0.021		
04/19/00	Press Tribune	0.022	0.021	
06/12/00	Bel-Air R Water Station	0.019		
06/12/00	Diamond Oaks	0.016		
06/12/00	Johnson Ranch Racquet Club	0.020		
06/12/00	Press Tribune	0.019	0.018	
07/12/00	Bel-Air R Water Station	0.022		
07/12/00	Diamond Oaks	0.015		
07/12/00	Johnson Ranch Racquet Club	0.021		
07/12/00	Press Tribune	0.018	0.019	0.023
08/09/00	Bel-Air R Water Station	0.017		
08/09/00	Diamond Oaks	0.015		
08/09/00	Johnson Ranch Racquet Club	0.018		
08/09/00	Press Tribune	0.018	0.017	0.019
11/02/00	Bel-Air R Water Station	0.014		
11/02/00	Diamond Oaks	0.011		
11/03/00	Johnson Ranch Racquet Club	0.016		
11/03/00	Press Tribune	0.013	0.013	0.017
02/14/01	Bel-Air Sunrise	0.015		
02/14/01	Diamond Oaks	0.017		
02/14/01	Johnson Ranch Racquet Club	0.018		
02/14/01	Press Tribune	0.019	0.017	0.017
05/09/01	Diamond Oaks	0.013		
05/10/01	Bel-Air Sunrise	0.014		
05/10/01	Johnson Ranch Racquet Club	0.013		
05/10/01	Press Tribune	0.012	0.013	0.015
08/01/01	Bel-Air Sunrise	0.014		
08/01/01	Diamond Oaks	0.013		
08/02/01	Johnson Ranch Racquet Club	0.016		
08/02/01	Press Tribune	0.015	0.014	0.015
10/17/01	Bel-Air Sunrise	0.015		
10/17/01	Diamond Oaks	0.012		
10/17/01	Johnson Ranch Racquet Club	0.016		
10/17/01	Press Tribune	0.014	0.015	0.015

01/16/02	Bel-Air Sunrise	0.019		
01/16/02	Diamond Oaks	0.018		
01/16/02	Johnson Ranch Racquet Club	0.022		
01/16/02	Press Tribune	0.020	0.020	0.015
05/08/02	Bel-Air Sunrise	0.016		
05/08/02	Diamond Oaks	0.015		
05/08/02	Johnson Ranch Racquet Club	0.016		
05/08/02	Press Tribune	0.016	0.016	0.016
07/25/02	Johnson Ranch Racquet Club	0.014		
07/25/02	Press Tribune	0.016		
07/25/02	School House Ln	0.017		
07/25/02	Washington Square	0.016	0.015	0.016

City of Roseville HAA5

Sample Date	Location	HAA5 (mg/L)	RAA
02/09/00	Bel-Air R Water Station	0.025	
04/19/00	Bel-Air R Water Station	0.017	
06/12/00	Bel-Air R Water Station	0.019	
07/12/00	Bel-Air R Water Station	0.022	0.021
08/09/00	Bel-Air R Water Station	0.017	0.019
11/02/00	Bel-Air R Water Station	0.014	0.018
02/14/01	Bel-Air Sunrise	0.015	0.017
05/10/01	Bel-Air Sunrise	0.014	0.015
08/01/01	Bel-Air Sunrise	0.014	0.014
10/17/01	Bel-Air Sunrise	0.015	0.015
01/16/02	Bel-Air Sunrise	0.019	0.016
05/08/02	Bel-Air Sunrise	0.016	0.016
02/09/00	Diamond Oaks	0.030	
04/19/00	Diamond Oaks	0.023	
06/12/00	Diamond Oaks	0.016	
07/12/00	Diamond Oaks	0.015	0.021
08/09/00	Diamond Oaks	0.015	0.017
11/02/00	Diamond Oaks	0.011	0.014
02/14/01	Diamond Oaks	0.017	0.014
05/09/01	Diamond Oaks	0.013	0.014
08/01/01	Diamond Oaks	0.013	0.013
10/17/01	Diamond Oaks	0.012	0.014
01/16/02	Diamond Oaks	0.018	0.014
05/08/02	Diamond Oaks	0.015	0.014
02/09/00	Johnson Ranch Racquet	0.037	
04/19/00	Johnson Ranch Racquet	0.021	
06/12/00	Johnson Ranch Racquet	0.020	
07/12/00	Johnson Ranch Racquet	0.021	0.025
08/09/00	Johnson Ranch Racquet	0.018	0.020
11/03/00	Johnson Ranch Racquet	0.016	0.019
02/14/01	Johnson Ranch Racquet	0.018	0.018
05/10/01	Johnson Ranch Racquet	0.013	0.016
08/02/01	Johnson Ranch Racquet	0.016	0.016
10/17/01	Johnson Ranch Racquet	0.016	0.016
01/16/02	Johnson Ranch Racquet	0.022	0.017
05/08/02	Johnson Ranch Racquet	0.016	0.018
07/25/02	Johnson Ranch Racquet	0.014	0.017
02/09/00	Press Tribune	0.037	
04/19/00	Press Tribune	0.022	
06/12/00	Press Tribune	0.019	
07/12/00	Press Tribune	0.018	0.024

08/09/00	Press Tribune	0.018	0.019
11/03/00	Press Tribune	0.013	0.017
02/14/01	Press Tribune	0.019	0.017
05/10/01	Press Tribune	0.012	0.016
08/02/01	Press Tribune	0.015	0.015
10/17/01	Press Tribune	0.014	0.015
01/16/02	Press Tribune	0.020	0.015
05/08/02	Press Tribune	0.016	0.016
07/25/02	Press Tribune	0.016	0.016

07/25/02	School House Ln	0.017
07/25/02	Washington Square	0.016

City of Roseville TTHM

Sample Date	Location	TTHM (mg/L)	Quarterly Average	RAA
03/02/98		0.036	0.036	
07/13/98		0.036	0.036	
09/21/98		0.037	0.037	
12/28/98		0.037	0.037	0.036
03/26/99	Bel-Air Water Station	0.045		
03/26/99	Diamond Oaks	0.038		
03/26/99	Johnson Ranch Racquet Club	0.035		
03/26/99	Press Tribune	0.045	0.041	0.038
05/06/99	Bel-Air Water Station	0.041		
05/06/99	Diamond Oaks	0.038		
05/06/99	Johnson Ranch Racquet Club	0.029		
05/06/99	Press Tribune	0.034	0.035	0.038
08/18/99	Bel-Air Water Station	0.030		
08/18/99	Diamond Oaks	0.021		
08/18/99	Johnson Ranch Racquet Club	0.021		
08/18/99	Press Tribune	0.030	0.026	0.035
10/27/99	Bel-Air Water Station	0.041		
10/27/99	Diamond Oaks	0.036		
10/27/99	Johnson Ranch Racquet Club	0.035		
10/27/99	Press Tribune	0.039	0.038	0.035
02/09/00	Bel-Air Water Station	0.053		
02/09/00	Diamond Oaks	0.045		
02/09/00	Johnson Ranch Racquet Club	0.042		
02/09/00	Press Tribune	0.045	0.046	0.036
04/19/00	Bel-Air Water Station	0.038		
04/19/00	Diamond Oaks	0.038		
04/19/00	Johnson Ranch Racquet Club	0.031		
04/19/00	Press Tribune	0.037	0.036	0.036
06/12/00	Bel-Air Water Station	0.031		
06/12/00	Diamond Oaks	0.036		
06/12/00	Johnson Ranch Racquet Club	0.027		
06/12/00	Press Tribune	0.027	0.030	0.037
07/12/00	Bel-Air Water Station	0.032		
07/12/00	Diamond Oaks	0.033		
07/12/00	Johnson Ranch Racquet Club	0.025		
07/12/00	Press Tribune	0.024	0.028	0.035
08/09/00	Bel-Air Water Station	0.035		

08/09/00	Diamond Oaks	0.040		
08/09/00	Johnson Ranch Racquet Club	0.032		
08/09/00	Press Tribune	0.030	0.034	0.032
11/02/00	Bel-Air Water Station	0.037		
11/02/00	Diamond Oaks	0.041		
11/03/00	Johnson Ranch Racquet Club	0.027		
11/03/00	Press Tribune	0.025	0.032	0.031
02/14/01	Bel-Air Sunrise	0.032		
02/14/01	Diamond Oaks	0.025		
02/14/01	Johnson Ranch Racquet Club	0.029		
02/14/01	Press Tribune	0.028	0.028	0.031
05/09/01	Diamond Oaks	0.032		
05/10/01	Bel-Air Sunrise	0.025		
05/10/01	Johnson Ranch Racquet Club	0.019	0.025	0.030
08/01/01	Bel-Air Sunrise	0.024		
08/01/01	Diamond Oaks	0.025		
08/02/01	Johnson Ranch Racquet Club	0.020		
08/02/01	Press Tribune	0.020	0.023	0.027
10/17/01	Bel-Air Sunrise	0.038		
10/17/01	Diamond Oaks	0.037		
10/17/01	Johnson Ranch Racquet Club	0.027		
10/17/01	Press Tribune	0.032	0.034	0.027
01/16/02	Bel-Air Sunrise	0.033		
01/16/02	Diamond Oaks	0.035		
01/16/02	Johnson Ranch Racquet Club	0.031		
01/16/02	Press Tribune	0.028	0.032	0.028
05/08/02	Bel-Air Sunrise	0.023		
05/08/02	Diamond Oaks	0.025		
05/08/02	Johnson Ranch Racquet Club	0.022		
05/08/02	Press Tribune	0.023	0.023	0.028
07/25/02	Johnson Ranch Racquet Club	0.017		
07/25/02	Press Tribune	0.018		
07/25/02	School House Ln	0.021		
07/25/02	Washington Square	0.017	0.018	0.027

City of Roseville TTHM

Sample Date	Location	TTHM (mg/L)	RAA
03/26/99	Bel-Air R Water Station	0.045	
05/06/99	Bel-Air R Water Station	0.041	
08/18/99	Bel-Air R Water Station	0.030	
10/27/99	Bel-Air R Water Station	0.041	0.039
02/09/00	Bel-Air R Water Station	0.053	0.041
04/19/00	Bel-Air R Water Station	0.038	0.041
06/12/00	Bel-Air R Water Station	0.031	0.041
07/12/00	Bel-Air R Water Station	0.032	0.038
08/09/00	Bel-Air R Water Station	0.035	0.034
11/02/00	Bel-Air R Water Station	0.037	0.034
02/14/01	Bel-Air Sunrise	0.032	0.034
05/10/01	Bel-Air Sunrise	0.025	0.032
08/01/01	Bel-Air Sunrise	0.024	0.029
10/17/01	Bel-Air Sunrise	0.038	0.030
01/16/02	Bel-Air Sunrise	0.033	0.030
05/08/02	Bel-Air Sunrise	0.023	0.029
03/26/99	Diamond Oaks	0.038	
05/06/99	Diamond Oaks	0.038	
08/18/99	Diamond Oaks	0.021	
10/27/99	Diamond Oaks	0.036	0.033
02/09/00	Diamond Oaks	0.045	0.035
04/19/00	Diamond Oaks	0.038	0.035
06/12/00	Diamond Oaks	0.036	0.039
07/12/00	Diamond Oaks	0.033	0.038
08/09/00	Diamond Oaks	0.040	0.037
11/02/00	Diamond Oaks	0.041	0.037
02/14/01	Diamond Oaks	0.025	0.035
05/09/01	Diamond Oaks	0.032	0.034
08/01/01	Diamond Oaks	0.025	0.031
10/17/01	Diamond Oaks	0.037	0.030
01/16/02	Diamond Oaks	0.035	0.032
05/08/02	Diamond Oaks	0.025	0.031
03/26/99	Johnson Ranch Racquet Club	0.035	
05/06/99	Johnson Ranch Racquet Club	0.029	
08/18/99	Johnson Ranch Racquet Club	0.021	
10/27/99	Johnson Ranch Racquet Club	0.035	0.030
02/09/00	Johnson Ranch Racquet Club	0.042	0.032
04/19/00	Johnson Ranch Racquet Club	0.031	0.032
06/12/00	Johnson Ranch Racquet Club	0.027	0.034
07/12/00	Johnson Ranch Racquet Club	0.025	0.031
08/09/00	Johnson Ranch Racquet Club	0.032	0.028
11/03/00	Johnson Ranch Racquet Club	0.027	0.027
02/14/01	Johnson Ranch Racquet Club	0.029	0.028
05/10/01	Johnson Ranch Racquet Club	0.019	0.026
08/02/01	Johnson Ranch Racquet Club	0.020	0.024

10/17/01	Johnson Ranch Racquet Club	0.027	0.024
01/16/02	Johnson Ranch Racquet Club	0.031	0.024
05/08/02	Johnson Ranch Racquet Club	0.022	0.025
07/25/02	Johnson Ranch Racquet Club	0.017	0.024
03/26/99	Press Tribune	0.045	
05/06/99	Press Tribune	0.034	
08/18/99	Press Tribune	0.030	
10/27/99	Press Tribune	0.039	0.037
02/09/00	Press Tribune	0.045	0.037
04/19/00	Press Tribune	0.037	0.038
06/12/00	Press Tribune	0.027	0.037
07/12/00	Press Tribune	0.024	0.033
08/09/00	Press Tribune	0.030	0.029
11/03/00	Press Tribune	0.025	0.026
02/14/01	Press Tribune	0.028	0.027
08/02/01	Press Tribune	0.020	0.026
10/17/01	Press Tribune	0.032	0.026
01/16/02	Press Tribune	0.028	0.027
05/08/02	Press Tribune	0.023	0.026
07/25/02	Press Tribune	0.018	0.026
07/25/02	School House Ln	0.021	
07/25/02	Washington Square	0.017	
03/02/98		0.036	
07/13/98		0.036	
09/21/98		0.037	
12/28/98		0.037	

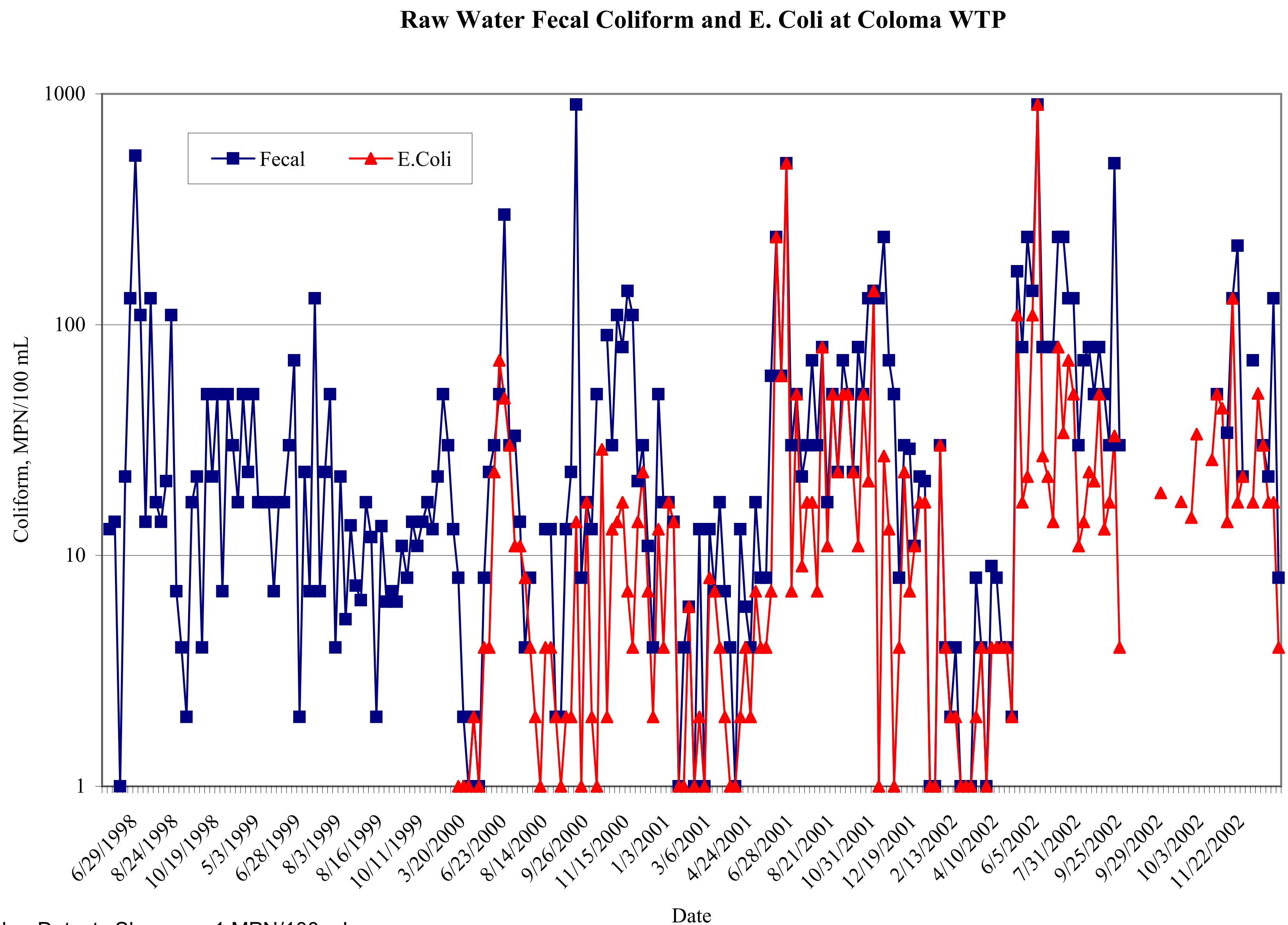
Arden Cordova Water Service

System Summary, ACWS

WATER SYSTEM:		
Utility Name		Arden Cordova Water Service
Service Area		Rancho Cordova
Number Customers - Retail/Wholesale		12,544 (total connects as of 12/31/2003 less irrigation)
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, SCWC has a short term lease of surface water rights from SMUD.
INTAKE:		
Location and Description		Intake Facilities on Folsom South Canal
Intake Protection Facilities		Fish Screens
WTP:		
Name		Coloma WTP
Type of Treatment		Direct WTP (per DHS)
State Approved Plant Capacity (MGD)		11 MGD
Capacity Flow Range (MGD)		0 - 11
Average Daily Flow (MGD)	Winter (Oct-Mar)	3.7 MGD
	Summer (Apr-Sep)	7 MGD
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	Title 22
UNIT PROCESSES:		
Pre-Oxidation	Chemical and Dose	Potassium Permangenate, 0.3 mg/L
Recycle	Amount	250 gpm
	Frequency	8 hours/day
Basin 1		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer-Coagulant (3-4 mg/L)
	Chemical, Purpose & Dose	Nonionic Polymer - Coagulant Aid (0.2 - 0.8 mg/l)
Rapid Mix	Volume Basin	N/A
	Type of Mixing	Static Mixer
Flocculation	No. of Basins	1
	Volume Basin	15,260
	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		
Chemical Addition	Chemical, Purpose & Dose	Cationic Polymer-Coagulant (3-4 mg/L)
	Chemical, Purpose & Dose	Nonionic Polymer - Coagulant Aid (0.2 - 0.8 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
Chemical Addition	Chemical, Purpose & Dose	Nonionic Polymer-Filter Aid (0.5 - 2 mg/L)
Filtration	No. of Filters	10
	Type of Filter	Tri Media Pressure Filters Constant Rate Control
	Underdrain Type	Johnson Screen
	Media: Type, Depth, Area	Anthracite(18"),Sand,Garnet(12"),Total Area = 2560 sf
	Filtration Rate	3 gpm/sf
	Backwash: Criteria,Rate	Turbidity >0.1 or headloss backup; 15 gpm/sf
	Filter -to-Waste	Yes - 10 minutes

System Summary, ACWS

Post-Chlorination	Chemical and Dose	Chlorine Gas (1-3 mg/L)
Wastewater Handling	Facility	Upflow Clarifier/Holding Pond
	Sources	Filter Backwash, Filter Waste Washwater
	Decant Recycle Location	To Headworks Upstream of Chemical Feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	9 MG
EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DHS	Brian Kinney
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart



Non-Detects Shown as 1 MPN/100 mL

SOUTHERN CALIFORNIA WATER COMPANY

Enhanced Coagulation and Total Organic Carbon Monitoring Data

RANCHO CORDOVA WATER SYSTEM

SYSTEM No. 3410015

FOR INTERNAL USE ONLY

LOCATION	CONSTITUENT	2001 RESULTS Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
COLOMA SWTP RAW	ALK (mg/l as $CaCO_3$)												
COLOMA SWTP RAW	TOC (mg/l)	3.9	2.8	3.0	2.1		2.7	3.4	2.3	2.7	4.0	2.3	3.6
COLOMA SWTP FILTERED	TOC (mg/l)						2.1	2.9	<2.0	<2.0	<2.0	3.4	
PERCENT TOC REMOVED (Actual)													
PERCENT TOC REMOVED (Required)[1]													
TOC COMPLIANCE RATIO (Act/Req)													
YEARLY RUNNING AVERAGE (of TOC Compliance Ratio)													

LOCATION	CONSTITUENT	2002 RESULTS Jan. 9	Feb. 28	**Mar. 28**	Apr.	May 15	**June 12**	July 11	Aug.	**Sept. 24**	Oct. 29	Nov. 26	**Dec. 10**
COLOMA SWTP RAW	ALK (mg/l as $CaCO_3$)	32	33	29	NA	27	25	26		23	24	26	96
COLOMA SWTP RAW	TOC (mg/l)	4.5	3.1	NA	NA	<2.0	7.8	<0.7		0.70	3.0	2.0	3.8
COLOMA SWTP FILTERED	TOC (mg/l)	NA	NA	NA	NA	<2.0	4.7	<0.7		0.30	<0.7	<2.0	3.6
PERCENT TOC REMOVED (Actual)		NA	NA	NA	NA	NA	39.7	NA		57.1	100.0	100.0	5.3
PERCENT TOC REMOVED (Required)[1]						Default	45.0	Default		Default	35.0	35.0	25.0
TOC COMPLIANCE RATIO (Act/Req)		NA	NA	NA	NA	1.0	0.9	1.0		1.0	2.9	2.9	0.2
YEARLY RUNNING AVERAGE (of TOC Compliance Ratio)		####	####	**###**	####	1.0	**0.9**			**1.0**	1.3	1.6	**1.4**

Note:
1…..Values from table below
This SWTP is rated By DHS as Direct Filtration. TOC removal requirements do not apply.

Note:
1…..Values from table below
This SWTP is rated By DHS as Direct Filtration. TOC removal requirements do not apply.

Required Removal of TOC (percent)

Source-Water TOC (mg/l)	Source-Water Alkalinity (mg/l as $CaCO_3$) 0 - 60	>60 - 120	> 120
>2.0 - 4.0	35.0%	25.0%	15.0%
>4.0 - 8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%

Required Removal of TOC (percent)

Source-Water TOC (mg/l)	Source-Water Alkalinity (mg/l as $CaCO_3$) 0 - 60	>60 - 120	> 120
>2.0 - 4.0	35.0%	25.0%	15.0%
>4.0 - 8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%

SOUTHERN CALIFORNIA WATER COMPANY

Haloacetic Acid Monitoring Data

RANCHO CORDOVA WATER SYSTEM

SYSTEM No. 3410015

LOCATION	CONSTITUENT	2002 RESULTS (ppb)											
		Jan.	Feb.	**Mar.** 27	Apr.	May	**June** 19	July	**Aug.** 12	Sept.	Oct.	Nov.	**Dec.** 4
SAMPLE STATION No. 2	DIBROMOACETIC ACID (DBAA)			0			0		0				0
12121 Gold Point Lane	DICHLOROACETIC ACID (DCAA)			5.2			0		3.4				1.2
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 1 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			2.2			0		3.5				0
	LOCATION TOTAL HAA5			7.4			0		6.9				1.2
SAMPLE STATION No. 3	DIBROMOACETIC ACID (DBAA)			0			0		0				0
11375 Sutter Fort Way	DICHLOROACETIC ACID (DCAA)			2.8			3		3.2				5.3
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 2 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			2		3.2				6.2
	LOCATION TOTAL HAA5			2.8			5		6.4				11.5
SAMPLE STATION No. 5	DIBROMOACETIC ACID (DBAA)			0			0		0				0
2240 Forestlake Drive	DICHLOROACETIC ACID (DCAA)			2.8			5		3.1				5.1
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 3 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			3		3				5.8
	LOCATION TOTAL HAA5			2.8			8		6.1				10.9
SAMPLE STATION No. 6	DIBROMOACETIC ACID (DBAA)			0			0		0				0
2512 Don Juan Drive	DICHLOROACETIC ACID (DCAA)			1.5			0		2.2				5.3
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 4 of 8	CHLOROACETIC ACID			3.3			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			0		2.5				6.6
	LOCATION TOTAL HAA5			4.8			0		4.7				11.9
SAMPLE STATION No. 7	DIBROMOACETIC ACID (DBAA)			0			0		0				0
10455 Investment Circle	DICHLOROACETIC ACID (DCAA)			1			0		2.1				1.5
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 5 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			0		2				1.8
	LOCATION TOTAL HAA5			1			0		4.1				3.3
SAMPLE STATION No. 8	DIBROMOACETIC ACID (DBAA)			0			0		0				0
2984 Kachina Way	DICHLOROACETIC ACID (DCAA)			3.5			0		2				5.2
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 6 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			2.2			0		1.9				5.9
	LOCATION TOTAL HAA5			5.7			0		3.9				11.1
SAMPLE STATION No. 9	DIBROMOACETIC ACID (DBAA)			0			0		0				0
10671 Basie Way	DICHLOROACETIC ACID (DCAA)			2.3			0		2.1				6.7
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 7 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			0		1.8				8.7
	LOCATION TOTAL HAA5			2.3			0		3.9				15.4
SAMPLE STATION No. 10	DIBROMOACETIC ACID (DBAA)			0			0		0				0
3065 Gold Camp Drive	DICHLOROACETIC ACID (DCAA)			2.2			0		2.1				4.7
	BROMOACETIC ACID (MBAA)			0			0		0				0
Sample No. 8 of 8	CHLOROACETIC ACID			0			0		0				0
	TRICHLOROACETIC ACID (TCAA)			0			0		2				6
	LOCATION TOTAL HAA5			2.2			0		4.1				10.7
TOTAL HAA5, MINIMUM THIS MONTH				1.0			0.0		3.9				3.9
TOTAL HAA5, MAXIMUM THIS MONTH				7.4			8.0		6.9				15.4
TOTAL HAA5, AVERAGE THIS MONTH				3.6			1.6		5.0				9.5
TOTAL HAA5, YEARLY RUNNING AVERAGE				**2.6**			**2.4**		**3.2**				**4.9**

Note: Values in bold print are quarterly compliance values for meeting the MCL. Starting 1/1/02 the MCL is 60 ppb.

SOUTHERN CALIFORNIA WATER COMPANY
Trihalomethane Monitoring Data
RANCHO CORDOVA WATER SYSTEM
SYSTEM No. 3410015

LOCATION	CONSTITUENT	2002 RESULTS (ppb)											
		Jan.	Feb.	**Mar.** 27	Apr.	May	**June** 19	July	**Aug.** 12	Sept.	Oct.	Nov.	**Dec.** 4
SAMPLE STATION No. 2	BROMODICHLOROMETHANE			5			0		2.1				1.7
12121 Gold Point Lane	BROMOFORM			0			0		0				0
	CHLOROFORM			7			0		6.3				3.6
Sample No. 1 of 8	CHLORODIBROMOMETHANE			1.3			0		0.82				1
	LOCATION TOTAL THM			13.3			0		9.22				6.3
SAMPLE STATION No. 3	BROMODICHLOROMETHANE			4.7			0.52		2.2				1.8
11375 Sutter Fort Way	BROMOFORM			0			0		0				0
	CHLOROFORM			5.1			1.2		6.5				9.6
Sample No. 2 of 8	CHLORODIBROMOMETHANE			1.3			0		0.83				0
	LOCATION TOTAL THM			11.1			1.72		9.53				11.4
SAMPLE STATION No. 5	BROMODICHLOROMETHANE			3.8			3.7		1.5				1.6
2240 Forestlake Drive	BROMOFORM			0			0		0				0
	CHLOROFORM			6.3			14		5				9.5
Sample No. 3 of 8	CHLORODIBROMOMETHANE			1.2			0.78		0.5				0
	LOCATION TOTAL THM			11.3			18.48		7				11.1
SAMPLE STATION No. 6	BROMODICHLOROMETHANE			4.4			0		1.5				1.8
2512 Don Juan Drive	BROMOFORM			0			0		0				0
	CHLOROFORM			6			0		5.1				11
Sample No. 4 of 8	CHLORODIBROMOMETHANE			1.2			0		0.51				0
	LOCATION TOTAL THM			11.6			0		7.11				12.8
SAMPLE STATION No. 7	BROMODICHLOROMETHANE			3.7			0		2.1				0.83
10455 Investment Circle	BROMOFORM			0			0		0				0
	CHLOROFORM			5.9			0		6.6				3.8
Sample No. 5 of 8	CHLORODIBROMOMETHANE			1.3			0		0.83				0
	LOCATION TOTAL THM			10.9			0		9.53				4.63
SAMPLE STATION No. 8	BROMODICHLOROMETHANE			4.2			0		2.1				1.8
2984 Kachina Way	BROMOFORM			0			0		0				0
	CHLOROFORM			6.5			0.85		6.6				10
Sample No. 6 of 8	CHLORODIBROMOMETHANE			1.4			0		0.81				0
	LOCATION TOTAL THM			12.1			0.85		9.51				11.8
SAMPLE STATION No. 9	BROMODICHLOROMETHANE			3.8			0		1.3				2.2
10671 Basie Way	BROMOFORM			0			0		0				0
	CHLOROFORM			5.7			0		4.4				12
Sample No. 7 of 8	CHLORODIBROMOMETHANE			1.3			0		0				0
	LOCATION TOTAL THM			10.8			0		5.7				14.2
SAMPLE STATION No. 10	BROMODICHLOROMETHANE			3.8			0		1.5				1.6
3065 Gold Camp Drive	BROMOFORM			0			0		0				0
	CHLOROFORM			5.5			0.99		4.8				8.8
Sample No. 8 of 8	CHLORODIBROMOMETHANE			1.5			0		0.5				0
	LOCATION TOTAL THM			10.8			0.99		6.8				10.4
BROMODICHLOROMETHANE, MINIMUM THIS MONTH				3.7			0.0		1.3				0.8
BROMODICHLOROMETHANE, MAXIMUM THIS MONTH				5.0			3.7		2.2				2.2
BROMODICHLOROMETHANE, AVERAGE THIS MONTH				4.2			0.5		1.8				1.7
BROMODICHLOROMETHANE, YEARLY RUNNING AVERAGE													
TOTAL THM, MINIMUM THIS MONTH				10.8			0.0		5.7				4.6
TOTAL THM, MAXIMUM THIS MONTH				13.3			18.5		9.5				14.2
TOTAL THM, AVERAGE THIS MONTH				11.5			2.8		8.1				10.3
TOTAL THM, YEARLY RUNNING AVERAGE				**5.2**			**5.2**		**5.8**				**8.2**

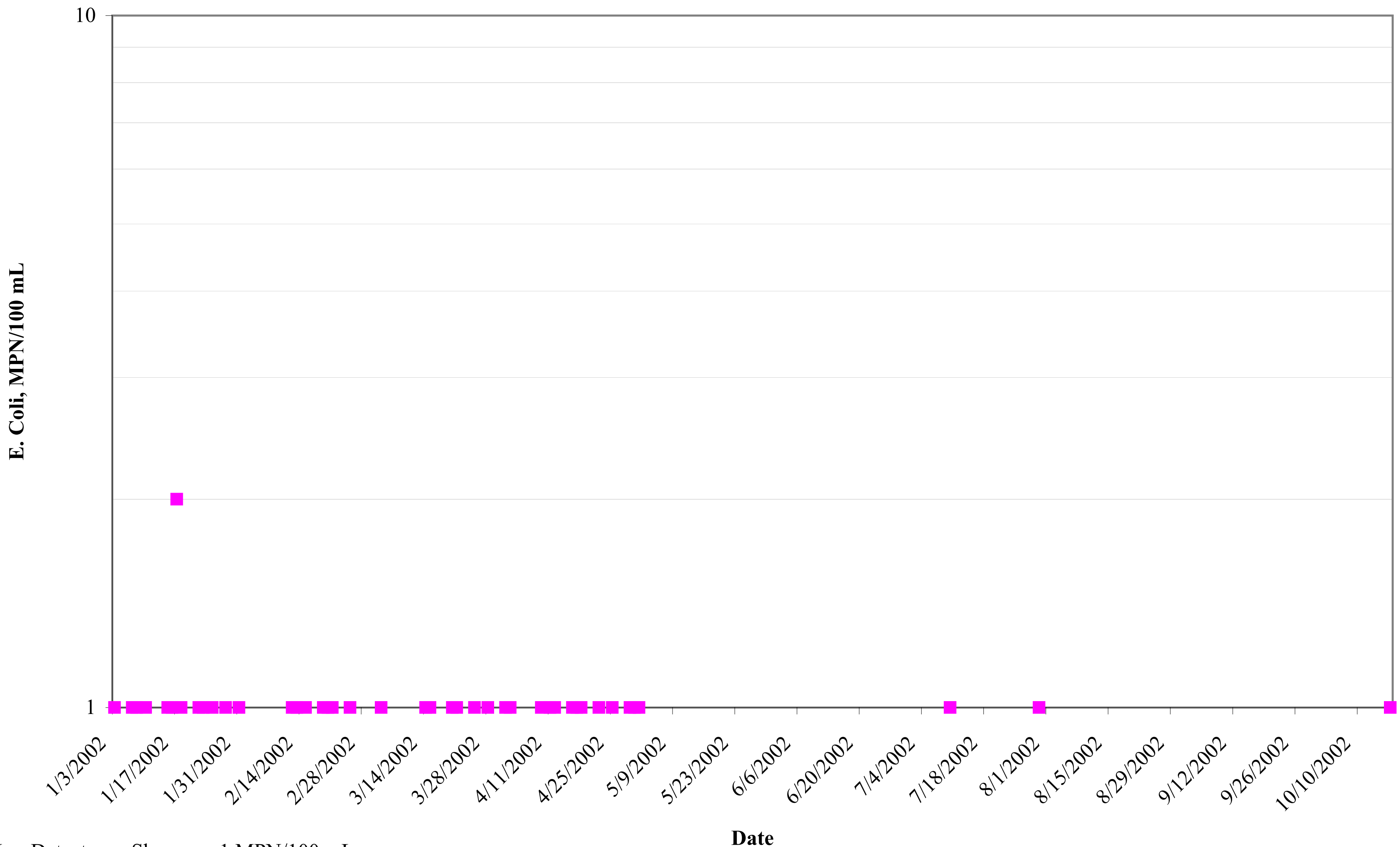
Note: Values in bold print are quarterly compliance values for meeting the MCL. The MCL through 12/31/01 is 100 ppb. Starting 1/1/02 the MCL is 80 ppb.

Carmichael Water District

System Summary, CWD

WATER SYSTEM:		
Utility Name		Carmichael Water District
Service Area		Carmichael
Number Customers - Retail/Wholesale		38,500 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)		16 MGD
Capacity Flow Range (MGD)		0 - 16 MGD
Average Daily Flow (MGD)	Winter (Oct-Mar)	
	Summer (Apr-Sep)	
Hours of Operation		0 or 24 hours
Water Quality Parameters Monitored	Raw Water	Title 22
	Treated Water	Title 22
UNIT PROCESSES:		
Recycle	Amount	<10% Plant Flow
	Frequency	Intermittent - As Needed
Filtration	No. of Filters	
	Type of Filter	Microfiltration
	Filtration Rate	
	Backwash: Criteria,Rate	Pressure Gradient
	Filter -to-Waste Facilities	No
Post-Chlorination	Chemical and Dose	Sodium Hypochlorite
pH Adjustment	Chemical and Dose	Lime
Wastewater Handling	Facility	Secondary and Tertiary Membrane Units
	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	DHS	Brian Kinney
	Other WTP's	See American River Watershed Technical Committee Notification Chart
	City/County/ State/Federal	See American River Watershed Technical Committee Notification Chart

Carmichael Water District Raw Ranney Collector Water E. Coli



Non-Detects are Shown as 1 MPN/100 mL

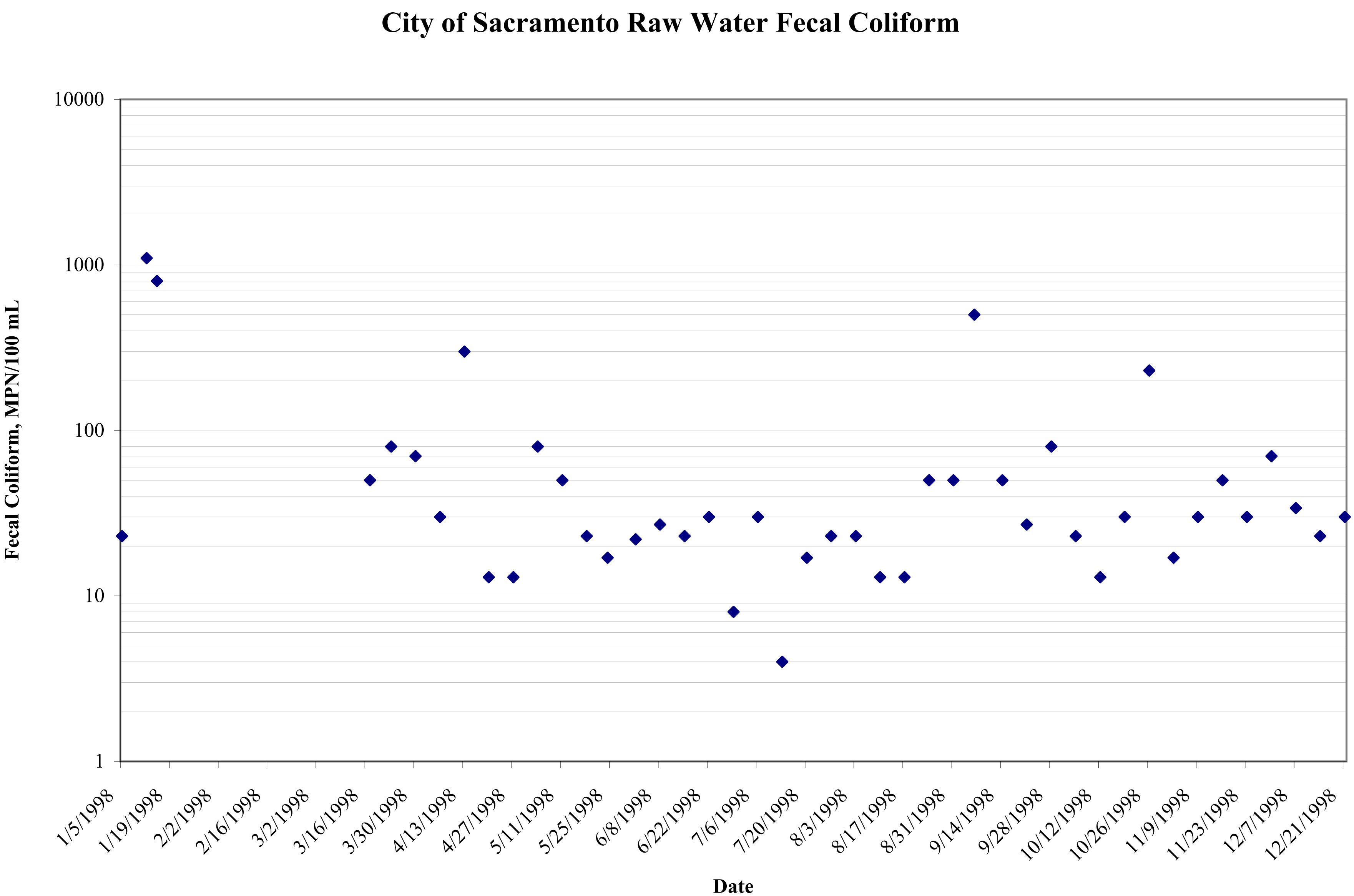
City of Sacramento

System Summary, City of Sacramento

WATER SYSTEM:		
Utility Name		City of Sacramento
Service Area		Sacramento
Number Customers - Retail/Wholesale		426,000 - Retail/Sacramento County and California Water - 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)		90 MGD
Capacity Flow Range (MGD)		30-90 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	Title 22, Protozoa
	Treated Water	Title 22
UNIT 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	Manual Lime Addition if Necessary
Grit Basin	Volume Basin	0.292 MG
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
	Type of Flocculators	Mechanical - Horizontal
	Mixing Energy	20,20,20 (1/s)
Sedimentation	No. of Basins	2
	Volume Basin	6.074 MG
	Surface Load Rate	1.24 gpm/sf
	Method of Sludge Removal	Chain and Flight, Manual Removal
Chemical Addition	Chemical, Purpose & Dose	Polymer-Filter Aid (0.03 mg/L)
Filtration	No. of Filters	8
	Type of Filter	Gravity Tri Media
	Filter Box Volume	0.33 MG
	Underdrain Type	Concrete Teepee
	Media: Type, Depth, Area	Anthracite- 12 inches, Sand 10 inches, Garnet- 2 inches, Gravel- inches 1742 sf/filter
	Filtration Rate	5.7 gpm/sf @ 100MGD
	Backwash: Criteria,Rate	Turbidity, headloss, hours 18 gpm/sf
	Filter -to-Waste Facilities	No
Post-Chlorination	Chemical and Dose	Chlorine Gas (0.2-0.5 mg/L)
Fluoridation	Chemical and Dose	Hydrofluosilic Acid (0.75 mg/L F)
pH Adjustment	Chemical and Dose	Calcium Oxide (7.5 mg/L)
Wastewater Handling	Facility	Equalization Basin
	Soucres	Filter Backwash Water
	Decant Recycle Location	Headworks, Upstream of Chemical Feed
DISTRIBUTION SYSTEM:		
Covered Storage	(Volume(MG)/Area(AC))	39 MG /
Disinfection Booster Stations	Number	1
	Range Cl2 Dosing (mg/L)	0.4 - 0.6 mg/L

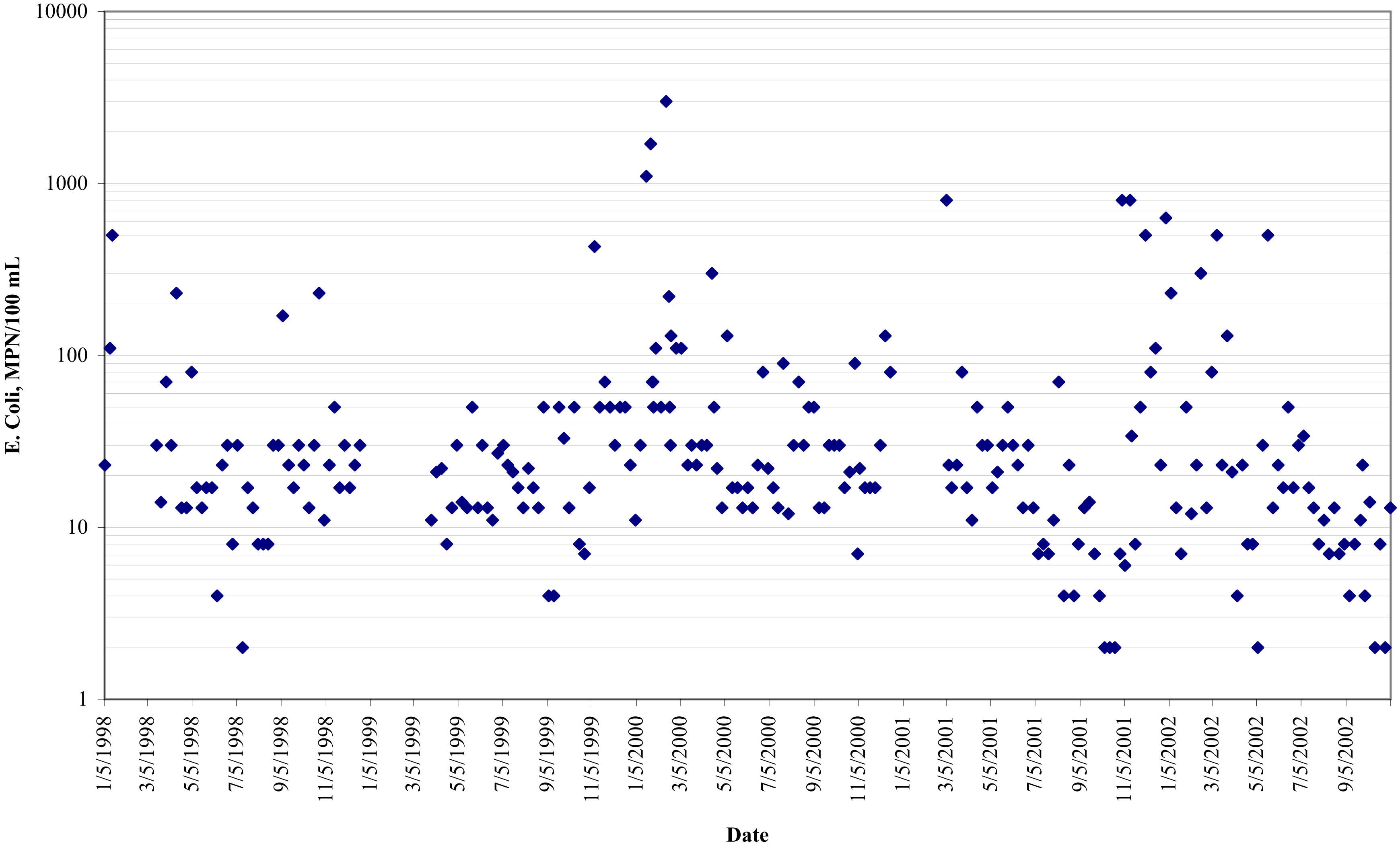
System Summary, City of Sacramento

EMERGENCY RESPONSE TO WATERSHED DISASTERS		
Notification	DHS	Cathy Lee
	Other WTP's	American River Notification Tree
	City/County/ State/Federal	Numerous First Responders (All Counties) as Well as Direct Dischargers



City of Sacramento Raw Water Fecal Coliform
Fecal Coliform, MPN/100 mL
10000
1000
100
10
1
1/5/1998
1/19/1998
2/2/1998
2/16/1998
3/2/1998
3/16/1998
3/30/1998
4/13/1998
4/27/1998
5/11/1998
5/25/1998
6/8/1998
6/22/1998
7/6/1998
7/20/1998
8/3/1998
8/17/1998
8/31/1998
9/14/1998
9/28/1998
10/12/1998
10/26/1998
11/9/1998
11/23/1998
12/7/1998
12/21/1998
Date

City of Sacramento Raw Water E. Coli



ICR Microbiological Summary

Constituent	E.A. Fairbairn WTP
	Raw
7/21/97-7/22/97	
Giardia (presumed), cysts/100L	<40
Cryptosporidium (presumed), oocysts/100L	<40
Virus, MPN/L	<0.47
Total Coliform, MPN/100mL	2400
Fecal Coliform, MPN/100mL	140
Turbidity, NTU	2.6
Particle Count	NA
8/18/97-8/19/97	
Giardia (presumed), cysts/100L	<41
Cryptosporidium (presumed), oocysts/100L	<41
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	700
Fecal Coliform, MPN/100mL	130
Turbidity, NTU	1.5
Particle Count	NA
9/22/97-9/23/97	
Giardia (presumed), cysts/100L	<47
Cryptosporidium (presumed), oocysts/100L	<47
Virus, MPN/L	<1.02
Total Coliform, MPN/100mL	700
Fecal Coliform, MPN/100mL	23
Turbidity, NTU	1.4
Particle Count	NA
10/20/97-10/21/97	
Giardia (presumed), cysts/100L	<115
Cryptosporidium (presumed), oocysts/100L	<115
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	5000
Fecal Coliform, MPN/100mL	90
Turbidity, NTU	1.5
Particle Count	NA
11/17/97-11/18/97	
Giardia (presumed), cysts/100L	<152
Cryptosporidium (presumed), oocysts/100L	<152
Virus, MPN/L	<1.02
Total Coliform, MPN/100mL	2400
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	2.2
Particle Count	NA
12/15/97-12/16/97	
Giardia (presumed), cysts/100L	<63
Cryptosporidium (presumed), oocysts/100L	<63
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	3000
Fecal Coliform, MPN/100mL	300
Turbidity, NTU	5
Particle Count	NA
1/19/98-1/20/98	
Giardia (presumed), cysts/100L	NA
Cryptosporidium (presumed), oocysts/100L	NA
Virus, MPN/L	NA
Total Coliform, MPN/100mL	5000
Fecal Coliform, MPN/100mL	800
Turbidity, NTU	17
Particle Count	NA

ICR Microbiological Summary

Constituent	E.A. Fairbairn WTP
	Raw
2/16/98-2/17/98	
Giardia (presumed), cysts/100L	NA
Cryptosporidium (presumed), oocysts/100L	NA
Virus, MPN/L	NA
Total Coliform, MPN/100mL	500
Fecal Coliform, MPN/100mL	50
Turbidity, NTU	13
Particle Count	NA
3/16/98-3/17/98	
Giardia (presumed), cysts/100L	47
Cryptosporidium (presumed), oocysts/100L	<47
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	500
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	5
Particle Count	NA
4/20/98-4/21/98	
Giardia (presumed), cysts/100L	<62
Cryptosporidium (presumed), oocysts/100L	<62
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	9000
Fecal Coliform, MPN/100mL	22
Turbidity, NTU	4.2
Particle Count	NA
5/18/98-5/19/98	
Giardia (presumed), cysts/100L	<39
Cryptosporidium (presumed), oocysts/100L	<39
Virus, MPN/L	<1.04
Total Coliform, MPN/100mL	500
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	1.8
Particle Count	NA
6/22/98-6/23/98	
Giardia (presumed), cysts/100L	<78
Cryptosporidium (presumed), oocysts/100L	<78
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	300
Fecal Coliform, MPN/100mL	23
Turbidity, NTU	11
Particle Count	NA
7/20/98-7/21/98	
Giardia (presumed), cysts/100L	<55
Cryptosporidium (presumed), oocysts/100L	<55
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	2200
Fecal Coliform, MPN/100mL	23
Turbidity, NTU	1.5
Particle Count	NA
8/17/98-8/18/98	
Giardia (presumed), cysts/100L	<109
Cryptosporidium (presumed), oocysts/100L	<109
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	500
Fecal Coliform, MPN/100mL	23
Turbidity, NTU	1.1
Particle Count	NA

ICR Microbiological Summary

Constituent	E.A. Fairbairn WTP
	Raw
9/21/98-9/22/98	
Giardia (presumed), cysts/100L	<139
Cryptosporidium (presumed), oocysts/100L	<139
Virus, MPN/L	<1.04
Total Coliform, MPN/100mL	500
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	1.1
Particle Count	NA
10/19/98-10/20/98	
Giardia (presumed), cysts/100L	<135
Cryptosporidium (presumed), oocysts/100L	<135
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	800
Fecal Coliform, MPN/100mL	17
Turbidity, NTU	1.6
Particle Count	NA
11/16/98-11/17/98	
Giardia (presumed), cysts/100L	<130
Cryptosporidium (presumed), oocysts/100L	<130
Virus, MPN/L	<1.03
Total Coliform, MPN/100mL	5000
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	2.6
Particle Count	NA
12/31/98-1/1/99	
Giardia (presumed), cysts/100L	NA
Cryptosporidium (presumed), oocysts/100L	NA
Virus, MPN/L	NA
Total Coliform, MPN/100mL	80
Fecal Coliform, MPN/100mL	30
Turbidity, NTU	1.1
Particle Count	NA

American River - EAFWTP
Giardia and Cryptosporidium Raw Water Monitoring

Cryptosporidium		**4/6/1999**	**4/19/1999**	**5/3/1999**	**5/17/1999**	**6/7/1999**	**6/21/1999**	**7/6/1999**	**7/19/1999**	**8/2/1999**	**8/16/1999**	**9/7/1999**	**9/27/1999**	**10/4/1999**	**10/18/1999**	**11/1/1999**	**11/15/1999**
DIC	**DAPI**																
	Positive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Empty		0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Amorphous		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Internal Structure		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total oocysts/L (Presumed)		<0.1	<0.1	<0.1	<0.09	<0.09	<0.09	<0.09	<0.09	**0.1**	<0.09	<0.09	**0.1**	<0.09	<0.09	<0.09	<0.09
Total oocysts/L (Confirmed)		<0.1	<0.1	<0.1	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Giardia		**4/6/1999**	**4/19/1999**	**5/3/1999**	**5/17/1999**	**6/7/1999**	**6/21/1999**	**7/6/1999**	**7/19/1999**	**8/2/1999**	**8/16/1999**	**9/7/1999**	**9/27/1999**	**10/4/1999**	**10/18/1999**	**11/1/1999**	**11/15/1999**
DIC	**DAPI**																
	Positive								0	2	0	0	3	2	1	0	0
	Negative								0	4	0	0	0	3	2	0	0
Empty									0	1	0	0	1	0	1	0	0
Amorphous									0	4	0	0	1	4	1	0	0
1 Internal Structure									0	0	0	0	0	1	0	0	0
>=2 Internal Structure									0	1	0	0	1	0	1	0	0
Total cysts/L (Presumed)									<0.09	**0.5**	<0.09	<0.09	**0.3**	**0.5**	**0.3**	<0.09	<0.09
Total cysts/L (Confirmed)									<0.09	**0.09**	<0.09	<0.09	**0.1**	<0.09	**0.09**	<0.09	<0.09

Samples Collected Before July 1999 Analyzed Using EPA Method 1622
Samples Collected After Analyzed Using EPA Method 1623

Presumed = Total IFA Count
Confirmed Crypto. = Int. Struct. and DAPI+
Confirmed Giardia = >=2 Int. Struct. and DAPI+

American River - EAFWTP
Giardia and Cryptosporidium Raw Water Monitoring

Cryptosporidium		**11/29/1999**	**12/13/1999**	**1/3/2000**	**1/18/2000**	**2/7/2000**	**2/22/2000**	**4/30/2001**	**5/14/2001**	**6/18/2001**	**7/9/2001**	**8/6/2001**	**9/10/2001**	**10/8/2001**	**11/1/2001**	**12/10/2001**
DIC	**DAPI**															
	Positive	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Empty		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amorphous		0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Internal Structure		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total oocysts/L (Presumed)		<0.1	<0.1	<0.1	**0.1**	**0.1**	<0.1	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.1	<0.09
Total oocysts/L (Confirmed)		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.1	<0.09
Giardia		**11/29/1999**	**12/13/1999**	**1/3/2000**	**1/18/2000**	**2/7/2000**	**2/22/2000**	**4/30/2001**	**5/14/2001**	**6/18/2001**	**7/9/2001**	**8/6/2001**	**9/10/2001**	**10/8/2001**	**11/1/2001**	**12/10/2001**
DIC	**DAPI**															
	Positive	0	0	0	0	0	2	0	0	1	0	1	0	0	1	0
	Negative	0	0	0	0	1	1	0	0	6	0	3	1	3	1	0
Empty		0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Amorphous		0	0	0	0	1	3	0	0	6	0	3	1	2	0	0
1 Internal Structure		0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
>=2 Internal Structure		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total cysts/L (Presumed)		<0.1	<0.1	<0.1	<0.1	**0.1**	**0.3**	<0.09	<0.09	**0.6**	<0.09	**0.4**	**0.09**	**0.3**	**0.2**	<0.09
Total cysts/L (Confirmed)		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.09	<0.09	<0.9	<0.09	<0.09	<0.1	<0.09

Samples Collected Before July 1999 Analyzed Using EPA Method 1622
Samples Collected After Analyzed Using EPA Method 1623

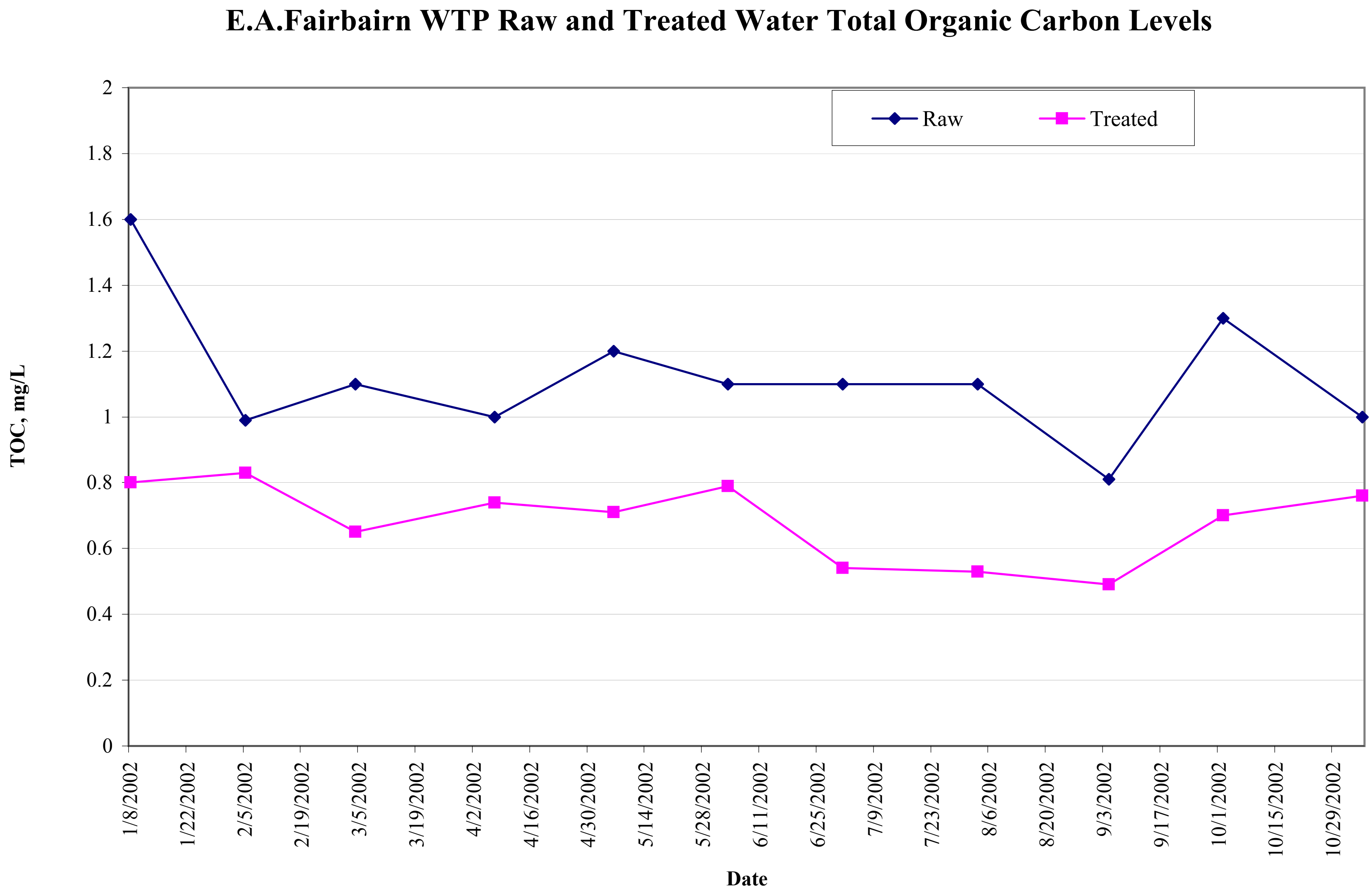
Presumed = Total IFA Count
Confirmed Crypto. = Int. Struct. and DAPI+
Confirmed Giardia = >=2 Int. Struct. and DAPI+

American River - EAFWTP
Giardia and Cryptosporidium Raw Water Monitoring

Cryptosporidium		**1/14/2002**	**2/11/2002**	**3/11/2002**	**4/8/2002**	**5/13/2002**	**6/10/2002**	**7/8/2002**	**8/12/2002**	**9/9/2002**	**10/14/2002**	**11/12/2002**	**12/9/2002**
DIC	**DAPI**												
	Positive	0	0	0	0	0	0	0	0	0	0	0	0
	Negative	0	0	0	0	0	0	0	0	0	0	0	0
Empty		0	0	0	0	0	0	0	0	0	0	0	0
Amorphous		0	0	0	0	0	0	0	0	0	0	0	0
Internal Structure		0	0	0	0	0	0	0	0	0	0	0	0
Total oocysts/L (Presumed)		<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Total oocysts/L (Confirmed)		<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Giardia		**1/14/2002**	**2/11/2002**	**3/11/2002**	**4/8/2002**	**5/13/2002**	**6/10/2002**	**7/8/2002**	**8/12/2002**	**9/9/2002**	**10/14/2002**	**11/12/2002**	**12/9/2002**
DIC	**DAPI**												
	Positive	0	0	0	1	1	0	0	1	2	2	1	0
	Negative	1	1	1	2	2	2	6	1	0	3	2	6
Empty		0	1	0	0	1	0	1	0	0	0	1	2
Amorphous		0	0	0	3	1	2	2	2	1	4	1	4
1 Internal Structure		1	0	1	0	1	0	2	0	1	1	1	0
>=2 Internal Structure		0	0	0	0	0	0	1	0	0	0	0	0
Total cysts/L (Presumed)		**0.09**	**0.09**	**0.09**	**0.3**	**0.3**	**0.2**	**0.5**	**0.2**	**0.2**	**0.5**	**0.3**	**0.5**
Total cysts/L (Confirmed)		<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09

Samples Collected Before July 1999 Analyzed Using EPA Method 1622
Samples Collected After Analyzed Using EPA Method 1623

Presumed = Total IFA Count
Confirmed Crypto. = Int. Struct. and DAPI+
Confirmed Giardia = >=2 Int. Struct. and DAPI+


E.A.Fairbairn WTP Raw and Treated Water Total Organic Carbon Levels
Raw
Treated
TOC, mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1/8/2002
1/22/2002
2/5/2002
2/19/2002
3/5/2002
3/19/2002
4/2/2002
4/16/2002
4/30/2002
5/14/2002
5/28/2002
6/11/2002
6/25/2002
7/9/2002
7/23/2002
8/6/2002
8/20/2002
9/3/2002
9/17/2002
10/1/2002
10/15/2002
10/29/2002
Date

City of Sacramento

Date	Location	TTHM, ug/L	Quarterly Average	RAA
3/23/98	2 S 12	***3.8***		
3/23/98	3 S 6	36.1		
3/23/98	3 SB	49.2		
3/23/98	5 SJ	42	42.4	
4/27/98	2 S 12	39		
4/27/98	3 S 6	39.8		
4/27/98	3 SB	49.5		
4/27/98	5 SJ	54.7	45.8	
7/13/98	2 S 12	45.3		
7/13/98	3 S 6	44.4		
7/13/98	3 SB	53.9		
7/13/98	5 SJ	47.8	47.9	
10/26/98	2 S 12	41.7		
10/26/98	3 S 6	53		
10/26/98	3 SB	62.5		
10/26/98	5 SJ	72.6	57.5	48.4
4/26/99	2 S 12	36.8		
4/26/99	3 S 6	33.4		
4/26/99	3 SB	41.1		
4/26/99	5 SJ	42.1	38.4	47.4
7/26/99	2 S 12	37.5		
7/26/99	3 S 6	37.4		
7/26/99	3 SB	44.1		
7/26/99	5 SJ	45.9	41.2	46.2
10/5/99	2 S 12	34.9		
10/5/99	3 S 6	26.68		
10/5/99	3 SB	36.1		
10/5/99	5 SJ	45.8	35.9	43.2
2/24/00	2 S 12	37		
2/24/00	3 S 6	41		
2/24/00	3 SB	39.1		
2/24/00	5 SJ	47.4	41.1	39.1
4/12/00	2 S 12	37.4		
4/12/00	3 S 6	38.4		
4/12/00	3 SB	47.6		
4/12/00	5 SJ	49.8	43.3	40.4
7/12/00	2 S 12	33.1		
7/12/00	3 S 6	40.8		
7/12/00	3 SB	39.3		
7/12/00	5 SJ	36.98	37.5	39.5
10/16/00	2 S 12	31.8		
10/16/00	3 S 6	28.4		
10/16/00	3 SB	46.2		
10/16/00	5 SJ	31.2	34.4	39.1
3/21/01	2 S 12	32.8		
3/21/01	3 S 6	36.5		
3/21/01	3 SB	37.4		
3/21/01	5 SJ	47.1	38.5	38.4
5/2/01	2 S 12	36.6		

5/2/01	3 S 6	40.8		
5/2/01	3 SB	45.8		
5/2/01	5 SJ	46.9	42.5	38.2
7/11/01	2 S 12	44.9		
7/11/01	3 S 6	46.2		
7/11/01	3 SB	54.4		
7/11/01	5 SJ	54.5	50.0	41.3
10/9/01	2 S 12	45		
10/9/01	3 S 6	45.6		
10/9/01	3 SB	53.5		
10/9/01	5 SJ	50	48.5	44.9
1/16/02	2 S 12	41.4		
1/16/02	3 S 6	38.3		
1/16/02	3 SB	44.2		
1/16/02	5 SJ	44.3	42.1	45.8
4/17/02	2 S 12	***4.2***		
4/17/02	3 S 6	44.6		
4/17/02	3 SB	43.6		
4/17/02	5 SJ	44.6	44.3	46.2
7/18/02	2 S 12	49.1		
7/18/02	3 S 6	39.4		
7/18/02	3 SB	44.2		
7/18/02	5 SJ	53.5	46.6	45.3
10/2/02	2 S 12	47.1		
10/2/02	3 S 6	48.1		
10/2/02	3 SB	51.3		
10/2/02	5 SJ	51	49.4	45.6

City of Sacramento

Date	Location	TTHM, ug/L	RAA
3/23/98	2 S 12	***3.8***	
4/27/98	2 S 12	39	
7/13/98	2 S 12	45.3	
10/26/98	2 S 12	41.7	42.0
4/26/99	2 S 12	36.8	40.7
7/26/99	2 S 12	37.5	40.3
10/5/99	2 S 12	34.9	37.7
2/24/00	2 S 12	37	36.6
4/12/00	2 S 12	37.4	36.7
7/12/00	2 S 12	33.1	35.6
10/16/00	2 S 12	31.8	34.8
3/21/01	2 S 12	32.8	33.8
5/2/01	2 S 12	36.6	33.6
7/11/01	2 S 12	44.9	36.5
10/9/01	2 S 12	45	39.8
1/16/02	2 S 12	41.4	42.0
4/17/02	2 S 12	***4.2***	43.8
7/18/02	2 S 12	49.1	45.2
10/2/02	2 S 12	47.1	45.9
3/23/98	3 S 6	36.1	
4/27/98	3 S 6	39.8	
7/13/98	3 S 6	44.4	
10/26/98	3 S 6	53	43.3
4/26/99	3 S 6	33.4	42.7
7/26/99	3 S 6	37.4	42.1
10/5/99	3 S 6	26.68	37.6
2/24/00	3 S 6	41	34.6
4/12/00	3 S 6	38.4	35.9
7/12/00	3 S 6	40.8	36.7
10/16/00	3 S 6	28.4	37.2
3/21/01	3 S 6	36.5	36.0
5/2/01	3 S 6	40.8	36.6
7/11/01	3 S 6	46.2	38.0
10/9/01	3 S 6	45.6	42.3
1/16/02	3 S 6	38.3	42.7
4/17/02	3 S 6	44.6	43.7
7/18/02	3 S 6	39.4	42.0
10/2/02	3 S 6	48.1	42.6
3/23/98	3 SB	49.2	
4/27/98	3 SB	49.5	
7/13/98	3 SB	53.9	
10/26/98	3 SB	62.5	53.8
4/26/99	3 SB	41.1	51.8
7/26/99	3 SB	44.1	50.4
10/5/99	3 SB	36.1	46.0
2/24/00	3 SB	39.1	40.1
4/12/00	3 SB	47.6	41.7

7/12/00	3 SB	39.3	40.5
10/16/00	3 SB	46.2	43.1
3/21/01	3 SB	37.4	42.6
5/2/01	3 SB	45.8	42.2
7/11/01	3 SB	54.4	46.0
10/9/01	3 SB	53.5	47.8
1/16/02	3 SB	44.2	49.5
4/17/02	3 SB	43.6	48.9
7/18/02	3 SB	44.2	46.4
10/2/02	3 SB	51.3	45.8
3/23/98	5 SJ	42	
4/27/98	5 SJ	54.7	
7/13/98	5 SJ	47.8	
10/26/98	5 SJ	72.6	54.3
4/26/99	5 SJ	42.1	54.3
7/26/99	5 SJ	45.9	52.1
10/5/99	5 SJ	45.8	51.6
2/24/00	5 SJ	47.4	45.3
4/12/00	5 SJ	49.8	47.2
7/12/00	5 SJ	36.98	45.0
10/16/00	5 SJ	31.2	41.3
3/21/01	5 SJ	47.1	41.3
5/2/01	5 SJ	46.9	40.5
7/11/01	5 SJ	54.5	44.9
10/9/01	5 SJ	50	49.6
1/16/02	5 SJ	44.3	48.9
4/17/02	5 SJ	44.6	48.4
7/18/02	5 SJ	53.5	48.1
10/2/02	5 SJ	51	48.4

City of Sacramento

Date	Location	HAA5, ug/L	Quarterly Average	RAA
5/2/01	2 S 12	26		
5/2/01	3 S 6	19.1		
5/2/01	3 SB	18.6		
5/2/01	5 SJ	20.3	21.0	
7/11/01	2 S 12	25		
7/11/01	3 S 6	24		
7/11/01	3 SB	20.6		
7/11/01	5 SJ	20.7	22.6	
10/9/01	2 S 12	29		
10/9/01	3 S 6	19.2		
10/9/01	3 SB	19.2		
10/9/01	5 SJ	16	20.9	
1/16/02	2 S 12	24		
1/16/02	3 S 6	27		
1/16/02	3 SB	18.6		
1/16/02	5 SJ	24	23.4	22.0
4/17/02	2 S 12	***<2.0***		
4/17/02	3 S 6	24		
4/17/02	3 SB	21.1		
4/17/02	5 SJ	22	22.4	22.3
7/18/02	2 S 12	29		
7/18/02	3 S 6	26		
7/18/02	3 SB	34		
7/18/02	5 SJ	27	29.0	23.9
10/2/02	2 S 12	24		
10/2/02	3 S 6	24		
10/2/02	3 SB	20		
10/2/02	5 SJ	15.2	20.8	23.9

City of Sacramento

Date	Location	HAA5, ug/L	RAA
5/2/01	2 S 12	26	
7/11/01	2 S 12	25	
10/9/01	2 S 12	29	
1/16/02	2 S 12	24	26.0
4/17/02	2 S 12	***<2.0***	26.0
7/18/02	2 S 12	29	27.3
10/2/02	2 S 12	24	25.7
5/2/01	3 S 6	19.1	
7/11/01	3 S 6	24	
10/9/01	3 S 6	19.2	
1/16/02	3 S 6	27	22.3
4/17/02	3 S 6	24	23.6
7/18/02	3 S 6	26	24.1
10/2/02	3 S 6	24	25.3
5/2/01	3 SB	18.6	
7/11/01	3 SB	20.6	
10/9/01	3 SB	19.2	
1/16/02	3 SB	18.6	19.3
4/17/02	3 SB	21.1	19.9
7/18/02	3 SB	34	23.2
10/2/02	3 SB	20	23.4
5/2/01	5 SJ	20.3	
7/11/01	5 SJ	20.7	
10/9/01	5 SJ	16	
1/16/02	5 SJ	24	20.3
4/17/02	5 SJ	22	20.7
7/18/02	5 SJ	27	22.3
10/2/02	5 SJ	15.2	22.1